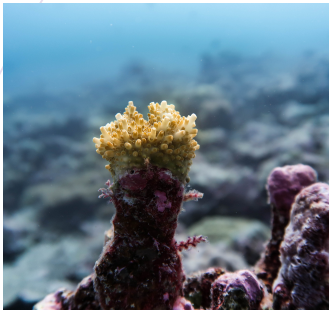


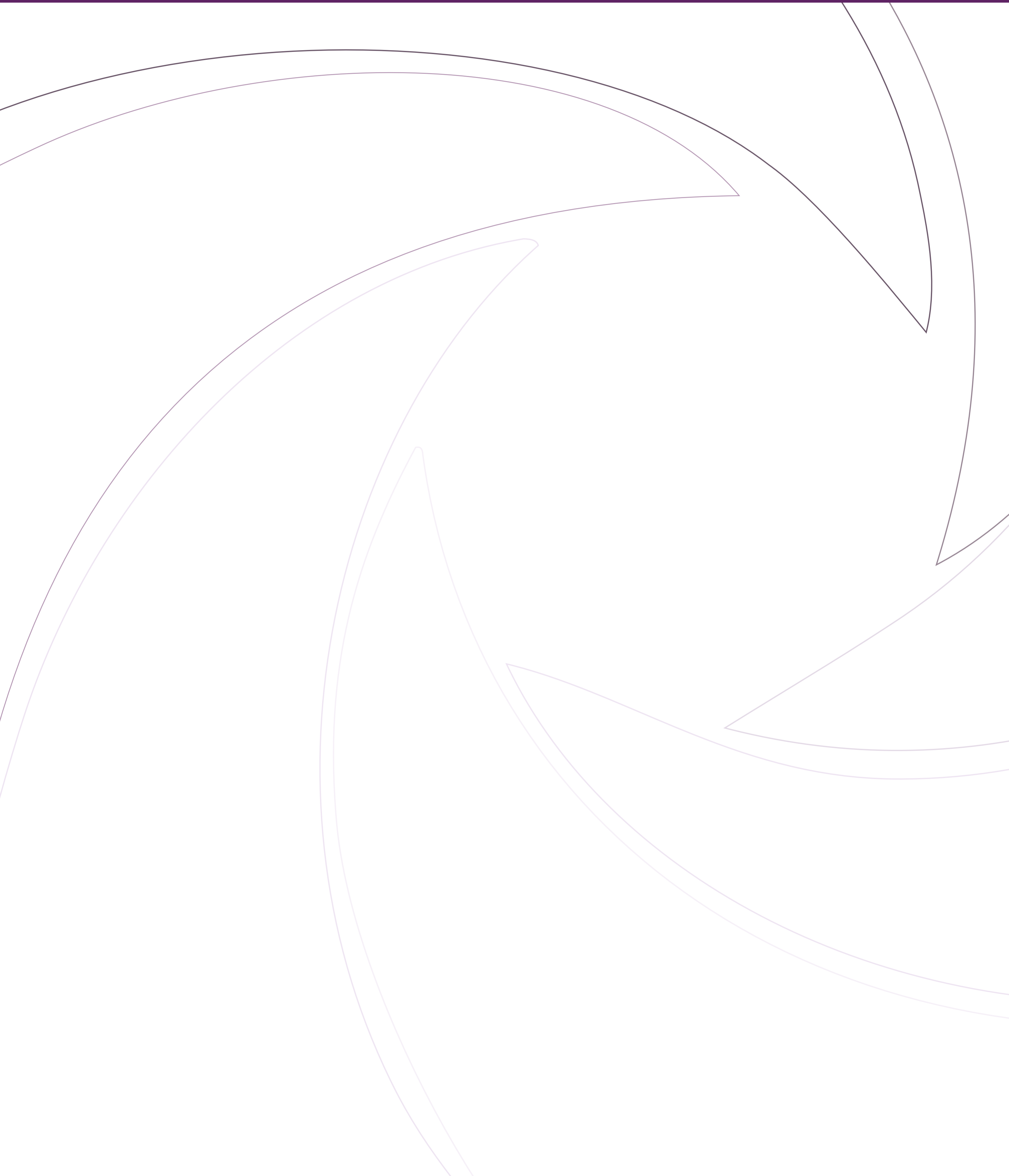
Images of Research 2019



For full details about the competition, please visit:

www.exeter.ac.uk/doctoralcollege/early-career-researchers/imagesofresearch

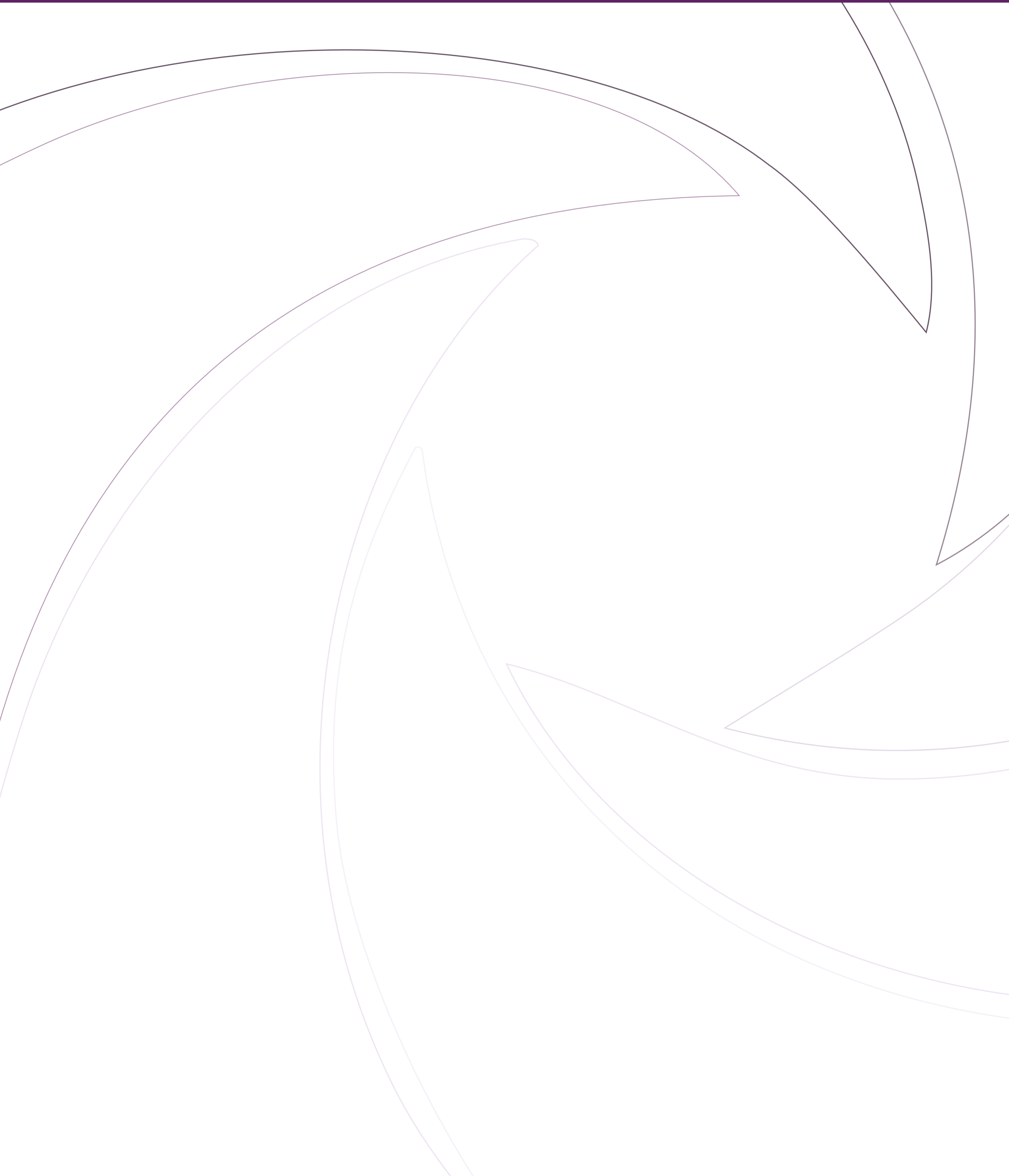
 @ExeterDoctoral #IoR2019



‘Images of Research’ is an innovative way for Early Career Researcher Staff to highlight the wide range of research that is taking place at the University of Exeter and an opportunity to look at research in a new and exciting way.

There are two main aims of the competition:

- To engage the public in academic research, particularly the breadth of research taking place at the University of Exeter
- To provide an opportunity for researchers to communicate often complex research to non-specialists



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Anti-poaching ranger

Katie Marx

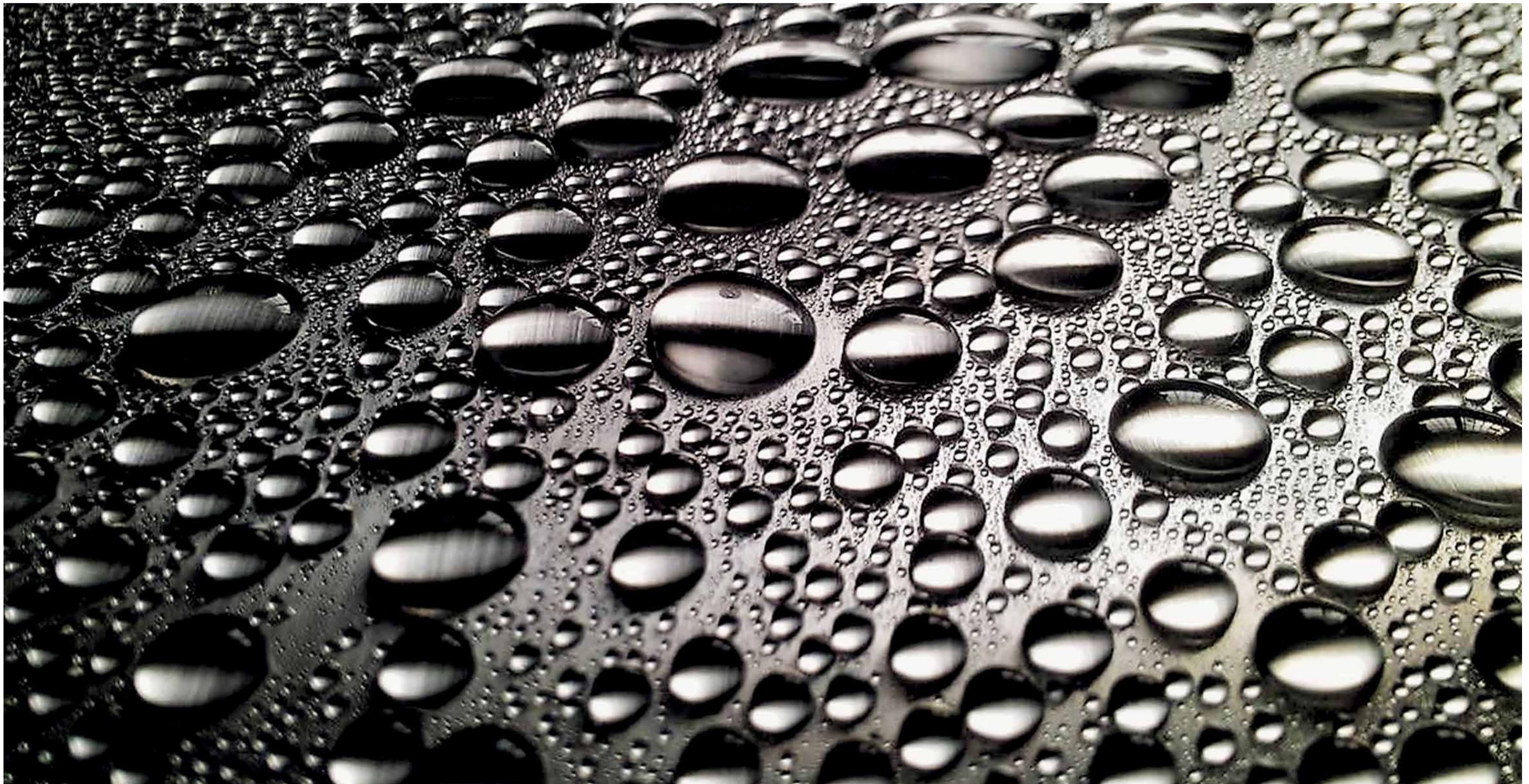


Present, an anti-poaching ranger, works at the Zululand Rhino Orphanage in South Africa. He is tasked with the dangerous job of protecting the four orphaned rhinos who currently live there from poachers. The poaching crisis in South Africa means that every day baby rhinos are being orphaned as their mothers fall victim to poaching. Rhino horn is a sought-after commodity across much of Asia, where it is used as a status symbol and in traditional medicine, despite being proven to have no medicinal benefits. Our team of researchers from the Exeter

Anthrozoology as Symbiotic Ethics (EASE) working group, with funding from National Geographic, are researching ways of engaging millennials with the plight of rhinos. The knowledge, attitudes and practices of these millennials in relation to rhino poaching and horn consumption will be assessed before and after exposure to a series of short films featuring imagery and narratives obtained by the project team during fieldwork in South Africa.

Bioinspired Self-Cleaning Coating For Solar Cells

Anurag Roy



The solar cell's performance strictly retard due to humidity, rain drop, dust and pollution related issues and becomes a riddle for a clean solution! Controlling surface wettability have promoted intensive research to mimic the amazing superhydrophobic and self-cleaning phenomena observed in biological systems most notably in the Lotus plant and the phenomenon is popular as "Lotus-Effect". With the inspiration of this effect, we have developed low cost, bio-compatible and hazard free Poly (methyl methacrylate)/

PMMA coated based Perovskite Solar Cells. PMMA coating provides dust, humidity, raindrop free self-cleaning solar cells without compromising its performance. The PMMA coating over the solar cell protects the raindrop via their self-cleaning chemical engineering as shown in the given picture. This study has been executed with the collaboration in India where the material has been developed and here (in UK) the photovoltaic performance has been analyzed.



Birds and Reefs

Ines Lange



An unusual collaboration between air- and sea-dwelling creatures has been observed in the remote Chagos Archipelago in the Indian Ocean. Seabirds populate some of the islands in high numbers, and fuel the surrounding ecosystems with their nutrient-rich guano. In contrast to islands infested with rats, which prohibit birds from

nesting, the coral reefs around these birdy islands are supporting higher fish biomass and growth rates, and possibly faster coral growth and recovery potential. This Fairy Tern in a window created by palm trees thus connects the blue sky with the blue lagoon, poop by poop.

Cold Business

Adolfo De Sanctis



Working at the forefront of technology sometimes means working at the edges of physical observables. In this case, working at temperatures as low as -272 degrees Celsius means approaching the temperature of the coldest parts of the Universe. This can offer beautiful displays such as the one depicted where cold Helium gas flowing through a steel pipe causes the water vapour around it to freeze in beautiful ice crystals. As cold air is denser than ambient

air, it moves downwards in perfectly aligned lines, before becoming turbulent when hitting the table below, a beautiful example of laminar flow. Work done in these facilities aims at studying novel methods to manipulate information and novel materials to realise future computers, digital memories and telecommunication devices.

Collaboration for sustainable aquaculture

Kelly Thornber



This photo was taken at a shrimp farm in Bangladesh. The aquaculture industry sustains the lives of more than 15 million people in Bangladesh, and disease is a huge problem. The University's Centre for Sustainable Aquaculture Futures is working with scientists in Bangladesh to improve their fish and shrimp farming, so that it is more productive and more sustainable in the future. Here you can see Dr Muhammad Meezanur Rahman, a Senior Scientist at WorldFish Bangladesh, holding some black tiger shrimp that are being tested for disease. Our collaboration with Dr Rahman and others at the non-governmental organisation WorldFish is providing insights into which diseases are causing the biggest problems in fish and shrimp farming, and finding ways to predict and prevent disease outbreaks. Through this collaboration we are able to apply cutting edge technologies to help farmers in some of the poorest and most rural areas of Bangladesh.



Cystic fibrosis is not going to stop me

Sarah Denford



Physical activity is highly recommended in the management of cystic fibrosis. However, during adolescence, physical activity often declines. Through a series of creative research projects (including photography and short films), we explored attitudes and experiences of physical activity among young people with cystic fibrosis. This provided a lens through which we were able to view physical activity as experienced by those living with the condition. Photos and films were shared with the cystic fibrosis community in an attempt to inspire those less active.

This image is of a young man with cystic fibrosis. In the short film, he describes his love for water polo, the positive impact that water polo has had on his mental and physical health, and the challenges he must overcome in order to remain active. This work will be used to inform the collaborative development an intervention to support young people to be more physically active

Eely Good Fishing

Polly Couldrick



A snap-shot of me, eel fishing, using a fyke net. These nets are used throughout Europe to catch European eel in traditional fisheries. Previously, these fyke nets were woven from strips of wood, but these days are made from netting.

Fishing for Change

Adam Porter



Our research group have had the unique and privileged opportunity of working in the Galapagos, seeking to understand the extent of the microplastic problem around the islands and to work towards solutions to protect the fragile ecosystems and natural paradise that are the 'Enchanted Islands'. In doing so we have been working with a multidisciplinary team of biologists, sociologists, archaeologists, policy makers, government officials, citizen scientists, and artists. This fish demonstrates the

collaboration between science, art, and education aimed at creating lasting change. The fish was put together by local artist Naomi Hart naomi-hart.com along with University of Exeter scientist Jen Jones and local NGO worker Anne Guezou from 372 bottle caps found on just 50 m of beach in the Galapagos. The fish represents both the impact of plastic pollution on marine life, but also the creativity that collaboration can spawn leading to demonstrable change.



Something is coming up

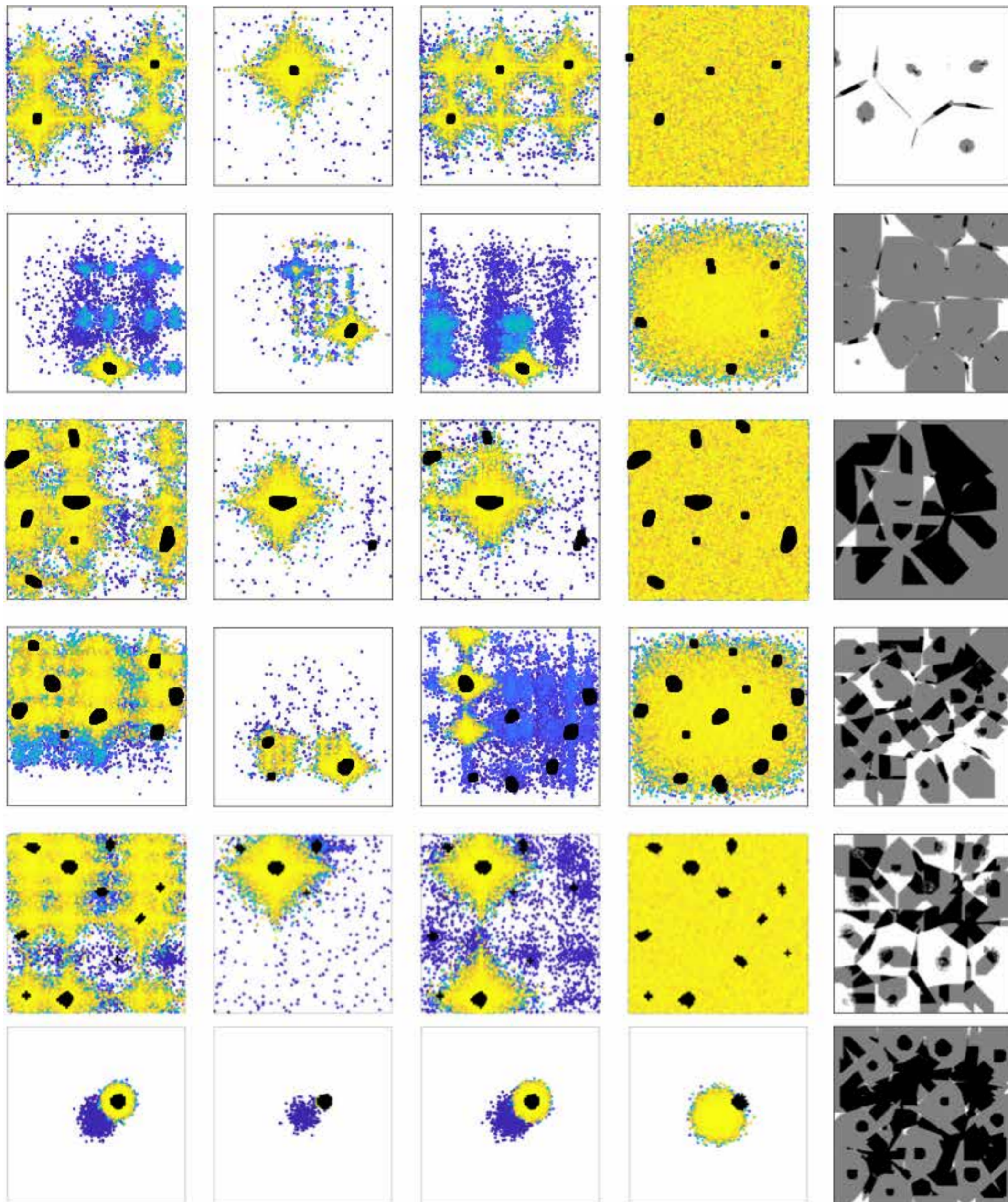
Alejandro Roman Gonzalez



Research cruises require everybody to pitch in, from the undergraduate student to professor level, everybody must get hands to the job. This often results in very tightly-knitted communities, especially during extended research cruises. Alternating periods of frantic work and period of rest during transit or waiting for the equipment to come back on board are the norm. In the picture, team members from one of ICEBERGS expedition (University of Exeter led project) to the West Antarctic Peninsula, waiting for a piece of equipment to come back on board of the British Antarctic Survey ship RRS James Clark Ross.

How Evolution Works in Different Environments

Tinkle Chugh



In the last few decades, computer scientists have used Darwin's evolution theory and the concept of survival of the fittest in developing clever algorithms. However, the question of how evolution works in different environments with different conditions is not easy to answer. Therefore, an analysis of the effect of conditions in different environments on the evolution of algorithms based on Darwin's theory of evolution can provide some useful insights to computer scientists and researchers in different domains. This image provides an evolution colormap of solutions obtained with different algorithms in different environments. An important observation from these plots is that the evolution of solutions by different algorithm very much depends on the environmental conditions.

Impact!

Anna Losiak



The dinosaurs went extinct because of the environmental effects of a collision between a giant asteroid and our planet. To avoid the same fate, we must study impacts. Impact geologists visit the 190 known impact craters scattered around the world in efforts to understand how the rocks and environment around the point of impact were affected.

We also make impact craters in the laboratory. To do this, we fire bullets at speeds exceeding 2 kilometres per second, slam them into rocks, and use high-speed cameras to watch what happens.

The gif shows selected images from a 2000 picture sequence taken in less than half a second. You can see how a 20 cm in diameter crater was formed when a 2 cm ceramic ball was shot into sand mixed with ceramic tiles. Material is being ejected from the site of the impact and deposited outside the crater.



Landowner tenant workshop

Kate Hind



Farmer to farmer peer learning can be very effective. We brought a landowner and his tenant to meet another farmer who grows a species rich grassland for animals to graze. The species rich grassland has a range of environmental and welfare benefits over conventional grassland, but comes at a cost. This farmer to farmer session allowed them to share and discuss practicalities of implementing different techniques on farm. Farmer to farmer knowledge transfer can be a very effective way of sharing different techniques, avoiding a heavy top down approach.

Listening to the Zoo

Paul Rose



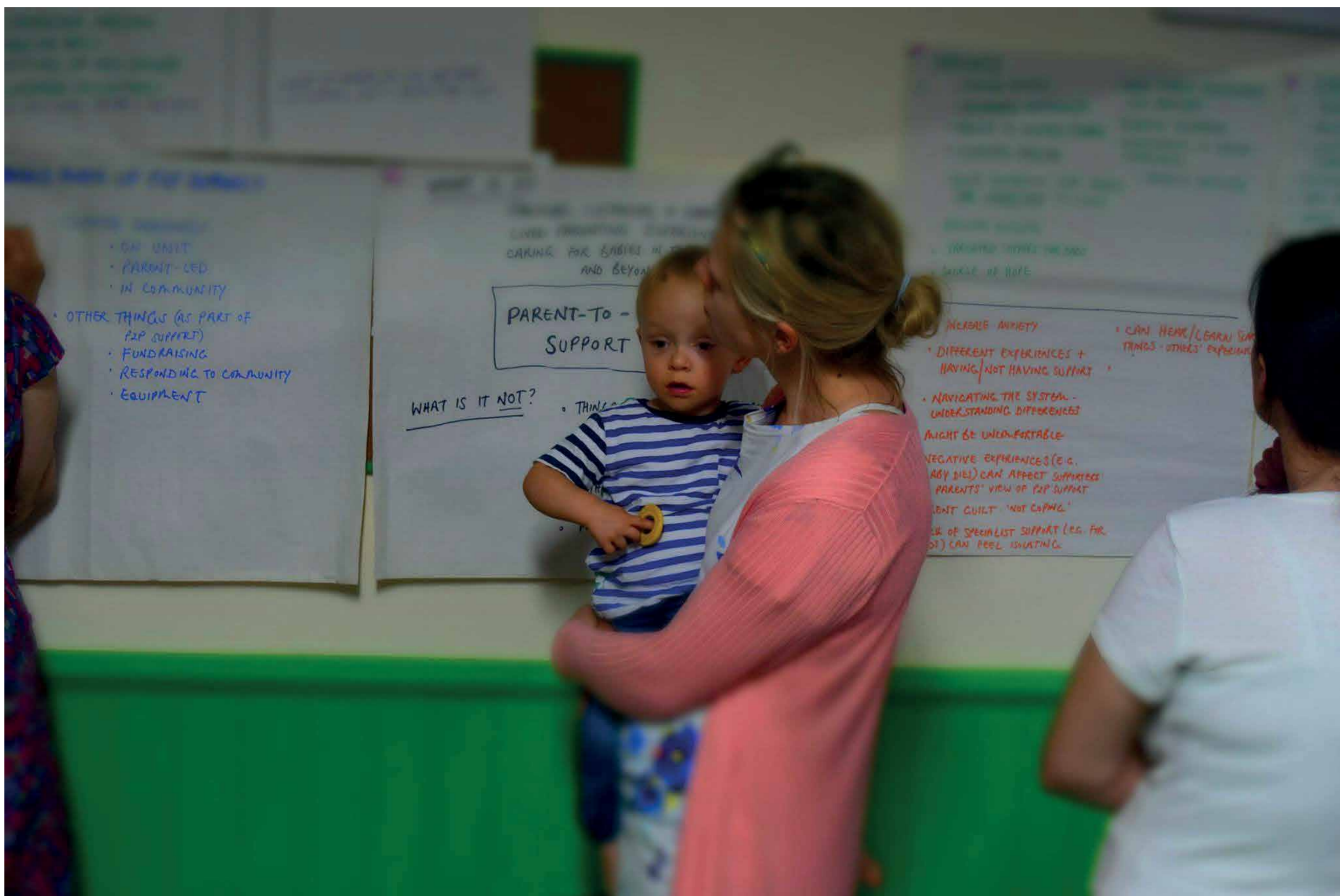
“Listening to the Zoo” is a project between the University of Exeter, Bristol Zoo and Paignton Zoo to capture the way in which sound influences the attitudes and responses of people who visit, live near or work at the zoo. Part of this project is to measure the soundscape that each zoo’s animals experience themselves- after all they live all their lives within a soundscape heavily influenced by humans. How do they respond to this? My research is to record the sound in and around enclosures

and evaluate animal’s behavioural responses from observations against what can be heard. Part of my work is on the behaviours of flamingos. At Bristol Zoo they live with some very inquisitive white-faced whistling ducks. Here, I found myself listening to the zoo and watching the birds, whilst being watched and listened to by two ducks who are named after a type of sound.



Mother and Child

Kate Boddy

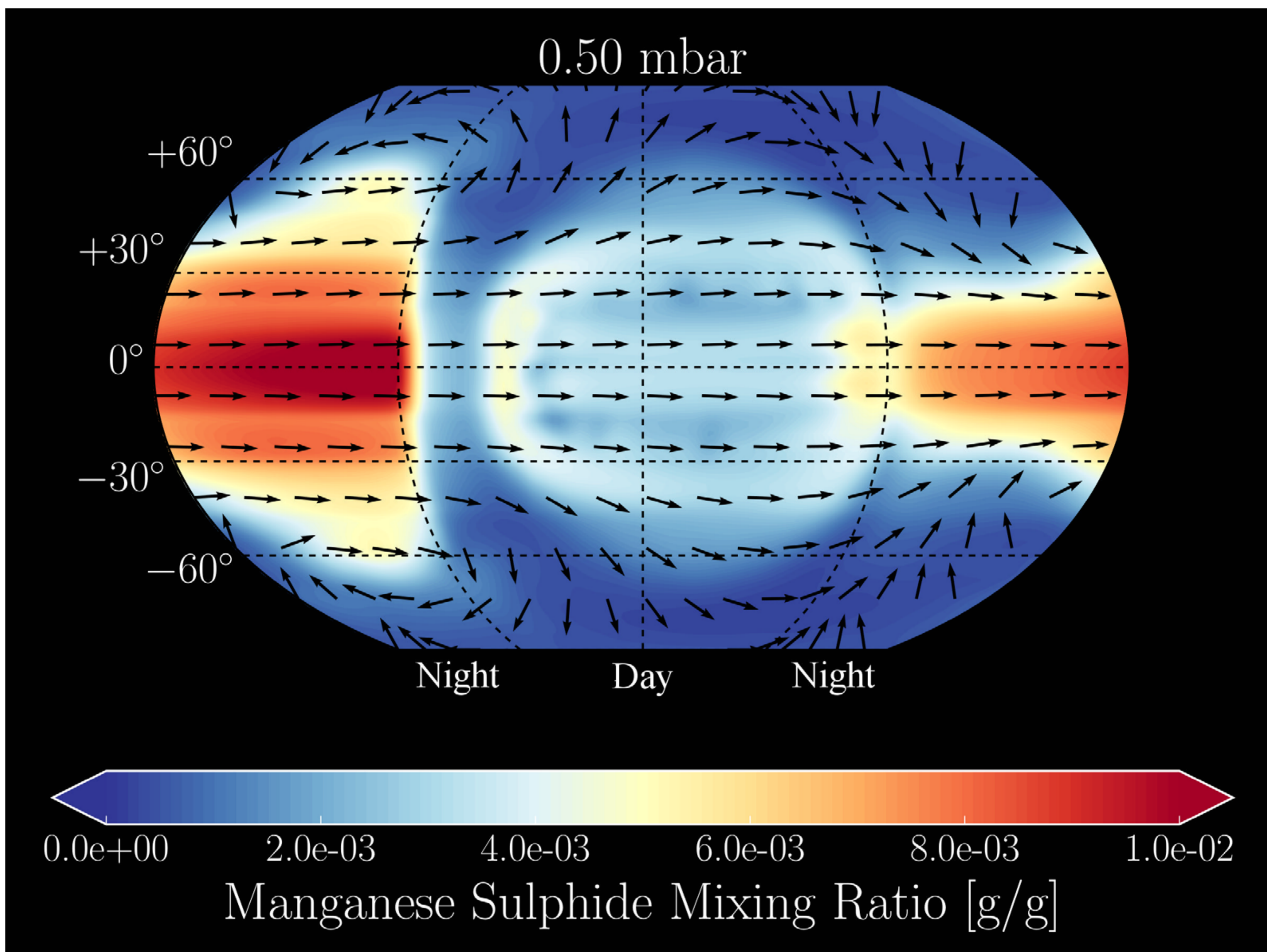


Here we see Emma and Oliver collaborating with researchers on a study exploring peer support for parents of babies in neonatal care. Parents with young children can face barriers that make research collaboration difficult such as the venue, timing and need to find childcare. We worked with parents to find a way to overcome these barriers and make our collaboration as inclusive

as possible. The solution? A soft-play venue, familiar to parents, and welcoming to young children, provided a space where parents and researchers could work together. This collaboration enabled us to connect the research with real life experiences, ensuring the research findings were relevant and meaningful.

Overcast on Exoplanets

Stefan Lines



Ever wondered what the weather is like on other worlds? The University of Exeter 'Exoclimatology' group researches the climate of exoplanets - planets orbiting stars outside our solar system. We collaborate with the Met Office, using their powerful weather prediction code to investigate the atmospheres of these exotic worlds. Our work has helped us to better understand the temperatures, winds and even clouds on these distant planets! The image you're looking at shows a map of cloud

coverage (Manganese Sulphide cloud - very different from the water clouds here on Earth!) in the upper atmosphere of a super-heated Jupiter-like (massive, gaseous) planet. Extreme day-side temperatures cause cloud to evaporate and exist mainly on the night-side, leaving the day-side exposed to intense stellar radiation. This research will assist in identifying potentially habitable worlds in our search for a new Earth and hence confirming our place in the universe.

PaReNt project team meeting

041218

Harriet Hunt

PARENT-TO-PARENT SUPPORT INTERVENTIONS FOR PARENTS OF BABIES CARED FOR IN A NEONATAL UNIT

A SYSTEMATIC REVIEW OF QUALITATIVE & QUANTITATIVE EVIDENCE. HARRIET HUNT · REBECCA WHEAR · KATE BODDY · LEANNA WAKELY · ALISON BETHEL · CHRISTOPHER MORRIS · REBECCA ABBOTT · SUSAN PROSSER · ANDREW COLLINSON · JENNIFER KURINCZUK · JO THOMPSON-COON ·



NON-JUDGMENTAL UNDERSTANDING



Scriberia

Parents of babies admitted to neonatal units experience an emotional journey. Feelings of helplessness, fear, sadness, guilt, grief and anger are common and may persist long after leaving the hospital. Support from a parent peer who has been through the same experience and can empathise with the challenges may help. Researchers from the University of Exeter Medical School, the Royal Devon and Exeter Foundation Trust, the Royal Cornwall Hospitals NHS Trust and local charity SNUG (Supporting Neonatal Users and Graduates), wanted to find out if peer support is effective for helping families during neonatal care.

The results of our systematic review were captured by a scribe, and help us to share our findings in an engaging and accessible way with parents, neonatal staff and everyone interested in parent-to-parent support for parents of babies in neonatal care. With this single illustration, our work is able to reach a wide audience.



Public engagement with farm

Kate Hind



A recent survey we commissioned found 60% of the public haven't been on a farm in the last 5 years (or at all), and 40% of people stated they are unaware of how their food is produced*. At present the environment is at the top of the political agricultural agenda, and the focus is on supporting farms to deliver wider benefits to society. This includes clean water, carbon storage, reduce flooding, wildlife etc. We therefore our working closely with farmers to best get members of the public onto farms and to discuss what wider benefits they can deliver, and who is going to pay for this. This lamb is from a farm which has been set up to allow easy public access.

* Sample size 1100.

Rhino Orphans being bottle fed

Katie Marx



Rhino calves Makhosi and Mpilo live at the Zululand Rhino Orphanage in South Africa. They are shown here with their friend Megan, who manages the Orphanage. The poaching crisis in South Africa means that every day baby rhinos are being orphaned as their mothers fall victim to poaching. Rhino horn is a sought-after commodity across much of Asia, where it is used as a status symbol and in traditional medicine, despite being proven to have no medicinal benefits. Our team of

researchers from the Exeter Anthrozoology as Symbiotic Ethics (EASE) working group, with funding from National Geographic, are researching ways of engaging millennials with the plight of rhinos. The knowledge, attitudes and practices of these millennials in relation to rhino poaching and horn consumption will be assessed before and after exposure to a series of short films featuring imagery and narratives obtained by the project team during fieldwork in South Africa.

Rhino Orphans

Katie Marx

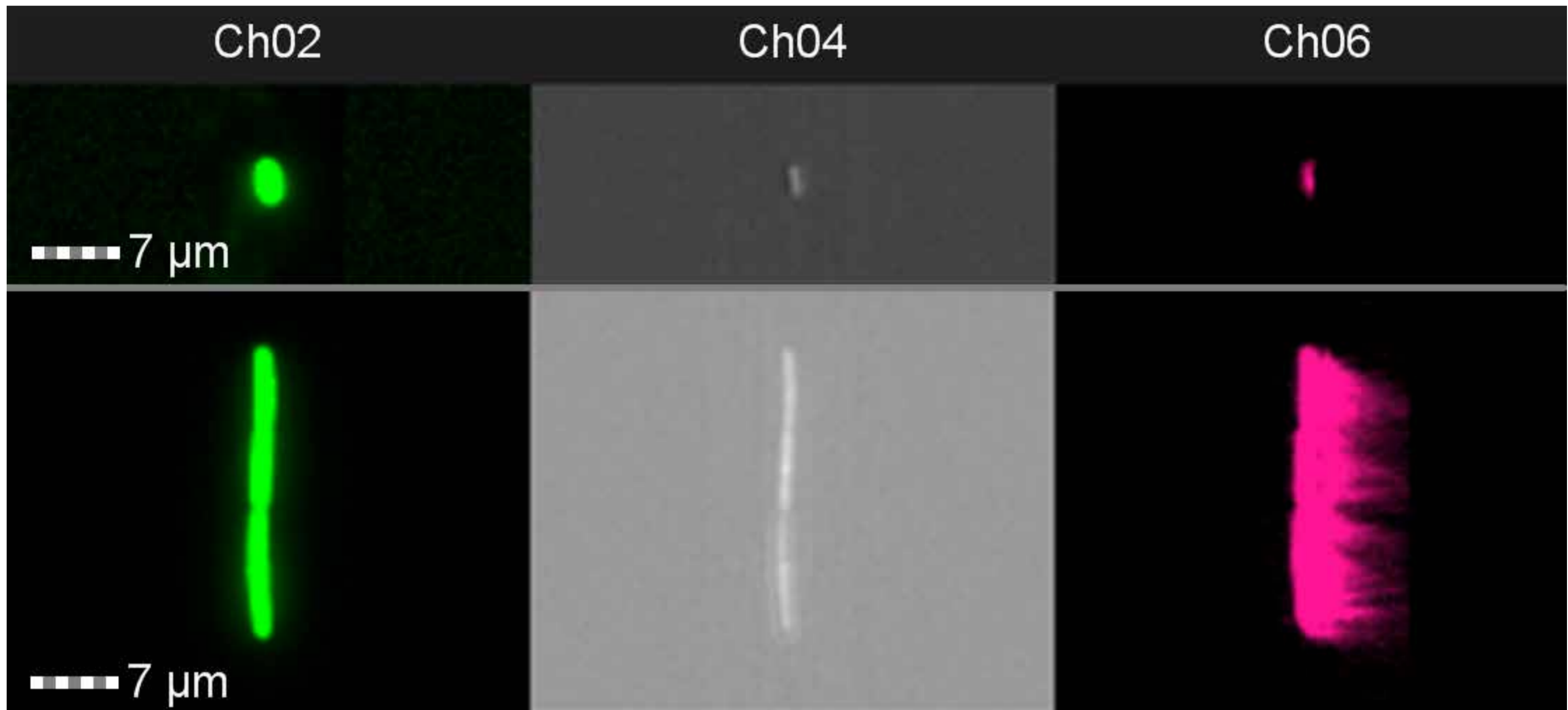


Rhino orphans Bhanoyi and Khula live at the Zululand Rhino Orphanage in South Africa. They are shown here being bottle fed by wildlife vet Brenda and anti-poaching ranger Kyle, with anti-poaching dog Mystique looking on. The poaching crisis in South Africa means that every day baby rhinos are being orphaned as their mothers fall victim to poaching. Rhino horn is a sought-after commodity across much of Asia, where it is used as a status symbol and in traditional medicine, despite being proven to have no medicinal benefits. Our team of researchers from

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Sleeping bacteria

Sariqa Wagley



Vibrio parahaemolyticus is a bacterium that loves to grow in warm environments rich in salt and can be found in seawater, shellfish and in crustacean during the summer months. It is the leading cause of seafood associated gastroenteritis worldwide. During the winter the salt levels and temperature drop and this change in environment no longer supports the bacteria's growth. In response to this change in environment some *V. parahaemolyticus* enter a state of dormancy or a sleep like state until conditions get better the following spring.

This picture shows images of *V. parahaemolyticus* taken using Amnis ImageStream Technology (in three different channels; green fluorescence, bright field and side scatter view). The top image shows healthy *V. parahaemolyticus* while the image below show bacteria in the sleep-like state. I am investigating how this bacterium enters the sleep state and how it reawakens when conditions improve again.

Soapbox Science Exeter

Sariqa Wagley



This picture was taken by an official Photographer on the 26th September 2018 for the Soapbox Science Exeter Event. Soapbox Science Exeter showcases the research of 12 women who are making significant contributions to the scientific community. The Exeter event which is entering its fifth year follows the format of London Hyde Park's Speakers' Corner, transforming Exeter's Princesshay into an arena for public learning and scientific

debate; creating a dynamic and bustling atmosphere and learning environment for all. In 2018, record numbers of the public came to the event with over 4000 people attending in the 3 hour session. In this picture you can see Dr Sariqa Wagley in the foreground engaging with the public describing how some bacteria go to sleep when they encounter adverse conditions in order to protect themselves.

Something is coming up

Alejandro Roman Gonzalez



Research cruises require everybody to pitch in, from the undergraduate student to professor level, everybody must get hands to the job. This often results in very tightly-knitted communities, especially during extended research cruises. Alternating periods of frantic work and period of rest during transit or waiting for the equipment to come back on board are the norm. In the picture, team members from one of ICEBERGS expedition (University of Exeter led project) to the West Antarctic Peninsula, waiting for a piece of equipment to come back on board of the British Antarctic Survey ship RRS James Clark Ross.

Stories of Waiting

Michael Flexer



Everything we did was collaborative from the ground up. We consulted with Hospiscare to understand their needs and aspirations for the engagement. The workshops themselves were co-created responsively with participants. We'd bring in offers and suggestions and we'd reflect on these collectively, telling stories together, making changes and proposing possible outcomes.

One outcome was this film, combining stories of waiting with footage of starlings over Brighton Pier. One participant recollected watching the murmurations when they lived in Hove, and we discussed as a group how these coordinated, complex movements worked as a metaphor for our creative waiting together, turning our separate lives and experiences into a unified but heterogenous piece of work.

Earlier in 2019, our research won a public engagement award from Birkbeck.

Tasty Reef

Ines Lange

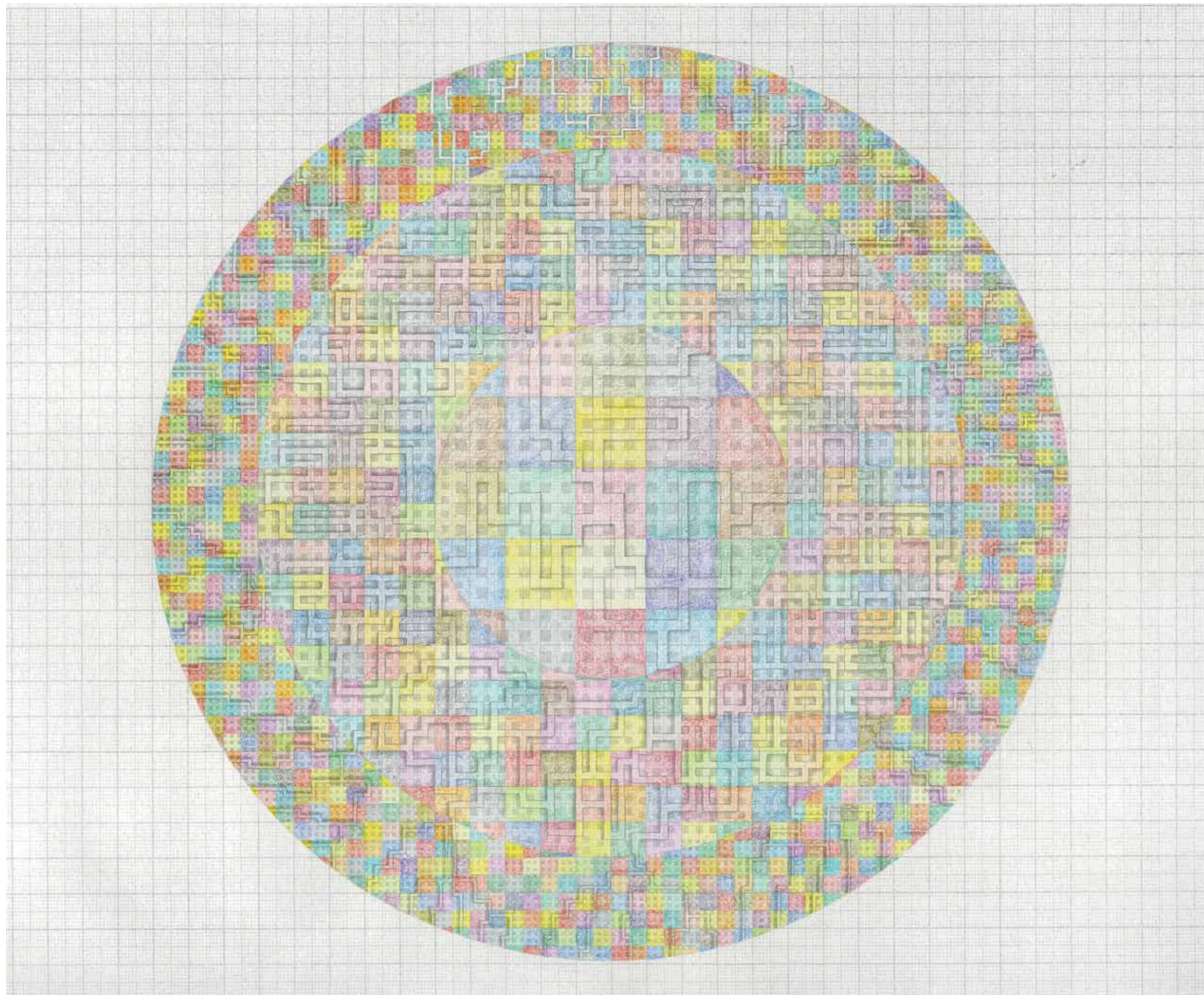


Parrotfish are keystone species in coral reefs. By scraping off algae from dead reef substrate with their beak-like jaws they also remove coral material, which is later excreted as sand. This process not only provides settlement space for young coral colonies, but also contributes up to 75% of the sand for adjacent islands and beaches. I am quantifying the rates at which different parrotfish species erode the reef substrate, as this is an

important component of the “net carbonate budget” of a reef, which indicates whether the reef is growing or eroding. Spending hours in the water with these colourful and funny fish was the highlight of my recent trips to the Maldives and the Chagos Archipelago. It also reminded me of the importance of protecting these charismatic creatures in order to sustain healthy coral reefs.

The Protein Maze

Gemma Anderson



A single amino acid, a dot (.), becomes a chain of amino acids – a protein, a line (—), moves in space to become a plane, then a volume. Like in drawing, a dot progresses to a line, to meander in space. So it seems that drawing might be an appropriate way to experiment, to 'be like' the protein.

Proteins pervade life and collectively they take an infinite variety of forms. Protein's fold, most of the time this is what a protein is trying to do. The folded protein is the relaxed protein, in its 'natural' state, not wasting any energy. Folding is a process, it happens through time, in an 'energy landscape' often imagined to be conical (cone shaped) with the folded protein resting in the very bottom – the point of least energy in the landscape. As the protein moves from the top of this landscape to the bottom (it might not make it) it embarks on an explorative journey of the space; body and environment continuously

co-creating each other. There are fast and slow tracks, uphill and downhill, dead-ends and if in trouble then a 'chaperone' will come to help find the way together. This dynamic process is hard to imagine and the images you find in scientific textbooks don't exactly give the game away (generally a cone, a few uphill or downhill). How else can we imagine this complexity? What other images could we see?

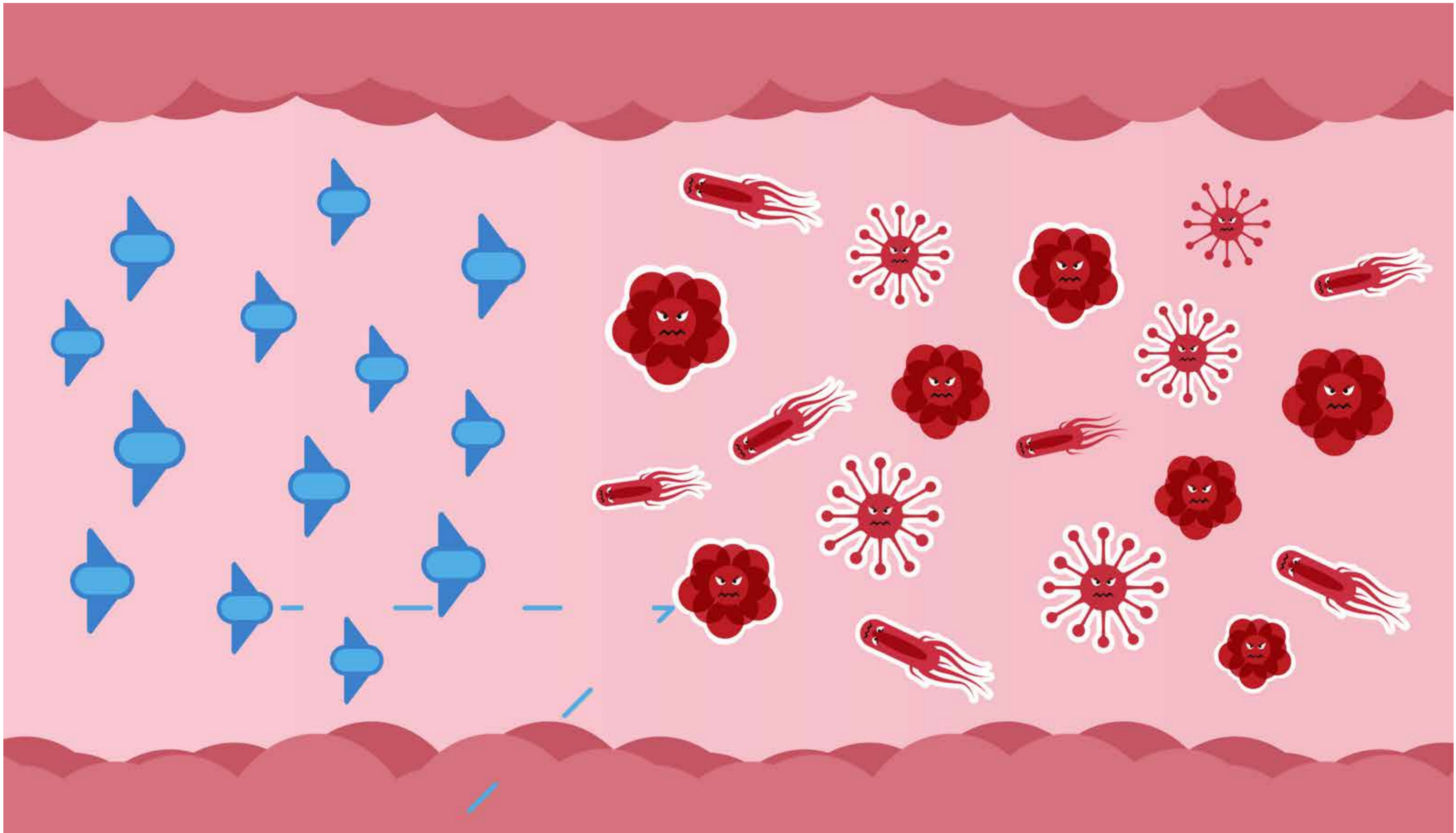
After making countless drawings with molecular biologist JJ Phillips, we take a day to look at them all together: drawings of cones, of simple figures moving in cones, colour coding energy levels, line drawings of movement series, planes in space. It struck me that the bottom of the cone is like the centre of a maze. We like the idea. We try drawing a maze. First we need an underlying grid architecture, not a generic pattern but one that is true to the dynamic pattern of the protein journeying. We

change the granularity of the grid for different stages of the process. Colour brings dimensions and guides the pathways that are created. The environment and the body co-create one another as the maze undermines the distinction between figuration and abstraction. The drawing process has its own stochasticity and the image, following its own creative process, reveals something true of the dynamic pattern of protein folding. The idiosyncrasies of this living process have informed and given rise to a new artistic process.

'Organic development in a work of art is at least analogous to, and probably identical with, organic development in nature; in an organic-artistic scheme the essence of art is in processes rather than its products; and such artistic 'events' as are thrown up are significant merely in that they reflect past, present and future aspects of the dominant process'. (Thistlewood, 1981)

When the drugs don't work.

Kelly Thornber



Antibiotic resistance is a huge global problem that is causing an increasing number of deaths of humans and animals, as the antibiotics we use to treat disease are becoming ineffective. One of the major ways we can help to prevent this problem getting worse is to only use antibiotics when they are necessary, however in many countries, antibiotics are used in animals even when there is no sign of disease. In the Centre for Sustainable Aquaculture Futures, we have worked closely with

WorldFish and the Food and Agriculture Organisation of the United Nations, to develop a 4 minute animation aimed at fish farmers in Bangladesh, to help them understand what antibiotics are, and why it is important not to misuse them. This image shows a scene inside a fish where the resistant bacteria (shown in red with white shields around them) are not affected by the antibiotics (in blue).

www.exeter.ac.uk/saf

For full details about the competition, please visit:

www.exeter.ac.uk/doctorscollege/early-career-researchers/imagesofresearch

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