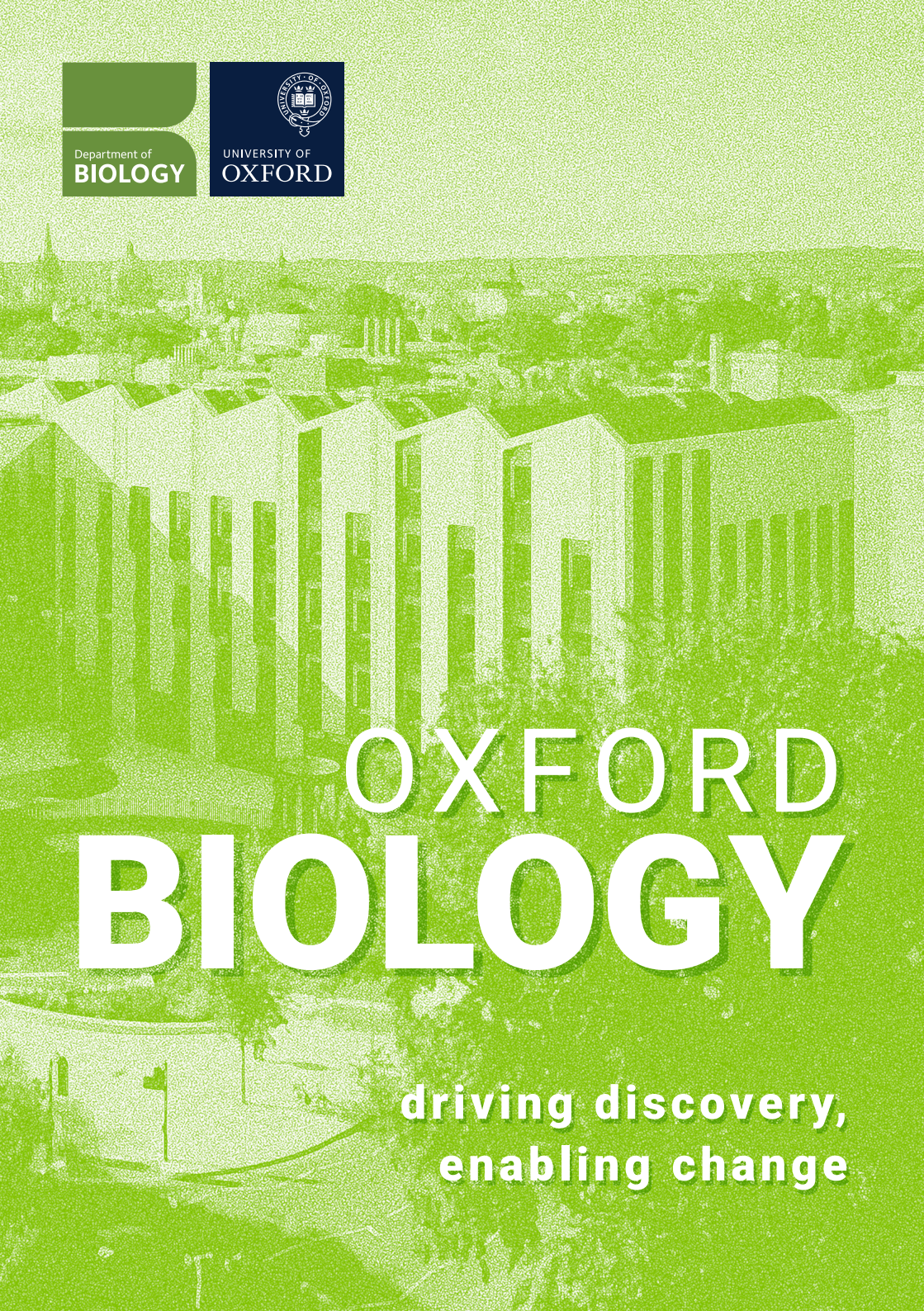
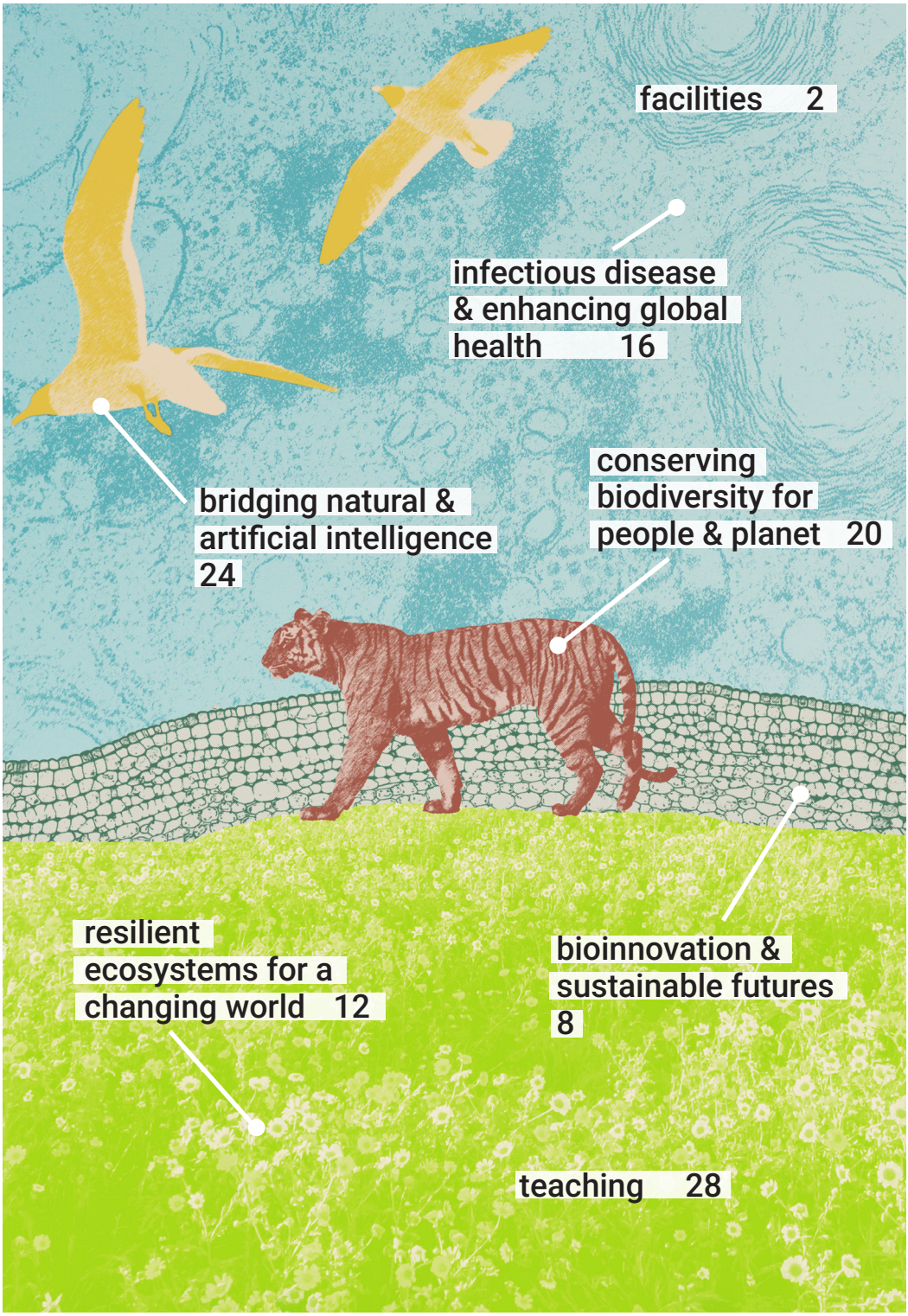
Department of BIOLOGY

UNIVERSITY OF OXFORD



OXFORD BIOLOGY

driving discovery,
enabling change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BIOLOGY AT OXFORD

We are entering a new era at Oxford Biology, defined by deeper discovery and greater collaboration. Our planet is facing unprecedented challenges – but our world-leading science, combined with your support, puts us on the path to solving them.

We are thrilled to be bringing our strengths into sharper focus through five new, dynamic research hubs. These span the breadth of the life sciences and encourage innovation and impact across disciplines.

Teaching and nurturing the next generation of scientists are, as ever, vital parts of our mission. Our field trip fund gives all undergraduates, regardless of background, the experience of connecting theory with the natural world. Our graduate scholarships are financial lifelines that enable brilliant minds to contribute to science without barriers. Donor support ensures that Oxford can remain a place where potential, not privilege, determines opportunity.

The Life and Mind Building is a new home for us, hosting world-class laboratories and teaching spaces. These provide a unique environment for interdisciplinary collaboration, enabling us to work in new ways.

At this pivotal moment in our history, we are looking for committed philanthropic partners to help us continue our vital work. We invite you to join us on this journey.

OUR FACILITIES

At Oxford Biology, our students and scientists use our world-class research and teaching facilities to explore life at every scale, from molecular interactions to entire ecosystems.

The **Life and Mind Building** is the Department's new home. This flagship facility includes purpose-built laboratories, collaborative teaching spaces and breakout zones designed to facilitate interdisciplinary interaction. The building represents a major investment in the future of life sciences at Oxford and will significantly enhance our capacity for joint research, innovation and public engagement.

Our modern **glasshouses and growth chambers** housed on the roof of the building support pioneering research in plant sciences, from climate resilience to crop genetics. These facilities enable highly controlled experimental conditions and are crucial for fundamental biology and research with real-world agricultural applications.

“

The Life and Mind Building was a major factor in my decision to move to Oxford. The opportunity to carry out our research in purpose-built, modern labs — designed for collaboration and flexibility — was incredibly compelling. It’s the kind of environment that enables bold, interdisciplinary science.

”

— Professor Rebecca Mosher

Image: Wates

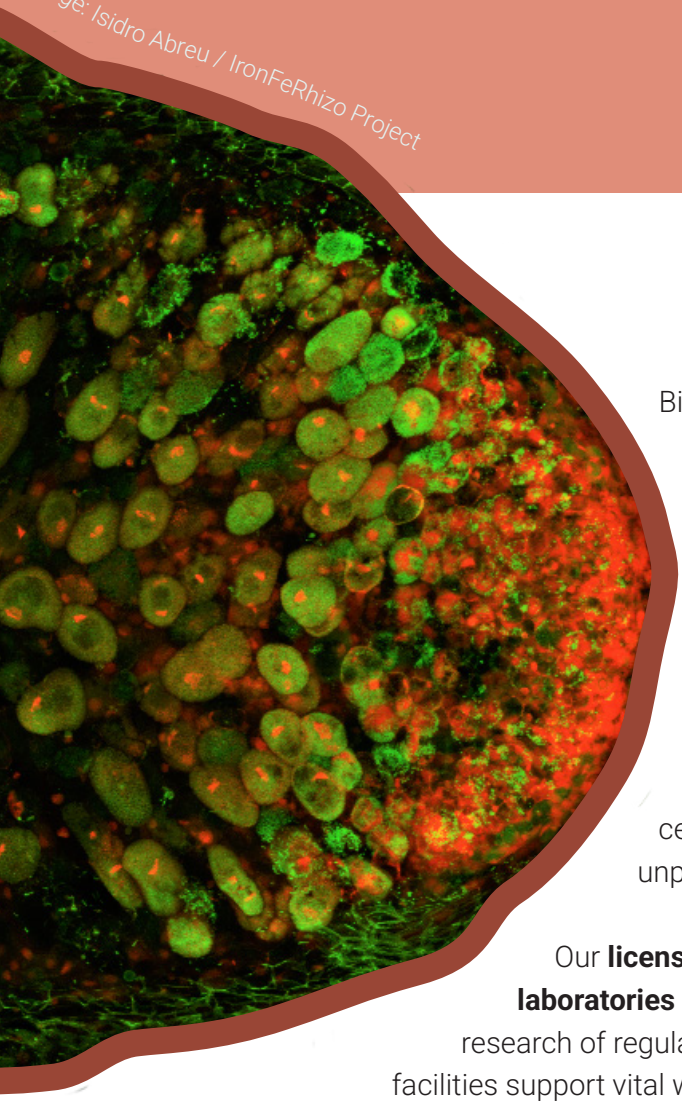


Image: Isidro Abreu / IronFeRhizo Project

Biological discovery depends on the ability to visualise life at the cellular and molecular level. Our state-of-the-art **imaging suite** provides access to cutting-edge microscopy and analytical platforms, enabling researchers to probe the inner workings of cells, tissues and organisms in unprecedented detail.

Our **licensed high-containment laboratories** allow safe handling and research of regulated materials. These facilities support vital work in disease biology, biosecurity and pathogen evolution, contributing directly to UK and global efforts in food security and environmental health.

Image: John Baker

The **Oxford University Herbaria** bring together over one million plant specimens from around the world, including more than 35,000 type specimens, some dating back to the 17th century and spanning nearly all plant groups and global regions. These are complemented by rare botanical books, manuscripts, illustrations and fossil materials, forming a uniquely rich resource for research in taxonomy, ecology, conservation and plant history. Recent digitisation efforts, generously supported by donors — including a significant past contribution from Clive Gillmore — are expanding access to these collections for researchers and the public worldwide. Continued philanthropic support will be essential to complete this work and unlock the full potential of Oxford's botanical treasures.

Image: Rosemary Wise

Our **John Krebs Field Station** is situated at the University's long-term ecological research site at Wytham Woods, one of the most intensively studied woodlands in the world. The field station is a specialist facility dedicated to the study of animal behaviour, sensory ecology and cognition. Named after eminent biologist Professor Lord John Krebs, the station supports research that deepens our understanding of how animals interact with their environments.

Image: Caroline Wood

Image: Gem Toes-Crichton

MOTION CAPTURE FACILITY

— pushing the boundaries of biomechanics

The Oxford Flight Group, led by Professor Graham Taylor, is a world-leading biomechanics team exploring the dynamics, guidance and control of flight, both natural and engineered. The group combines experimental, computational and theoretical approaches to understand how animals and machines navigate complex environments.

The facility's standout feature is its high-performance Vicon motion capture system, equipped with 22 cameras that track retroreflective markers at 120 frames per second. Using this technology, the team has captured and analysed over 25,000 bird flights, which helps us understand their flight behaviours in more depth.

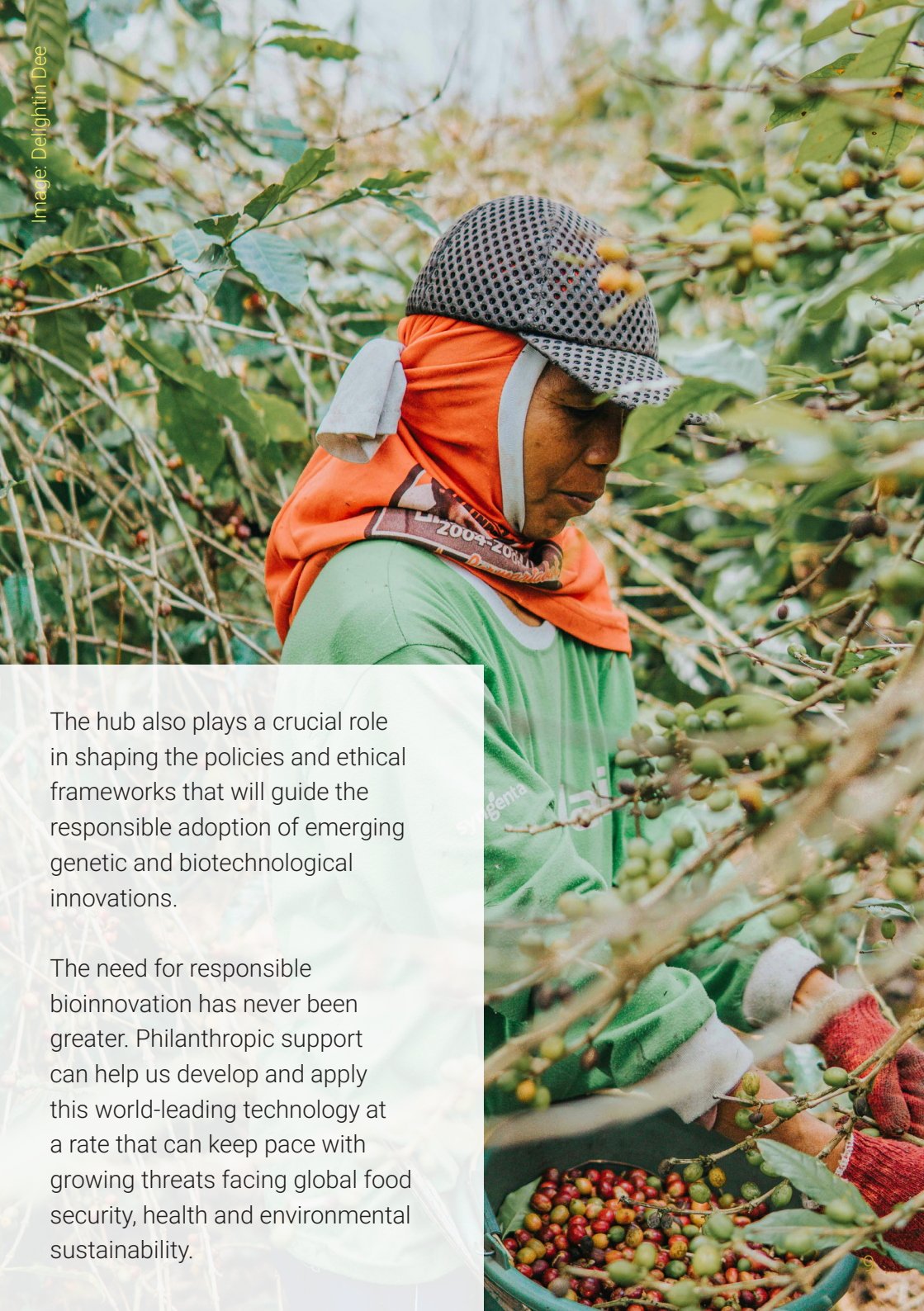
BIOINNOVATION AND SUSTAINABLE FUTURES

Understanding mechanisms of evolutionary innovation to guide bioengineering solutions for the future

Our bioinnovation hub explores the exceptions to the rules of biology: the unusual traits, unexpected adaptations and evolutionary outliers that offer clues to how life can be reshaped to meet twenty-first century challenges.

By studying the mechanisms behind biological variation we uncover how nature has generated novelty, and how we might harness that same potential to build a more resilient and sustainable world.

Our scientists use powerful tools like single-cell omics, gene editing, state-of-the-art imaging and AI-driven modelling to investigate how complex traits evolve and how they might be recombined or optimised.



The hub also plays a crucial role in shaping the policies and ethical frameworks that will guide the responsible adoption of emerging genetic and biotechnological innovations.

The need for responsible bioinnovation has never been greater. Philanthropic support can help us develop and apply this world-leading technology at a rate that can keep pace with growing threats facing global food security, health and environmental sustainability.

WILD BIOSCIENCE

— revolutionising crop innovation

Oxford spin-out Wild Bioscience, launched in 2021 with £12 million in seed funding, is engineering the next generation of crops using evolution-tested genetics. Their revolutionary platform combines plant biology with AI to "activate" wild plant genes for traits like faster growth, drought resilience and yield increases of up to 20%. Supported by major field trials and a recent £6.7 million ARIA grant to the Department of Biology and Wild Bioscience for chloroplast engineering, this growing company is poised to reshape agriculture by boosting food security and reducing pressure on natural ecosystems.

Image: Kai Pilger

Spin-outs are how we turn discovery into impact. These ventures create skilled jobs and help Oxford science tackle global challenges beyond the lab.

— Professor Steve Kelly

DODO DNA

— uncovering the secrets of extinct species

Image: New York Public Library

Thanks to funding from Joe Hernandez, Professor Sonya Clegg and her research group have recovered genetic data from museum specimens of extinct island birds, to understand their evolution and pathways to extinction.

This includes two iconic flightless birds: the dodo from Mauritius, and its cousin, the Rodrigues solitaire. Extraction of DNA from bones from the Oxford Museum of Natural History has resulted in successful recovery of whole mitochondrial genomes from multiple individuals. These are now being analysed to understand diversity through time.

Also included is an extinct species of white-eye from Norfolk Island, Australia, where whole genomes have been recovered. An exciting finding is that this extinct species hybridised with a related living species before its demise, leaving parts of its genome to endure in a wild relative despite the loss of the species.

Using museum specimens in genomic studies allows us to gain historical perspective relevant for an improved understanding of evolution and conservation as biodiversity changes with time. Learning from evolution – its successes and its failures – is helping guide us towards tomorrow's innovations.

RESILIENT ECOSYSTEMS FOR A CHANGING WORLD

Identifying routes to resilience across all scales of life to sustain thriving ecosystems

In a time of accelerating environmental disruption, understanding how living systems respond and recover is one of biology's most urgent challenges. Our ecosystems hub is pioneering research to uncover the biological foundations of resilience.

Our scientists are developing tools to measure and predict resilience across multiple scales, from genes and cells to forests, oceans and planetary systems. We explore how different biological processes, spanning milliseconds to millennia, interact and shape the ability of life to cope with change.

To do this, we integrate technologies such as AI, remote sensing, biologging and high-resolution imaging with knowledge from ecology, molecular biology, economics, social science and law. By using this interdisciplinary approach, we can identify the common principles that govern resilience and apply them to major problems, such as protecting food supplies and managing ecosystems.

Our goal is to build a blueprint for resilience. Philanthropic support will accelerate this work and help us build a society that can anticipate and respond to future environmental shocks.

Image: Kyle Glenn

DR ALINE SOTERRONI

For Dr Aline Soterroni, mathematical modelling offers a powerful approach to addressing global environmental challenges. Working at the intersection of science and policy, Aline has helped shape Brazil's first Nationally Determined Contribution under the Paris Agreement, and has contributed to a national platform for projecting scenarios and assessing the mitigation potential of national policies.

> **"We found that nearly 80% of Brazil's net-zero target could be achieved through nature-based solutions, such as halting deforestation and restoring native vegetation. It is exciting to generate quantitative evidence that can directly inform priorities and help drive transformation at local, national, and international level."**
>
> **— Dr Aline Soterroni**

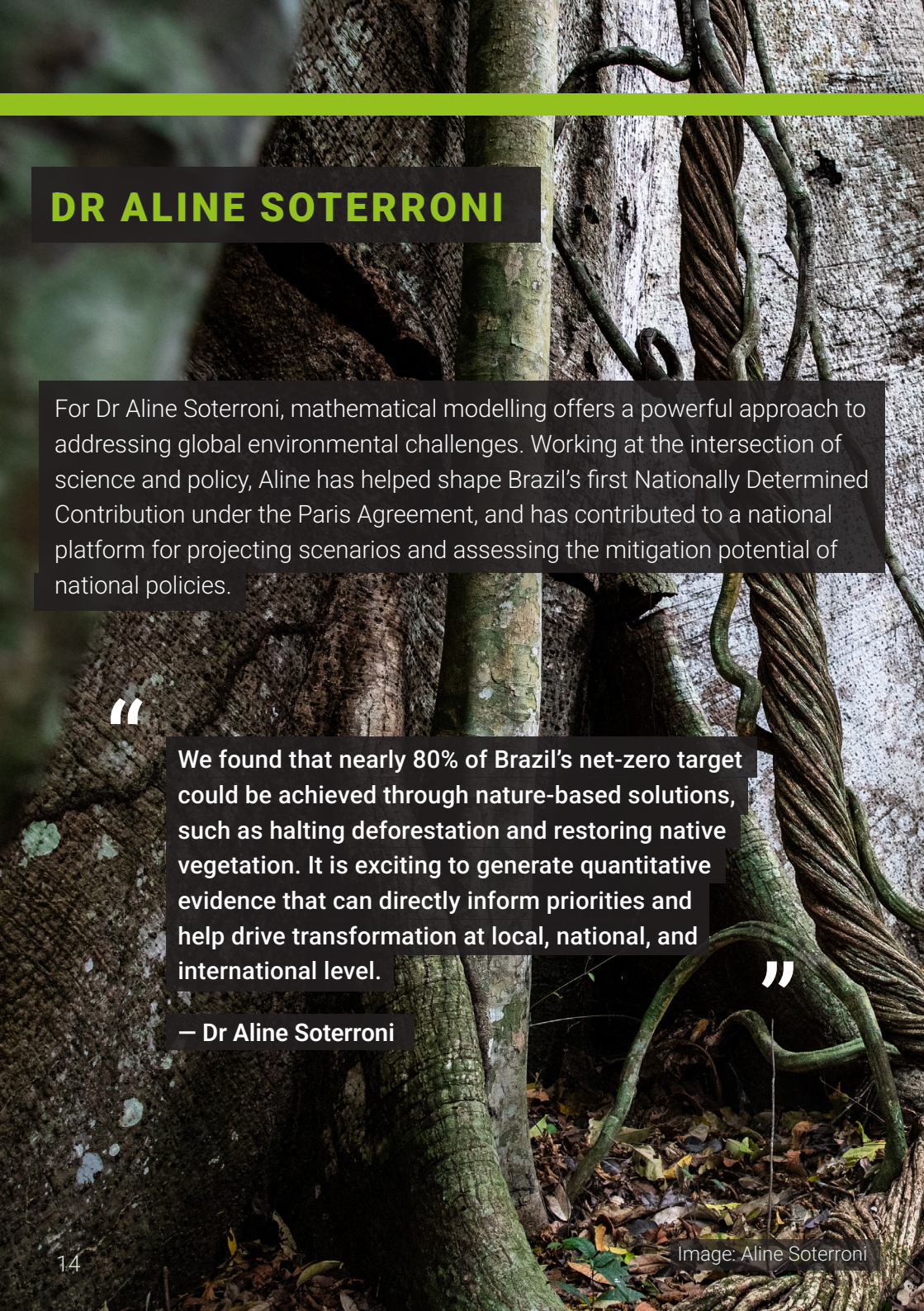


Image: Aline Soterroni

Image: Luke Bray

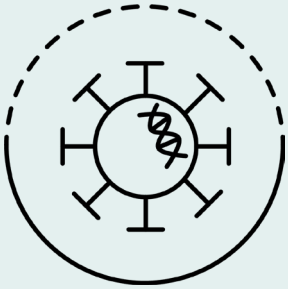
WYTHAM WOODS

— the lab with leaves

The Wytham Tit Project is one of the longest-running ecological studies of wild animals in the world, spanning over 40 generations of offspring. Since 1947, researchers have monitored thousands of individually marked great and blue tits to understand breeding, behaviour, ageing and the effects of climate change. What began with 100 nest boxes has since expanded to cover the entire 385-hectare woodland, and with the support of generous donors and funding sources, this iconic study offers vital insights into ecology and evolution.

The Wytham Digital Forest project marks a step change in how complex ecosystems are monitored and understood. Instead of traditional, high-end scanning solutions, the researchers will use affordable handheld devices, including technologies generously provided by Sony Semiconductor Solutions and funding from Sony Interactive Entertainment, to build a living digital twin of selected plots within Wytham Woods – a model that changes dynamically with the forest itself.

Image: Annie Spratt



INFECTIOUS DISEASE & ENHANCING GLOBAL HEALTH

Investigating what makes pathogens dangerous and hosts resilient, to strengthen and protect health

Infectious diseases pose a serious threat to global wellbeing, from pandemics to agricultural challenges. Research often separates human, animal and environmental health, leaving us vulnerable to emerging threats we don't fully understand.

To address this, our infectious disease hub takes a pathogen-centred, planet-wide approach, investigating one fundamental question: what makes a pathogen dangerous? Our researchers explore how viruses, bacteria, fungi and parasites evolve, spread and interact with hosts across species, including humans, wildlife, livestock and crops.

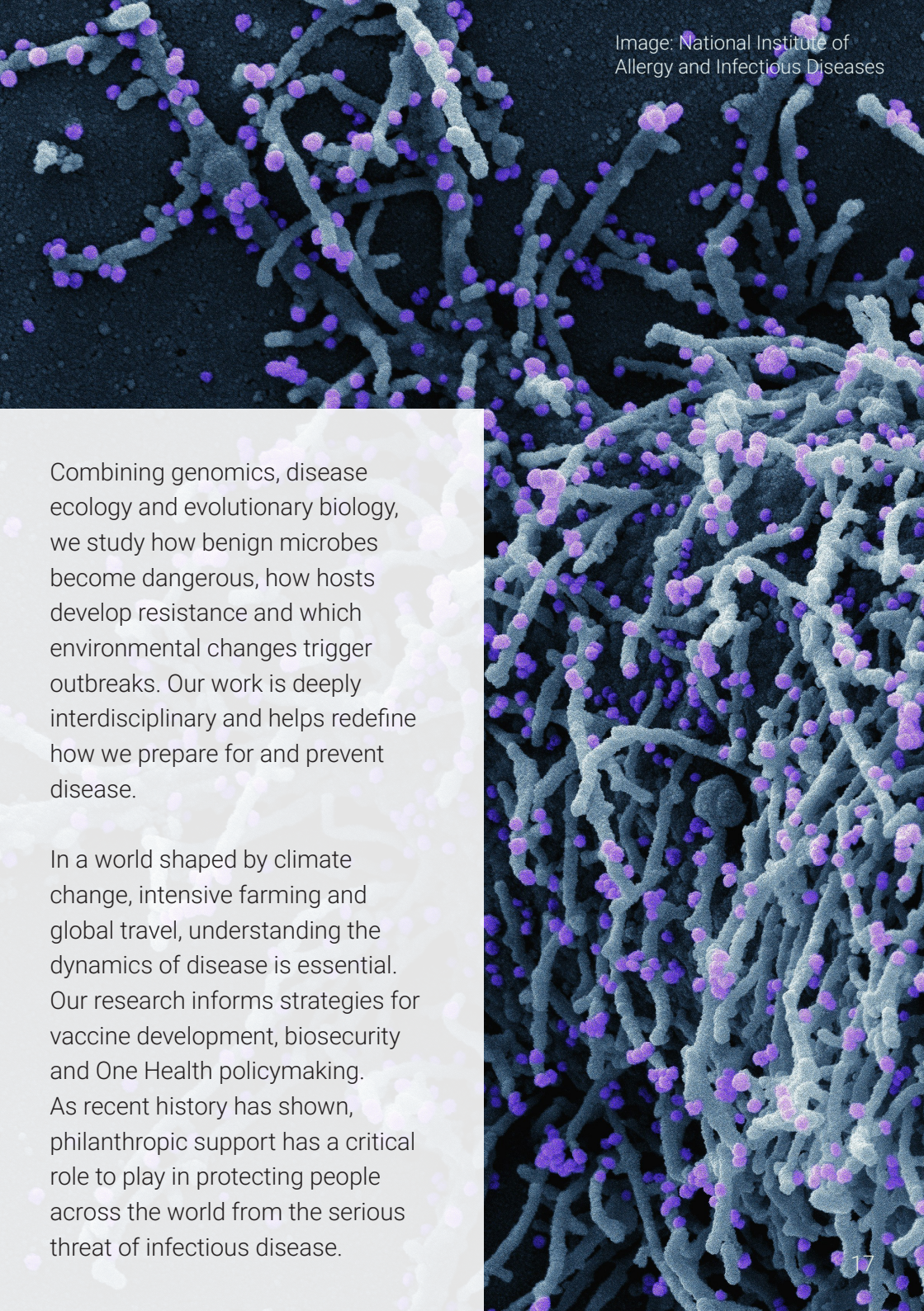


Image: National Institute of Allergy and Infectious Diseases

Combining genomics, disease ecology and evolutionary biology, we study how benign microbes become dangerous, how hosts develop resistance and which environmental changes trigger outbreaks. Our work is deeply interdisciplinary and helps redefine how we prepare for and prevent disease.

In a world shaped by climate change, intensive farming and global travel, understanding the dynamics of disease is essential. Our research informs strategies for vaccine development, biosecurity and One Health policymaking. As recent history has shown, philanthropic support has a critical role to play in protecting people across the world from the serious threat of infectious disease.

A CAMPYLOBACTER VACCINE

– tackling a global health challenge

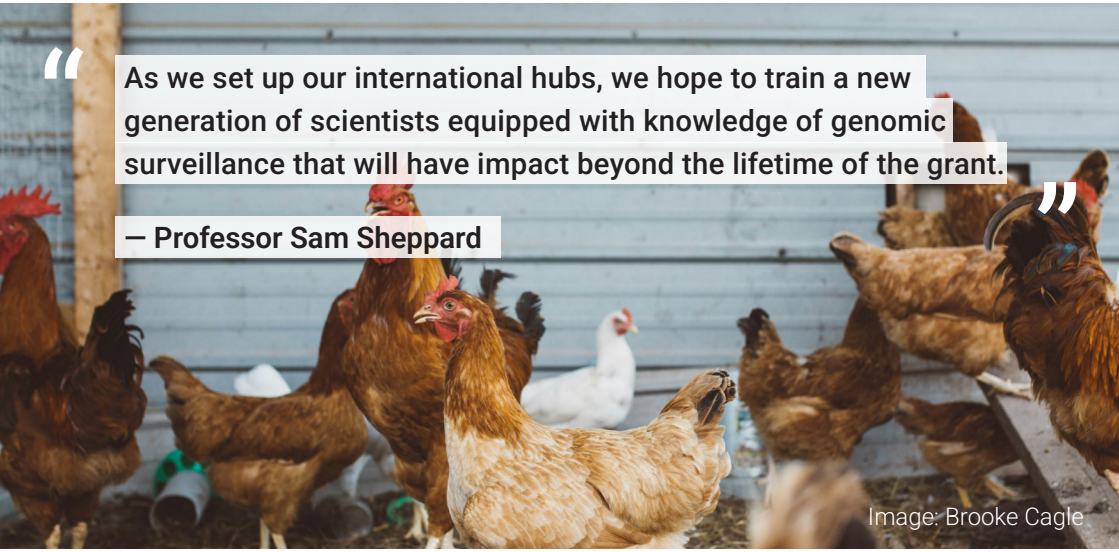
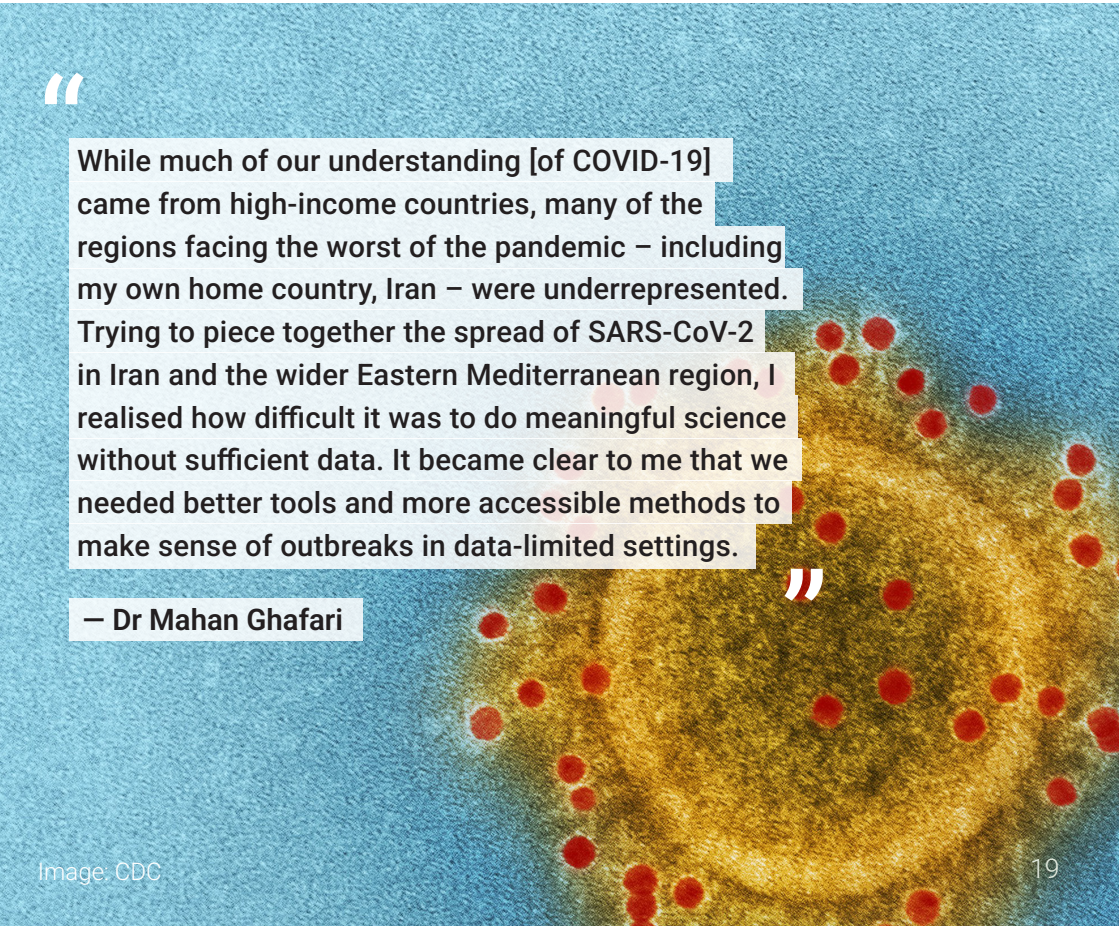


Image: Brooke Cagle

Thanks to a £5 million Wellcome Discovery Award, Professor Sam Sheppard leads an international effort to combat *Campylobacter*, a major bacterial cause of diarrhoeal disease in children under five in low- and middle-income countries. His team use genomic surveillance to understand how the disease spreads and develop a livestock-targeted vaccine to break the transmission chain. The project is building long-term research capacity across 19 countries, training a new generation of scientists and creating a global model for vaccine development, offering hope against antibiotic-resistant infections worldwide. Sam is part of the Ineos Oxford Institute for antimicrobial research, founded following a £100 million donation from Ineos. The institute aims to combat the growing global issue of antimicrobial resistance.

DR MAHAN GHAFARI

For Dr Mahan Ghafari, tracing viruses back through time illuminates the potential threats of the future. Mahan's work is building capacity for more equitable and effective responses to epidemics and pandemics by investigating how pathogens change and what this means for us.



> **While much of our understanding [of COVID-19] came from high-income countries, many of the regions facing the worst of the pandemic – including my own home country, Iran – were underrepresented. Trying to piece together the spread of SARS-CoV-2 in Iran and the wider Eastern Mediterranean region, I realised how difficult it was to do meaningful science without sufficient data. It became clear to me that we needed better tools and more accessible methods to make sense of outbreaks in data-limited settings.**
>
> **— Dr Mahan Ghafari**

Image: CDC

CONSERVING BIODIVERSITY FOR PEOPLE & PLANET

Halting and reversing nature loss while meeting human needs

Nature is the foundation of human wellbeing, yet over one million species are threatened with extinction and natural habitats are vanishing at an alarming rate. The systems we rely on for life are under pressure like never before.

Our biodiversity hub tackles this crisis head-on. Researchers work across disciplines to understand the causes of biodiversity loss, evaluate solutions and support actions that protect both ecosystems and the people who depend on them. We develop global indicators to track biodiversity trends, assess the effectiveness of conservation strategies and create new models for sustainable food and fibre production.

Image: Ato Aikins

Crucially, we put people at the heart of biodiversity research, ensuring that conservation benefits are shared fairly and that nature-based solutions address both environmental and societal needs. Our work informs international policy and helps governments, communities and businesses to make evidence-based changes. Generous donor support helps us to safeguard nature for future generations fairly and equitably, improving lives across the world.

HESTIA

– a world with sustainable agriculture

"I fundamentally believe in the foundational importance of better knowledge and information to drive change in the food system. HESTIA is directly addressing this problem by scaling up our access to information on which farming practices and which food products are most and least sustainable, and putting that knowledge into the hands of farmers, food companies, consumers, and policymakers."

— Dr Joseph Poore

Image: EqualStock

Agriculture is a major driver of humanity's most pressing environmental problems. HESTIA is an online platform which provides the largest global archive of public data on farms and their environmental impacts, plus a Life Cycle Assessment modelling toolkit to help drive the adoption of environmental impact assessment across the food supply chain.

HESTIA has received funding from the Login5 Foundation and other philanthropic and charitable organisations, which has supported the team to grow the platform, helping fill data gaps, and conduct experimental farm trials across four continents related to changing farmer behaviour and reducing environmental impacts.

AFRICAN BIODIVERSITY FELLOWSHIP

– supporting people, supporting wildlife

Our African Biodiversity Fellowships, funded by the A. G. Leventis Foundation, enable conservationists from African countries to work with the University's extensive environmental research network in Oxford, build collaborations and develop new perspectives and skills that benefit the work they are doing in their home countries.

The programme also ensures that our research is informed by, and meaningful for, real-world conservation issues, and is carried out in collaboration with in-country end-users.

The fellowship is hosted by our Interdisciplinary Centre for Conservation Science, led by Professor Dame E.J. Milner-Gulland, whose professorship is endowed by Tasso Leventis.

Image: Chris Stenger

BRIDGING NATURAL & ARTIFICIAL INTELLIGENCE

From foundations to frontiers: shaping the future of embodied intelligence

Intelligence — whether natural or artificial — is one of the defining challenges of our time. AI has made striking advances, yet living organisms still surpass machines in their ability to adapt, learn, and thrive in complex, changing environments.

Our intelligence hub takes an embodied approach, asking: how does intelligence emerge from the interaction of brain, body and environment? By studying how organisms sense, process and act on information, and combining this with advanced computational modelling, we seek new principles of adaptive intelligence that can shape the next generation of intelligent systems.

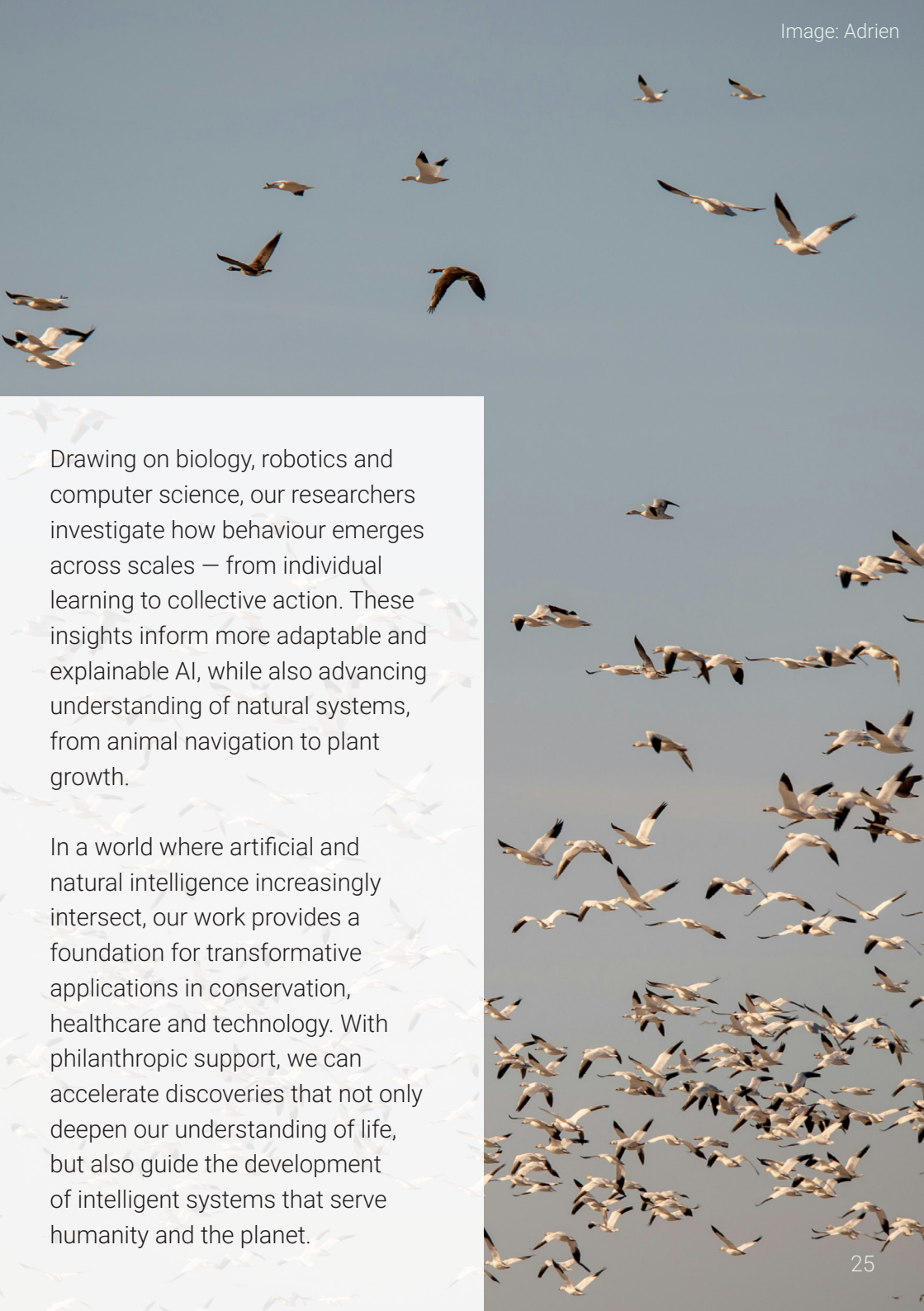


Image: Adrien

Drawing on biology, robotics and computer science, our researchers investigate how behaviour emerges across scales — from individual learning to collective action. These insights inform more adaptable and explainable AI, while also advancing understanding of natural systems, from animal navigation to plant growth.

In a world where artificial and natural intelligence increasingly intersect, our work provides a foundation for transformative applications in conservation, healthcare and technology. With philanthropic support, we can accelerate discoveries that not only deepen our understanding of life, but also guide the development of intelligent systems that serve humanity and the planet.

SEISMIC SENSES

— on display at the Royal Society

Our Animal Vibration Lab made waves at the 2025 Royal Society Summer Science Exhibition, showcasing its interactive exhibit "Seismic Senses: from spiders to elephants". Visitors encountered live tarantulas, stepped inside a multisensory "vibration pod" and used real seismic sensors to explore how animals perceive the world through ground vibrations. The lab's interactive game invited children to become "seismic scientists", tracking signals in the field and discovering how human activity affects wildlife. By uncovering how animals interpret and respond to subtle physical cues, the lab's research deepens our understanding of the natural world and the nature of intelligence itself — offering insights that can inspire new technologies.

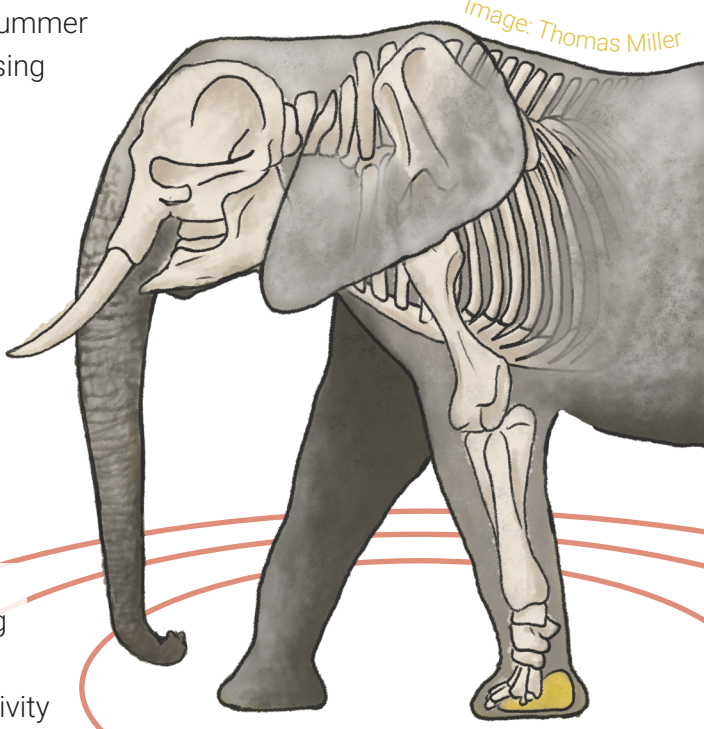


Image: Thomas Miller

DR RACHEL PARKINSON

Dr Rachel Parkinson studies how insect brains process information and how this is disrupted by environmental stressors like pesticides. Her work has revealed how even low levels of chemicals can affect bees' vision, movement and navigation and have serious consequences for pollination and food systems.

As an Eric & Wendy Schmidt AI in Science Fellow, a programme funded by Schmidt Sciences, Rachel has developed AI-powered tools to detect early signs of harm in pollinators. She has also co-founded MetaBeeAI, a platform that uses large language models to rapidly assess pesticide risk. Her work bridges biology, technology and conservation and helps shape strategies to protect insects vital to ecosystems and agriculture.

OUR TEACHING

UNDERGRADUATE

Research and teaching are inseparable in Oxford Biology. Our students learn from leading researchers, developing the skills and curiosity to explore life in all its complexity. In the Life and Mind Building's purpose-built labs and learning spaces, hands-on investigation and interdisciplinary thinking prepare the next generation to tackle the world's most urgent biological challenges.

Our teaching extends beyond the classroom, with fieldwork often a defining moment in the academic and personal development of our students. Fieldwork gives students the chance to apply their knowledge, develop critical research skills and build confidence and resilience. However, the cost of travel, equipment and accommodation is a barrier for many. Our field trip fund ensures that every student, regardless of financial background, can participate fully in the hands-on learning that makes Oxford Biology exceptional.

Our tropical forest field course allows 20 academically excellent and highly motivated undergraduate students each year to experience the richness and complexity of tropical forests first-hand in Borneo. Uniquely, from 2025 the course also welcomes four fully funded local students each year from Indonesia and Malaysia, providing knowledge transfer and networking opportunities as well as invaluable cultural exchange.

Each year, the field course costs £45,000 to run, making philanthropic support essential to ensuring that no qualified student is ever held back by financial concerns. Thanks to alumnus Siddarth Shrikanth and the Generation Foundation, three years of bridge funding are in place — but continued support is vital to endow the hardship fund and secure the course's long-term future.

Image: Harry Roberts

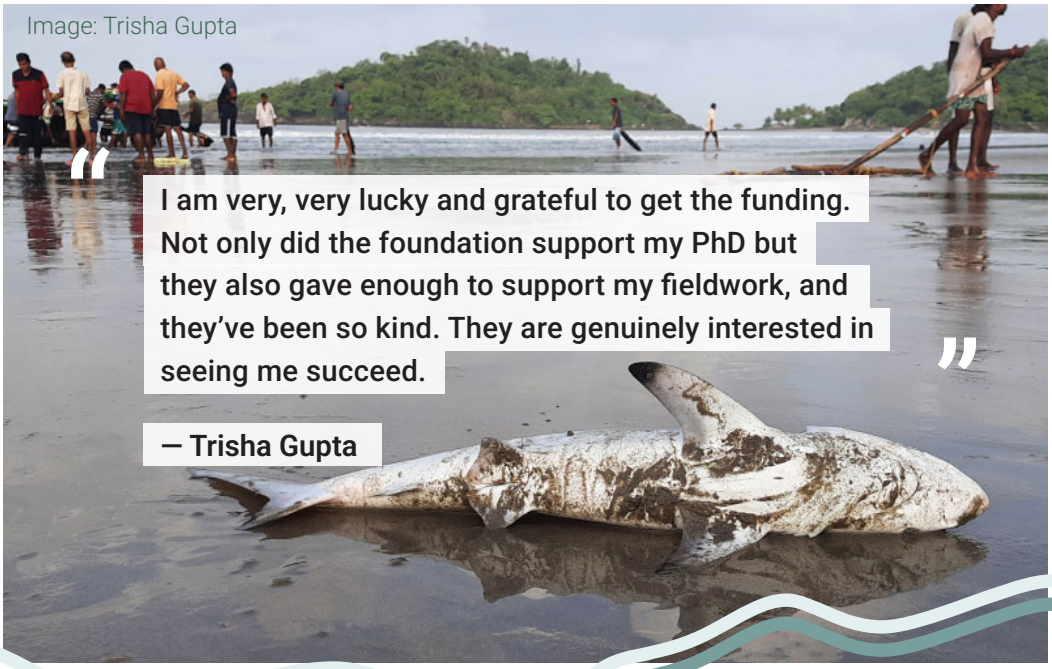
POSTGRADUATE

Our DPhil students are the driving force behind much of Oxford Biology's research. However, without financial support, many talented students are unable to take up their place on a course of study. We rely on philanthropy to fund scholarships that remove barriers to entry and ensure that the most promising individuals can thrive at Oxford. Donors can contribute to partial awards or establish full named scholarships, directly investing in the next generation of scientific leaders.

"My DPhil is funded by the African Natural History Research Trust Scholarship, which has been invaluable in allowing me to come to Oxford. My project involves studying the evolutionary history of a genus of moth, *Parasa*, which is found throughout the global tropics. I use specimens from natural history museums to extract and sequence their DNA. The work hopes to uncover how closely related species of the genus are across their wide distribution, and will improve our understanding of long-term insect evolution and dispersal across the planet."

— Tabitha Taberer

Image: Tabitha Taberer



With support from the Levine Family Foundation, DPhil student Trisha Gupta has taken action to protect some of India’s most enigmatic and misunderstood marine species. In the last half-century alone, the global abundance of oceanic sharks and rays has fallen by 71%.

A big focus of Trisha’s work has been aligning the conservation of India’s sharks and rays with the needs of local communities, for whom these species can be key contributors to both livelihoods and food security.

Trisha had to work hard to build trust with local communities. She relocated to Goa for three months in the run up to a key part of her project, which involved asking sensitive questions about measures that could reduce or stop fishing of these endangered species entirely. It is an experience that would not have been possible were it not for the support of the Levine Family Foundation.

The Recanati-Kaplan Centre Postgraduate Diploma in International Wildlife Conservation Practice, delivered through our Wildlife Conservation Research Unit, equips early-career conservationists from biodiversity-rich but resource-limited countries with the biological knowledge and practical skills to tackle global challenges.

Participants are selected for their talent and commitment, providing opportunities for those who would not otherwise have access to a world-class scientific education. A grant from Dr Thomas Kaplan, founder of the Panthera Foundation, provides for the sponsorship of candidates from the Global South.

BUILDING OUR FUTURE TOGETHER

This document has illustrated just a few examples of the energy, innovation and dedication to excellence that drives Oxford Biology. As we launch our hubs and move into our new home in the Life and Mind Building, we are looking for philanthropic partners and supporters who are as curious, dedicated and excited about the potential of our research as we are.

As a department and community we are deeply committed to addressing the challenges currently facing our planet, but we cannot do it without your help.

We would be delighted to answer any questions you may have about our department and our research, and warmly invite you to reach out to explore opportunities for support.

MPLS Development Office
mpls@dae.ox.ac.uk


Image: NBBJ / Ty Cole
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