



UNIVERSITY OF
PLYMOUTH

Advancing knowledge, transforming lives



ANNUAL REVIEW

2020

Welcome to the University of Plymouth's inaugural Annual Review



Welcome to the University of Plymouth's inaugural *Annual Review*.

This publication reflects upon the 2019–20 academic year – a year that has encompassed great success and unprecedented challenges; 12 months during which our world-leading research was recognised with the highest honour in education, and a global pandemic forced us to suspend traditional face-to-face teaching for the first time in the 158-year history of the institution.

Across the University, through research and innovation, education, and civic engagement, our people have responded magnificently to this rapidly changing and uncertain environment. Whether initiating the development of coronavirus vaccines, delivering online education and assessment or manufacturing components for life-saving PPE, our staff and students have embodied the ethos of the Civic University. Many have worked long hours, under intense pressure, to deliver and to support their colleagues, communities and cohorts.

For the whole sector, there are likely to be 'bumps in the road' ahead – but the University can be confident in its ability to navigate them with its Strategy 2030 providing a sound basis for the development and operational

robustness of the institution. This strategy envisages a broad-based, international university of its region, maintaining pre-eminence in research and education in marine and maritime environments and societies, and leadership in environmental sustainability.

As this *Annual Review* documents, the University is already delivering upon that vision in many respects. In 2019–20, the University was rated in the top 25 for teaching in the National Student Survey, and was awarded the Queen's Anniversary Prize for Higher and Further Education for a third time, in recognition of two decades of ground breaking research into microplastics and marine litter and policy impact. The University is demonstrating its civic leadership through multimillion-pound grants to support innovation and eHealth, and addressing dental and legal deprivation in our local communities through experiential education.

There is much work ahead of us, but we are building successfully upon our heritage of being a university that advances knowledge and transforms lives.

Professor Judith Petts CBE
Vice-Chancellor

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Strategy

In December 2019, the University published its refreshed strategy, *University 2030: A Future of Excellence*. This provides the basis for the institution’s development, building upon its mission of **advancing knowledge and transforming lives**. It is founded upon extensive, positive and rich discussions with staff at all levels, as well as our students.

Strategy 2030 sets two ambitious institutional goals to be realised by the end of the decade: **to be a top-30 university in the UK, and top 250 in the world**. This will require investment in staff, the estate, emerging technologies and digital trends, and will build upon the University’s pre-eminence in marine and maritime research and education, and its admired, holistic approach to environmental sustainability, across research, education and practice.

OUR STRATEGIC PRIORITIES

Strategy 2030 is underpinned by three strategic priorities and a fourth enabling priority.



PRIORITY ONE: DELIVER EXCELLENT EDUCATION AND RESEARCH

The first priority is concerned with the fundamental excellence of the University’s main areas of work, namely an innovative education portfolio, programme excellence, and strong research foundations and research power. This includes: development of blended and experiential learning, and competitive online programmes; expanding the postgraduate offer and international student numbers; optimising the institution’s location and industrial links; increasing the percentage of research-active staff, growing income, nurturing our research talent base; and supporting cross-University interdisciplinary institutes focused on global challenges.



PRIORITY TWO: NURTURE OUTSTANDING STUDENTS AND STAFF

The second priority seeks to support the development of a distinctive South West coast experience for those enrolled at the University, one that prepares graduates for the world and its career opportunities. It also sets out the institution’s intent to attract, develop and retain excellent staff. Its objectives include: ensuring students develop critical skills through the combination of research-enhanced, experiential education and excellent student support; providing opportunities for students to take advantage of the natural assets of the region, facilitating as well their potential to make a positive difference to communities; building critical mass through strategic recruitment in high-performing areas; unlocking academic staff time for teaching and research; and supporting staff in external engagement and ambassadorial roles.



PRIORITY THREE: DRIVE GLOBAL CONNECTIVITY THAT MAKES A DIFFERENCE

The third priority focuses upon how the University achieves influence and impact through significant industry partnerships, and how it maximises its reach through strategic partnerships. This encapsulates an intent to optimise research impact and knowledge exchange for the good of society and the economy; to drive revenue from research and development activities to support investment; and to capitalise on applied expertise to support graduate pathways into employment. It also pledges to grow strong and sustainable international collaborations, particularly partnerships with leading marine and maritime institutions.



ENABLING PRIORITY: INVEST TO ENSURE A LEADING- EDGE, SUSTAINABLE UNIVERSITY

To enable the three strategic priorities, the University has pledged to sustainably invest in them. This will require optimisation of resource allocation, and of emerging technologies and digital trends; and the delivery of transparent and responsible institutional stewardship.



HOW WE WILL KNOW THAT WE HAVE BEEN SUCCESSFUL

In addition to the two key indicators based upon league table position, Strategy 2030 envisages and elucidates a successful University of Plymouth as:

- A broad-based, international university of the region – one exuding confidence in its excellence and impact
- Attracting and retaining the best staff, building and maintaining critical mass in areas of research excellence
- Addressing global challenges through international and interdisciplinary collaborations, and impacting socioeconomic outcomes through industrial and civic engagement
- Prioritising personalised, research-led and experiential education and learning, connecting with learners internationally; and nurturing skilled, adaptable and resilient graduates
- Sustaining an exciting group of international partnerships and collaborations, including significant partnerships with leading marine and maritime institutions
- Ensuring thought leadership, setting policy agendas locally, nationally and internationally, and communicating and engaging effectively with all stakeholders
- Delivering a healthy surplus to support investment; agile, innovative and unafraid to take calculated risks
- Attracting corporate investors and partners in research and education facilities
- Supporting staff and students through a leading-edge digital strategy, and maintaining inspiring, transformative and sustainable infrastructure, which also makes a difference to the city.

Research and Enterprise



The University has a proud reputation for conducting world-leading, impactful research across a broad range of fields. From health technologies to heritage; marine sciences to medicine; psychology to sustainability. And alongside these sustained peaks of excellence, the University is fast developing a critical mass of expertise in emerging, exciting areas such as agri-technology, antimicrobial resistance, cybersecurity and creative economies.

Our University draws upon its location to maximise these research strengths. Across marine sciences and maritime, we're able to take advantage of the breathtaking natural environment of Plymouth Sound (the first National Marine Park), as well as the many marine-related companies that are based here. To this natural laboratory we have added a waterfront Marine Station, home to our expanding fleet of research and teaching vessels, and a nationally leading Marine Building, with its wave tanks and navigation centre, and we are developing a cutting-edge Cyber-SHIP Lab to tackle the issue of cybersecurity in the maritime sector.

In health and care research, we take advantage of our co-location and partnership with the University Hospitals Plymouth NHS Trust. Our Derriford Research Facility, located adjacent to the hospital, is home to medical and biomedical experts conducting research into areas such as infection and immunity, neurodegenerative diseases, brain tumours and antimicrobial resistance. We are leading the development of potentially the first new antibiotic in 30 years and the first vaccines for the animal population against COVID-19. And adding to our first-class facilities, a new Brain Research and Imaging Centre is due

to open, which will include the most advanced MRI scanner in the region.

Finally, our Sustainable Earth Institute (SEI) – our third overarching strategic research institute – continues to build innovative partnerships with industry and government, not just here in the South West, but also overseas. Operating from the new Sustainability Hub on campus, the SEI acts as a catalyst whereby University expertise can be applied to a range of challenges, from the low carbon agenda to water quality and food security in the developing world.

Over the following pages, we present some of the developments and successes that have defined the year, including the publication of groundbreaking work in high-impact journals, the winning of major funding grants, our partnerships with industry, and the recognition of our staff in identifying and solving problems of global significance. The University's research community is flourishing, ready to respond to global challenges and opportunities.

Professor Jerry Roberts

Deputy Vice-Chancellor – Research and Enterprise



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MARINE

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- Health technology and advanced social robots
- Developing animal vaccines for COVID-19

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ENTERPRISE

- Investment for innovative businesses
- Multimillion-pound support for health technology in Cornwall
- Nurturing intellectual property
- New unmanned marine vessel
- Partnering in the pioneering National Marine Park
- Research funding

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The key story here is that the emission of fibres while wearing clothes is likely of a similar order of magnitude as that from washing them. That constitutes a substantial and previously unquantified direct release to the environment. The results also show textile design can strongly influence both release to the air and release due to laundering; that is a crucial message highlighting the importance of sustainable design for the fashion industry. Indeed, many of the current issues associated with the environmental impacts of plastic items stem from a lack of holistic thinking at the design stage.

Professor Richard Thompson
OBE FRS, Director of the Marine Institute, and Head of the International Marine Litter Research Unit.



Marine

GROUNDBREAKING RESEARCH INTO MICROPLASTICS AND MICROFIBRES

In a year when the University's 20-year expertise in marine plastics and litter was recognised with a third prestigious Queen's Anniversary Prize for Higher and Further Education (see page 50), its scientists unveiled several groundbreaking new studies. Among them were the findings of a major government-funded project detailing how particles released from vehicle tyres could be a significant and previously largely unrecorded source of microplastics in the marine environment. The research showed that tyre particles can be transported directly to the ocean through the atmosphere, or carried by rainwater into rivers and sewers, where they can pass through the water treatment process. Researchers estimate this could place around 100 million m² of the UK's river network – and more than 50 million m² of estuarine and coastal waters – at risk of contamination by tyre particles. The project, undertaken for Defra, will be used to guide ongoing and future research into the impact of human activities on the marine environment, as the government continues in its fight against plastics pollution.

The University also published first-of-its-kind research revealing that wearing clothes can release even greater quantities of microfibres to the environment than washing them. Working with scientists from the Institute for Polymers, Composites and Biomaterials of the National Research Council of Italy (IPCB-CNR), the team discovered that up to 4,000 fibres per gram of fabric could be released during a conventional wash, while up to 400 fibres per gram of fabric could be shed by items of clothing during just 20 minutes of normal activity. Scaled up, the results indicate that one person could release almost 300 million polyester microfibres per year to the environment by washing their clothes, and more than 900 million to the air by simply wearing the garments. The research, published in *Environmental Science & Technology*, found that there were significant differences depending on how the garments were made, meaning that clothing design and manufacturers have a major role to play in preventing microfibres from being emitted into the environment. A further study, published at the end of the year, went on to show that some commercially available washing machine filters may capture up to 80% of these fibres.



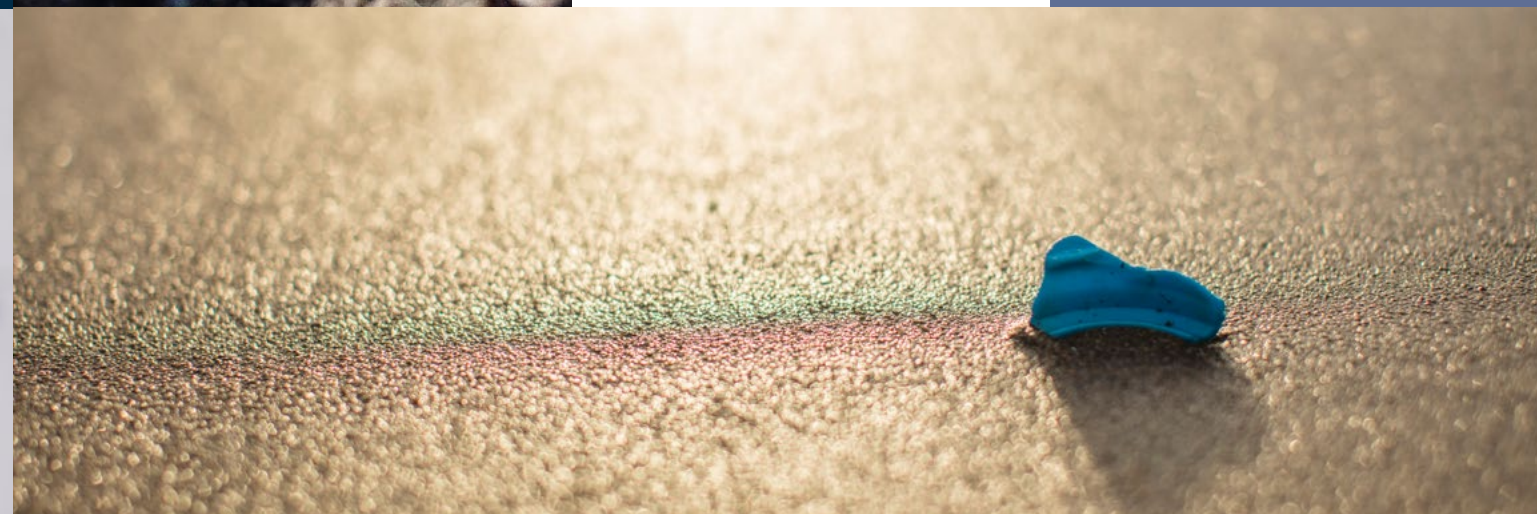
MUSSEL REEFS HEIGHTEN MICROPLASTIC RISK

Commercially important seafood species are at greater risk of microplastic contamination depending upon how they clump together in the marine environment. This was the finding of a first-of-its-type study in which scientists from the University used a series of experiments to assess whether the reefs formed by blue mussels (*Mytilus edulis*) affected their exposure to, and consumption of, tiny microplastic particles. Writing in *Environmental Research Letters*, the team, led by graduate Hyeon Shynn Lim and Dr Antony Knights, evidenced how the arrangement and surface roughness of natural reef structures – such as that constructed by mussel populations – create conditions that make them natural sinks for plastics and other forms of human pollution. They also believe species like the blue mussel that are important for human consumption, but susceptible to microplastic pollution, may be useful indicators of the problem and its potentially harmful biological impacts.

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Often we look to protect reef-forming species based on what they are. However, we are not aware of any research that has shown that the physical structure of the reef itself might also inadvertently increase species' exposure to pollutants like microplastics. With no means of addressing this issue, due to our increasing awareness of the quantity of microplastic in the marine environment, this study offers the first evidence that forming a reef is a double-edged sword for individuals.

Dr Antony Knights, Associate Professor in Marine Ecology, School of Biological and Marine Sciences.



THE ENDURING LEGO BRICK

A new study has found that a LEGO brick can weather the effects of the marine environment for anywhere between 100 and 1,300 years. By measuring the mass of individual bricks found on beaches against equivalent unused pieces, researchers were able to calculate the length of time it would take for them to completely disintegrate. Published in *Environmental Pollution*, the study focused on 50 bricks recovered from beaches in the South West and analysed using an X-ray fluorescence (XRF) spectrometer.

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The pieces we tested were smoothed and discoloured, with some of the structures having fractured and fragmented, suggesting that as well as pieces remaining intact they might also break down into microplastics. It once again emphasises the importance of people disposing of used items properly to ensure they do not pose potential problems for the environment.

Dr Andrew Turner, Associate Professor (Reader) in Environmental Sciences, School of Geography, Earth and Environmental Sciences.

CHARTING PLANKTON DECLINE IN THE ATLANTIC OCEAN

Research led by the University has shown that a shortage of summer nutrients resulting from the changing climate has contributed to a 50% decline in important North-East Atlantic plankton over the past 60 years. The study, published in *Global Change Biology*, reveals that larger, nutritious plankton – vital to supporting fish, seabirds and marine mammals – are being replaced by tiny, primary producers that are of poorer food quality owing to decreasing amounts of iron and nutrients in surface waters. The study was led by scientists in the School of Geography, Earth and Environmental Sciences (funded through the Natural Environment Research Council's [NERC] Shelf Sea Biogeochemistry Programme), working with colleagues from Plymouth Marine Laboratory, the Marine Biological Association and the University of Southampton. With picoplankton replacing nutritious phytoplankton – a vital primary producer of omega-3 – the scientists say that competition for scarce summer nutrients could become a key force in structuring shelf seafood webs, where 80% of the world's wild-captured seafood originates.

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Zooplankton such as copepods are considered beacons of climate change, and the ~50% decline in their abundance over the last six decades is worrying. Our study is the first to provide a mechanism for such a widespread decline, and this understanding is essential for projecting future responses to climate change.

Dr Katrin Schmidt, plankton ecologist, School of Geography, Earth and Environmental Sciences.

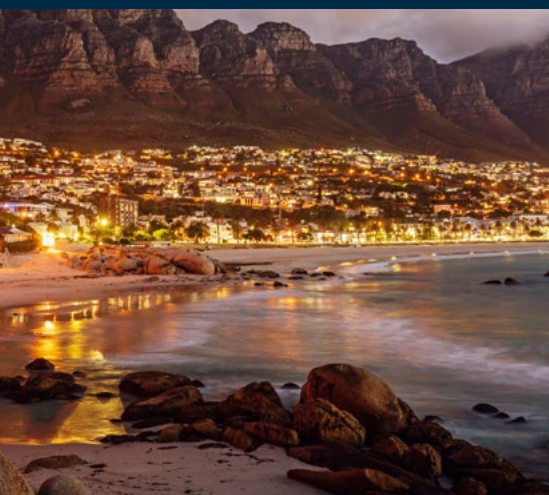
ARTIFICIAL NIGHT SKY POSES SERIOUS THREAT TO COASTAL SPECIES

A NERC-funded project led by marine biologists revealed that artificial lighting lining the world's coastlines could be having a significant impact on species that rely on the moon and stars to find food. According to the Artificial Light Impacts on Coastal Ecosystems (ALICE) project, creatures such as the sand hopper (*Talitrus saltator*) orientate their nightly migrations based on the moon's position and brightness of the natural night sky. But researchers found that lighting can disrupt this lunar compass and cause species to venture away from their natural feeding grounds, even impacting the ecosystem.

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Through the ALICE project, we are finding increasing evidence that light pollution from coastal cities can influence marine species inhabiting nearby beaches, rocky shores and even the seafloor. These results highlight how pervasive city lighting could be in shaping the ecology of coastlines kilometres distant from their nearest urban centres.

Dr Thomas Davies, Lecturer in Marine Conservation, School of Biological and Marine Sciences.



WARMER AND ACIDIFIED OCEANS CAN LEAD TO 'HIDDEN' CHANGES IN SPECIES BEHAVIOUR

A study conducted by researchers at Ghent University (Belgium), the University of Plymouth and the University of South Carolina (USA) has shown that ocean warming and acidification impact not only the behaviour of individual species but also the wider marine ecosystems which are influenced by them. Published in *Nature Climate Change*, the report shows that in warmer seawater with lower pH, a common clam – the peppery furrow shell (*Scrobicularia plana*) – makes considerable changes to its feeding habits. Instead of relying predominantly on food from within the water column, it can adapt its behaviour to use its tube-like feeding siphon to scrape more of its food from the seafloor. This in turn can lead to surface-dwelling invertebrates showing greater tolerance to warming and acidification, most likely owing to the stimulatory effect of the clam's altered feeding on their microalgal food resources.

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This shows how unexpected the effects of human impacts on our environment can be. If the behaviour of a given species changes because of ocean acidification and warming, what are the implications for other components of that community? Our study illustrates the importance of investigating the consequences of human impacts on the environment at multiple levels, including how this affects the way animals behave.

Mark Briffa, Professor of Animal Behaviour, School of Biological and Marine Sciences.



SEA LEVEL RISE MIGHT NOT RESULT IN 'ISLAND DROWNING'

Coral reef islands across the world could naturally adapt to survive the impact of rising sea levels, according to new research led by the University of Plymouth in conjunction with the University of Auckland (New Zealand) and Simon Fraser University (Canada). The increased flooding caused by the changing global climate has been predicted to render such communities – where sandy or gravel islands sit on top of coral reef platforms – uninhabitable within decades. However, in the study, published in *Science Advances*, the academics say this is far from a foregone conclusion. Using numerical modelling of island morphology alongside physical model experiments, the team were able to show that islands composed of gravel material can respond and in relation to overtopping waves, with sediment from the beach face being transferred to the island's surface.

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It is important to realise that these coral reef islands have developed over hundreds to thousands of years as a result of energetic wave conditions removing material from the reef structure and depositing the material towards the back of reef platforms, thereby creating islands. The height of their surface is actually determined by the most energetic wave conditions; therefore, overtopping, flooding and island inundation are necessary – albeit inconvenient and sometimes hazardous – processes required for island maintenance.

Gerd Masselink, Professor of Coastal Geomorphology, and Head of the Coastal Processes Research Group, School of Biological and Marine Sciences.



'FOSSIL EARTHQUAKES' OFFER NEW INSIGHT INTO SEISMIC ACTIVITY DEEP BELOW EARTH'S SURFACE

A major international study published in *Nature Communications* has shed new light on the mechanisms through which earthquakes are triggered up to 40km beneath the Earth's surface. Funded by NERC, the research was led by Plymouth geologists and colleagues at the University of Oslo (Norway), who conducted geological observations of seismic structures in exhumed lower crustal rocks on the Lofoten Islands, Norway. They also analysed samples at the University's Plymouth Electron Microscopy Centre. The results showed that earthquake ruptures may be encouraged by the interaction of different shear zones that are creeping slowly and aseismically. This interaction loads the adjacent blocks of stiff rocks into the deep crust, until they cannot sustain the rising stress anymore and snap – generating earthquakes. As part of the study, scientists also worked with University of Plymouth filmmaker Heidi Morstang, Associate Professor in Photography in the School of Art, Design and Architecture, to produce a 60-minute documentary about their work.

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The model we have now developed provides a novel explanation of the causes and effects of such earthquakes that could be applied at many locations where they occur.

Dr Lucy Campbell, Post-Doctoral Research Fellow, School of Geography, Earth and Environmental Sciences.

Sustainable Earth

FUTURE RAINFALL COULD FAR OUTWEIGH CURRENT CLIMATE PREDICTIONS

The UK's uplands could in future see significantly more annual rainfall than is currently being predicted in national climate models. This was the conclusion of new research by the University after scientists analysed rainfall records from the 1870s to the present day and compared them against those featured in the Met Office's UK Climate Projections 2018 (UKCP18) report. The study, published in *Climate Research*, showed that there has been a significant increase in spring, autumn and winter precipitation, greatest in upland windward areas of the region, with winter increases broadly consistent with UKCP18 projections. However, their results show – for spring, summer and autumn precipitation – there could be large divergence by the mid- to late-21st century, with the observed mismatch greatest in upland areas.

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Our study helps to contextualise the latest UK climate change projections, and suggest caution is required when making assumptions on climate impacts based on climate models. Current models predict that by 2050, summer rainfall on Dartmoor will fall by as much as 20%, but our results from past records show that in the uplands it is on an upward trajectory. This research highlights the complex challenges facing those trying to predict the effects of climate change.

Dr Paul Lunt, Associate Professor in Environmental Science, School of Geography, Earth and Environmental Sciences.

FOSSIL REVEALS EVIDENCE OF 200 MILLION-YEAR-OLD 'SQUID' ATTACK

Palaeontologists at the University have discovered the world's oldest known example of a squid-like creature attacking its prey, in a fossil dating back almost 200 million years. The fossil was found on the Jurassic coast of southern England in the 19th century and is currently housed within the collections of the British Geological Survey in Nottingham.

In a new analysis, researchers at the University, working with the University of Kansas and Dorset-based company The Forge Fossils, have found that it appears to show a creature – which they have identified as *Clarkeiteuthis montefiorei* – with a herring-like fish (*Dorsetichthys bechei*) in its jaws. They say the position of the arms, alongside the body of the fish, suggests this is not a fortuitous quirk of fossilisation but that it is recording an actual palaeobiological event. It has also been dated from the Sinemurian period (between 190 and 199 million years ago), pre-dating any previously recorded similar sample by more than 10 million years.

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This is a most unusual, if not extraordinary, fossil as predation events are only very occasionally found in the geological record. It points to a particularly violent attack which ultimately appears to have caused the death, and subsequent preservation, of both animals.

Malcolm Hart, Emeritus Professor.



STUDY IDENTIFIES WAY TO ENHANCE THE SUSTAINABILITY OF MANUFACTURED SOILS

With soil degradation and erosion posing a global threat to food security, scientists at the University have found that a combination of waste materials supplemented with a product of biomass can improve the quality of manufactured soils. Adding biochar – a solid, carbon-rich material derived from biomass – to soil constructed from waste materials helps reduce the loss of essential nutrients such as carbon and nitrogen. In a paper, published in *Science of the Total Environment*, academics on the FABsoil project said this could not only improve the sustainability of manufactured soils but also lower the soil's dependence on intensive fertiliser applications. FABsoil is a partnership between the University, the Eden Project and businesses in Cornwall, such as the Green Waste Company. It has received financial support from Agri-Tech Cornwall, a three-year £9.6 million initiative part-funded by the European Regional Development Fund, with match-funding from Cornwall Council.

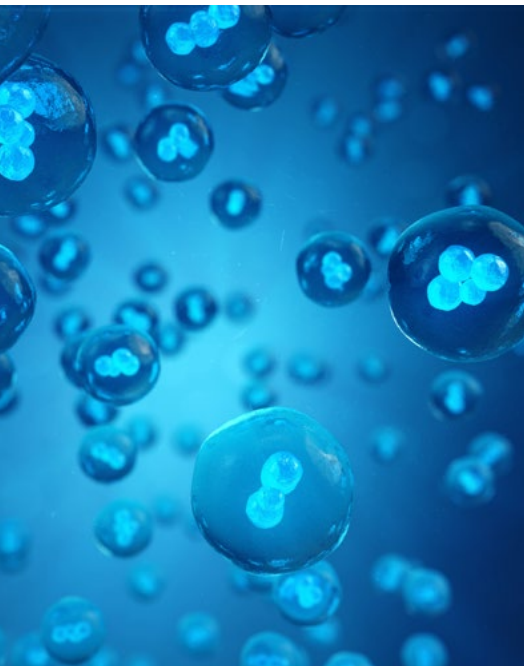
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The manufacture of high value soils from waste materials offers international opportunities in terms of food security, carbon sequestration and achieving a circular economy. However, it is crucial that whatever soil we create is sustainable in the long term and that is one of the key ongoing challenges our research aims to meet.

Mark Fitzsimons,
Professor of Environmental
Chemistry, School of
Geography, Earth and
Environmental Sciences.



Health and Care Research



INSIGHT INTO CELLS' 'SELF-EATING' PROCESS COULD PAVE THE WAY FOR NEW DEMENTIA TREATMENTS

The process by which cells undergo autophagy – or 'self-eating' – thus helping the body to destroy bacteria and viruses after infection, was the focus of a major research paper by medical scientists this year. Published in *Nature Communications*, the paper shed new light on the mechanisms behind how it works, and how it fails, in particular something called 'liquid-liquid phase separation'. The team believe the findings could provide the first steps towards new treatments for neurodegenerative diseases.

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By understanding more about autophagy and the details of the processes involved, we can identify what might be going wrong, and therefore where to target when it comes to tackling neurodegenerative diseases. This research is a major step in helping us to do that.

Shouqing Luo, Professor of Neurobiology, Peninsula Medical School.



RESULTS OF LONG-TERM COHORT STUDY COULD HELP IDENTIFY CHILDREN AT RISK OF FUTURE TYPE 2 DIABETES

The findings of a unique study, which has followed 300 healthy children in Plymouth for 15 years to determine who would become at risk of developing type 2 diabetes and why, were published during the year. Conducted by researchers in the Peninsula Medical School and Nestlé, the EarlyBird project has monitored the children from the age of five to early adulthood to explore how their metabolism changes during growth. The latest results, published in *Diabetes Care*, show that the earliest event leading to pre-diabetes is dysfunction of the pancreatic beta-cell, independent of body weight. Beta-cells in the pancreas produce insulin, the hormone that regulates blood sugar levels. The study also showed that this beta-cell dysfunction was associated with the presence of genetic factors previously associated with type 2 diabetes in adults.

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The rapidly rising prevalence of type 2 diabetes is one of the biggest global health challenges, and there is an urgent need to develop effective strategies for early intervention and prevention. The research partnership between the University and Nestlé has shown how the risks of future type 2 diabetes can be predicted in childhood. This opens up the possibility of individualised advice and early intervention to reduce the risks of future type 2 diabetes.

Jon Pinkney, Professor of Endocrinology and Diabetes, Peninsula Medical School, and Honorary Consultant Physician in Endocrinology and Diabetes at University Hospitals Plymouth NHS Trust.



RESEARCH OFFERS FRESH PERSPECTIVE ON MOUTHWASH

Dental researchers published two high-profile studies this year, revealing the impact that commonly used mouthwash can have upon the body. The first, working with the Centre for Genomic Regulation, in Barcelona, and published in the *Radical Biology & Medicine* journal, showed that mouthwash can counterattack the beneficial blood-pressure-lowering effect of exercise by more than 60% over the first hour of recovery, and totally abolishing it two hours after exercise when participants were given the antibacterial mouthwash.

The second major piece of research, published in *Scientific Reports*, revealed that mouthwash can increase the amount of lactate-producing bacteria, which lowers pH, making saliva more acidic and thus increasing the risk of tooth damage. The team looked at the effects of chlorhexidine mouthwash on the whole oral microbiome, and after seven days they found it reduced microbial diversity and increased the abundance of species within the families Firmicutes and Proteobacteria.

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There is a surprising lack of knowledge and literature behind the use of these products. Chlorhexidine mouthwash is widely used but research has been limited to its effect on a small number of bacteria linked to particular oral diseases, and most has been carried out in vitro.

Dr Raul Bescos, Lecturer in Dietetics and Physiology, School of Health Professions.

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We want to change the way we think about disabled musicians. It's not about forcing them into 'normality', it's about celebrating what they can do.

Dr Nuria Bonet, Associate Lecturer, School of Humanities and Performing Arts.

DISABLED FORMER MUSICIANS OFFERED RETURN TO THE STAGE

A potentially life-changing project was launched during the year to help injured or ill former musicians reconnect with the joy of playing. The Interdisciplinary Centre for Computer Music Research is working with people (such as ex-military or emergency services) who, through physical injury or mental illness, are no longer able to play their instruments. The work will involve making individual adaptations to the way instruments are played, and providing psychological support. The project is the brainchild of composer Dr Nuria Bonet, and Charlotte Storey, former Head of Voice in Plymouth Conservatoire. Music will be composed specifically for participants and their abilities, with a series of rehearsals culminating in a public performance by the group at a future date.

A NEW METHOD OF TOOTH REPAIR

An international team of researchers, led by Professor Bing Hu, unveiled new research on a potentially novel solution to tooth repair. Professor Hu and his team have discovered a new population of mesenchymal stem cells (the stem cells that make up skeletal tissue such as muscle and bone) in a continuously growing mouse incisor model. In a paper, published in *Nature Communications*, they showed that these cells contribute to the formation of tooth dentin, the hard tissue that covers the main body of a tooth. Importantly, the work showed that when they are activated, they send signals back to the mother cells of the tissue to control the number of cells produced, through a molecular gene called *Dlk1*. Their paper was the first to show that *Dlk1* is vital for this process to work, and went on to prove that it can enhance stem cell activation and tissue regeneration in a tooth wound healing model. This mechanism could provide a novel solution for tooth reparation, in combating problems such as tooth decay and trauma treatment.

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By uncovering both the new stem cells that make up the main body of a tooth and establishing the vital use of *Dlk1* in regenerating the tissue, we have taken major steps in understanding stem cell regeneration.

Bing Hu, Professor of Oral Biology, Peninsula Dental School.



TEST BED FOR CUTTING-EDGE HEALTH TECHNOLOGY WELCOMES WORLD'S MOST ADVANCED SOCIAL ROBOT

A robot that has featured on the cover of *Time* magazine was brought to the country for the first time to be tested by health technology experts working on a multimillion-euro project in Cornwall. 'Stevie', "the world's most advanced social robot", arrived in the UK from Washington, courtesy of the University's Centre for Health Technology, to be trialled at a day centre in Camborne. Stevie carried out a range of activities and tasks such as leading a game of bingo, as well as simply spending time with clients. Researchers monitored his performance and gathered feedback from staff, as part of the eHealth Productivity and Innovation in Cornwall and the Isles of Scilly (EPIC) project (see also page 22).

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It is an honour to have hosted Stevie at the University and to work with him in a care setting, and it shows the idea of 'Testbed Cornwall' already has the clout to attract world-leading technology.

Ray Jones, Professor of Health Informatics, School of Nursing and Midwifery, and Project Lead for EPIC.

DEVELOPING ANIMAL VACCINES FOR COVID-19

A University spinout company, led by a renowned biomedical scientist, is making significant progress in the development of a vaccine that could be used to tackle COVID-19 in animals. The Vaccine Group, incorporated from the work of Dr Michael Jarvis, has been researching the virus since the pandemic began and announced that its first two possible vaccines had proven successful in pre-animal trial laboratory testing. Its aim now is to develop vaccines so as to eliminate SARS-CoV-2 (the virus that causes COVID-19) in existing animal sources. The vaccines could also be used to ensure cats, which have already been shown can become infected with SARS-CoV-2, and other pets do not become a reservoir for future outbreaks. The company is also investigating the longer-term potential of human vaccines; the next stage of development will be vital in assessing the technology's safety and efficacy for use in humans.

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The ability to control SARS-CoV-2 and prevent COVID-19 re-emerging from animal populations might become a key tool in the fight against this pandemic. Our vaccine platform appears able to induce immunity at sites where SARS-CoV-2 replicates. Whilst we are initially testing the efficacy of our vaccines in animals, positive data would open up the possibility of rapidly moving to a human vaccine.

Dr Michael Jarvis, Associate Professor (Reader) in Virology and Immunology, School of Biomedical Sciences, and Founder and Chief Scientific Officer of The Vaccine Group.



INVESTMENT FOR INNOVATIVE BUSINESSES

In addition to EPIC, the University also secured a seven-figure fund extension for another Cornwall-based programme supporting innovative businesses. A grant of £3.4 million was awarded by the ERDF to prolong the work of Acceleration Through Innovation (ATI) to 2022. ATI has so far engaged more than 580 businesses, awarded 48 innovation grants with a total value in excess of £1 million, and enabled 61 businesses to bring new products, services and processes to the market or their business. Phase 2 of ATI will make a further £500,000 of grants available for businesses in the Duchy.

“

This is an immensely challenging time for businesses and once we emerge from this situation, they are likely to need support more than ever. So, it is fantastic that we have secured additional funding, enabling us to continue our work with small- to medium-sized enterprises (SMEs) across Cornwall and the Isles of Scilly. ATI2 will deliver high-value, high-impact interventions to SMEs with specific innovation needs that have the potential to lead to scalable and commercially viable new products, services or processes.

Jo Hancock, EPIC Programme Manager, Acceleration Through Innovation.

Enterprise

MULTIMILLION-POUND SUPPORT FOR HEALTH TECHNOLOGY IN CORNWALL

The future of the health technology sector in Cornwall received a major boost this year, thanks to a successful funding application by the University. A £4 million, three-year extension of the eHealth Productivity and Innovation in Cornwall and the Isles of Scilly (EPIC) project was confirmed, ensuring experts can continue to support businesses in developing technology to address the challenges faced by communities and providers in coastal and rural settings.

The project, led by the Centre for Health Technology, will also work to help patients, professionals and care commissioners become accustomed to new technology to encourage its adoption. Funded by the European Regional Development Fund (ERDF), EPIC 2 will again make £600,000 available to businesses through a Challenge Fund. It will also set up ‘the EPICentre’ at the Health and Wellbeing Innovation Centre in Truro, to showcase local eHealth products and services, and be somewhere companies, health and care professionals and others can come to view and work together on the design of new ones.

“

Cornwall and the Isles of Scilly face challenges because of rurality and the older population, but necessity is the mother of invention – that also becomes our advantage. By developing products and services that are needed locally, we can lead the country with that technology.

Ray Jones, Professor of Health Informatics, School of Nursing and Midwifery, and Project Lead for EPIC.



NURTURING INTELLECTUAL PROPERTY

The University has an array of recently established spinout companies – all of which have been incorporated from cutting-edge research in science and medicine, and developed with the support of Frontier IP. **The Vaccine Group (TVG)**, created to commercialise the work of Dr Michael Jarvis, Associate Professor (Reader) in Virology and Immunology, raised £680,000 in equity funding to enhance its research into novel vaccine technologies. The additional funding, which values TVG at £9.5 million, will be used to accelerate development and expand the range of vaccines used to combat zoonotic diseases that jump from animals into humans. **Molendotech**, launched in 2017 to develop and commercialise the work of Simon Jackson, Honorary Professor at the University's Peninsula Medical School, secured considerable investment in April to speed the development of its novel bacteria-testing technology. The company, which is based at the University's Brixham Laboratory, raised £425,000 from new and existing investors through an equity funding round. The investment will be used to accelerate and expand the applications of its technology, which has recently attracted strong interest internationally from potential customers concerned about secondary infections as they tackle the COVID-19 outbreak. And finally, **Fieldwork Robotics**, which commercialises the work of Dr Martin Stoelen, raised £298,000 through an initial equity funding round. The proceeds will be used to accelerate development and scale-up of the company's novel robotics technology for harvesting soft fruit and vegetables. Fieldwork is now valued at just over £5 million. It has also signed an agreement with Bosch UK on a collaboration to optimise the company's soft robotic arms and develop software aimed at reducing the arms' cost and increasing their speed. The management of University IP to deliver real-world impact from its research will be a key component of impact case studies in the next Research Excellence Framework, which has been postponed from its original 2021 date.




NEW UNMANNED MARINE VESSEL JOINS UNIVERSITY FLEET

ERDF funding helped the University to secure a state-of-the-art unmanned marine vessel capable of conducting research off the south-west coast. The C-Worker 4 is the first major unmanned asset to join the University's fleet of vessels and marine field equipment, and will be central to its participation in the Marine Business Technology Centre project. The vessel will also create opportunities for Devon-based SMEs to take part in collaborative research, development and innovation activities within the Smart Sound Plymouth offshore proving area.

“

This technology has the undoubted potential to be a game changer in the field, enabling us to capture data which can transform our understanding of the oceans and the impact climate change and other factors are having on them. It is also a fantastic opportunity for our students and staff, and the wider business community, to engage with the technology and develop new and innovative ways of applying it to their work.

Professor Kevin Jones,
Executive Dean, Faculty of
Science and Engineering.



PARTNERING IN THE PIONEERING NATIONAL MARINE PARK

The University is one of the leading partners working to create the UK's first National Marine Park in Plymouth. Local, regional and national organisations from a variety of sectors have backed the project, which will showcase to the world the unique assets that Britain's Ocean City has to offer, including an estimated 1,000 different species of marine life. In the process, it will help boost the economy, attract more visitors, and enable funding for research and a range of other benefits. A Declaration of Intent for Plymouth Sound National Marine Park was signed by civic leaders in the city, including Lewis Pugh, UN Patron of the Oceans, and Charles Clover, Executive Director of the Blue Marine Foundation.

“

Plymouth Sound is a beautiful natural environment, and one that has contributed to the development of the largest marine research community in the country. The National Marine Park will only strengthen that, and will facilitate new links and collaborations with partners around the world.

Professor Richard Thompson
OBE FRS, Director of the
Marine Institute.

Examples of new research funding

Last year, the University received almost £16 million in research income, with new awards and grants totalling nearly £12 million. Here are a few examples of awards in excess of £100,000.

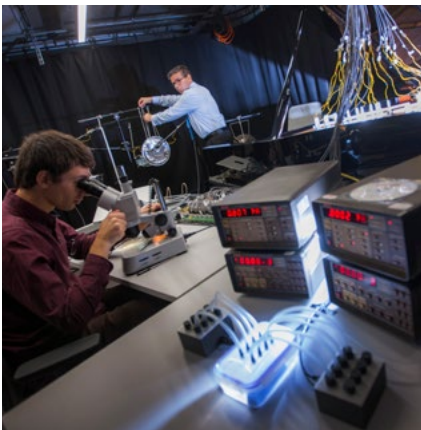
PRINCIPAL LEAD	SPONSOR	DESCRIPTION	AWARD VALUE
Ray Jones	European Regional Development Fund (ERDF)	EPIC 2: eHealth Productivity and Innovation in Cornwall and the Isles of Scilly	£3,043,260
Kevin Jones	Research England	Research England Development Fund for Maritime Cyber Project	£1,682,000
Elsa Fouragnan	UK Research and Innovation	Mapping the neural circuit of credit assignment for a new targeted intervention in addiction	£824,537
Thomas Davies	Natural Environment Research Council	Artificial Light Impacts on Coastal Ecosystems (ALICE)	£711,836
Jonathan Pinkney	NHS National Institute for Health Research	PRO-GROUP: How are treatment outcomes for people with severe obesity ImPROved by GROUP-based behavioural intervention?	£677,896
Caroline Floccia	Economic and Social Research Council	Language development in Arabic-speaking children in the early years: tackling the roots of academic and social inequalities	£538,822
Subrata Banerjee	Engineering and Physical Sciences Research Council	Radio Me: real-time radio remixing for people with mild-to-moderate dementia who live alone, incorporating agitation reduction and reminders	£533,678
Oliver Tills	Medical Research Council	Development of a phenomics hub for industrial, biomedical and environmental applications	£439,753
William Sheaff	NHS National Institute for Health Research	Evaluating approaches to health and care services' commissioning and provision with the third sector in the UK	£407,094
Martyn Hann	Engineering and Physical Sciences Research Council	Extreme loading on floating offshore wind turbines under complex environmental conditions	£389,691
Richard Byng	NHS National Institute for Health Research	Partners 2 Extension: evaluating the impact of general practice-based, coaching-based care for individuals with psychosis	£384,607
Jasper Graham-Jones	Interreg (EU – European Regional Development Fund)	INdIGO: INnovative fishing Gear for Oceans, developing biodegradable fishing gear	£336,922
Richard Thompson OBE FRS	Interreg (ERDF)	Preventing plastic pollution	£331,429
Deborah Greaves OBE FREng	Engineering and Physical Sciences Research Council	Collaborative Computational Project on Wave Structure Interaction+	£312,512
Mila Mileva	British Academy	Multimodal person perception	£294,150
Adrian Dawson	UK Research and Innovation (UKRI)	UKRI COVID-19 Grant Extension Allocation	£286,592

PRINCIPAL LEAD	SPONSOR	DESCRIPTION	AWARD VALUE
Katharine Willis	European Regional Development Fund	Green Minds: an Urban Innovative Actions-funded project, aiming to better connect people to green and blue spaces in and around Plymouth	£257,310
Ralph Fyfe	Leverhulme Trust	Reclaiming Exmoor	£248,612
Jonathan Ellis	Leverhulme Trust	Wherefore the magic? Investigating evolutionary hypotheses for the origin of psychedelic compounds in nature	£242,910
Arunangsu Chatterjee	Interreg (ERDF)	Healthy ageing through innovation in rural Europe	£227,729
Jennifer Freeman	Medical Research Council	Development and evaluation of a training package to support the remote assessment and management of people with movement impairment and disability	£222,670
Jonathon Miles	Interreg (ERDF)	TIGER (Tidal Stream Industry Energiser) project	£221,424
Gerhard Masselink	Natural Environment Research Council	Coastal REsistance: Alerts and Monitoring Technologies (CreamT)	£177,672
Richard Handy	European Commission – Horizon 2020	NanoHarmony: towards harmonised test methods for nanomaterials	£169,163
Sian Rees	European Regional Development Fund	Green Minds: an Urban Innovative Actions (UIA)-funded project, aiming to better connect people to green and blue spaces in and around Plymouth	£168,366
Kerry Howell	European Commission – Horizon 2020	Mission Atlantic – developing and systematically applying an integrated ecosystem assessment at the Atlantic basin scale	£164,769
William Blake	Biotechnology and Biological Sciences Research Council	Integrated community-driven engagement for sustainable enhancement of food production in East Africa: the Jali Ardhi [Care for the Land] project	£163,839
Nicholas Axford	Youth Endowment Fund	Feasibility and pilot evaluation of transition hub for looked-after children and those on the edge of care	£158,873
Helen Lloyd	GambleAware	A mixed-method investigation of the gaming/gambling interface	£150,839
Sabine Pahl	United Nations	Global stock-taking exercise on current actions to eliminate marine plastic litter and microplastics	£145,517
Marie Bryce	General Dental Council	The concept of seriousness in fitness-to-practise cases	£124,779
Mario Gianni	Innovate UK	Knowledge Transfer Partnership with AB Precision Ltd (Innovate) KTP011575	£122,792
Kerry Howell	Natural Environment Research Council	SMARTeX (Seabed Mining And Resilience To EXperimental impact)	£112,179

Education and Student Experience



The University has built its reputation upon the quality of its teaching and learning for more than 150 years. From those trainee mariners who were educated and prepared for life at sea in the 19th century, to our contemporary doctors, lawyers, biologists and engineers, the University has been renowned for providing its students with the knowledge, skills and tools they need to succeed in the world. There are many components to this: staff who love to teach and who want students to be a part of a shared academic community; a commitment to investing in facilities and equipment; a willingness to embrace pedagogic best practice and to innovate through sustainability; and a research-led curriculum, where students are learning from and engaging with academics who are leading explorations of research questions of the moment.



This year, as for the whole university sector, some of those underpinning tenets of the teaching and learning culture were challenged in a most profound way. The COVID-19 pandemic and societal lockdown meant we had to close the doors of our campus. Lecture theatres and laboratories, tutorials and examinations were either out of bounds or had to be reassessed and repurposed for the digital domain. It took a huge amount of work from University teams to deliver that – many working around the clock against a variety of home challenges – but they delivered, and our students coped admirably with the changes. It was a genuine ‘coming together’ of our academic community.



The legacy of the COVID-19 pandemic very much influences our future as well. A great deal of focus has fallen upon how we deliver an even better student experience, one that provides equally and flexibly for those who want to be on campus and learning in a safe environment, and those who prefer to be based remotely, engaging with us through digital channels.

As the results of this year’s National Student Survey show – where we were in the top 25 universities for overall teaching – we are succeeding in delivering a distinctive south-west coast experience. But we have more to do, and we have the strategy in place to further improve our innovative education portfolio of truly excellent programmes and to grow still further our international footprint. From such a challenging year, there is cause for reflection, celebration and anticipation.

Professor Julian Chaudhuri,
Deputy Vice-Chancellor – Education and Student Experience

30 STRATEGIC DEVELOPMENTS: INVESTING IN THE CAMPUS AND STUDENT EXPERIENCE

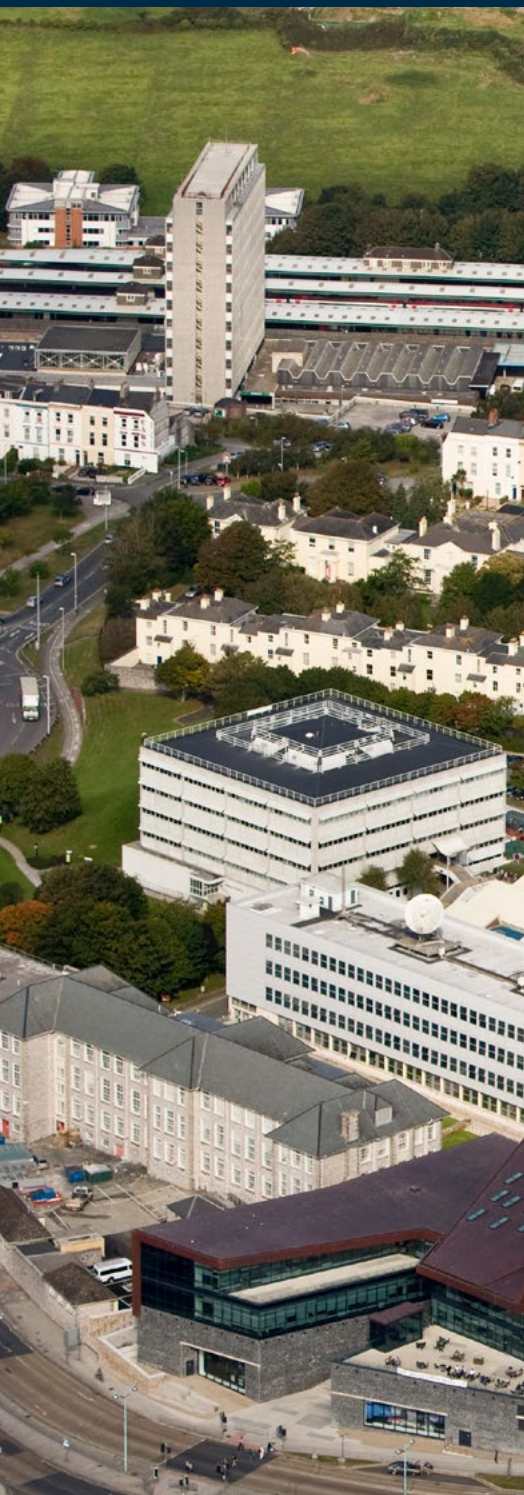
- Intercity Place – a new home for the health professions
- New Engineering and Design Facility
- The Digital Fabrication and Immersive Vision Lab
- Simulated Dental Learning Environment
- The Student Hub
- Developing Knowledge Exchange
- Unique music technology degree

36 SUCCESS AND RECOGNITION

- National Student Survey 2020
- Plymouth visit by the Chair of the Office for Students
- Teaching Fellowships and awards
- Government praise for community dental programmes
- Graduate outcomes on the rise
- Enrolments and graduations



Strategic Developments: Investing in the Campus and Student Experience



INTERCITY PLACE – A NEW HOME FOR THE HEALTH PROFESSIONS

The University has signed a lease to take over a landmark building in the city from which it will train future generations of health professionals. The Intercity Place project will involve the complete regeneration of the 11-storey building overlooking Plymouth railway station. It will be reconfigured and refurbished throughout – with the exterior also being rejuvenated – so that the finished development creates a striking and welcoming entrance to Plymouth. Once completed, it will house inter-professional clinical skills facilities for the University's Faculty of Health and be used to train future nurses, midwives, paramedics, physiotherapists and other allied health professionals. There will also be additional educational services, enabling staff to work together in one location to support the future health workforce. The Intercity Place project forms part of the University's wider Campus Masterplan, which outlines plans to invest in its campus and the city over the next decade.

“

As the largest provider of healthcare training in the South West, University staff, students and graduates have played a key role in tackling the COVID-19 pandemic. This project will ensure continued delivery and indeed expansion of the vital workforce training for our hospitals and frontline healthcare services whatever health challenges present themselves in the future. It also demonstrates our commitment to, and confidence in, the city of Plymouth, helping to transform this landmark building and breathing new life into a key part of our community.

Professor Judith Petts CBE,
Vice-Chancellor.

NEW ENGINEERING AND DESIGN FACILITY

The University is moving forward with its plans to develop a multimillion-pound home for its engineering, computing, mathematics and design teaching and research. The new Engineering and Design Facility is one of the biggest developments contained within the Campus Masterplan, and is under development with award-winning architect Feilden Clegg Bradley Studios. Incorporating a refurbishment of the Babbage Building and a new-build component, it promises to reshape the western edge of the campus, and transform teaching in the School of Engineering, Computing and Mathematics, and offer additional space for the School of Art, Design and Architecture. Ahead of a planning application being submitted later this summer, the University and Feilden Clegg Bradley Studios have conducted a virtual consultation to give staff and the general public the chance to look at the current proposals and provide feedback.



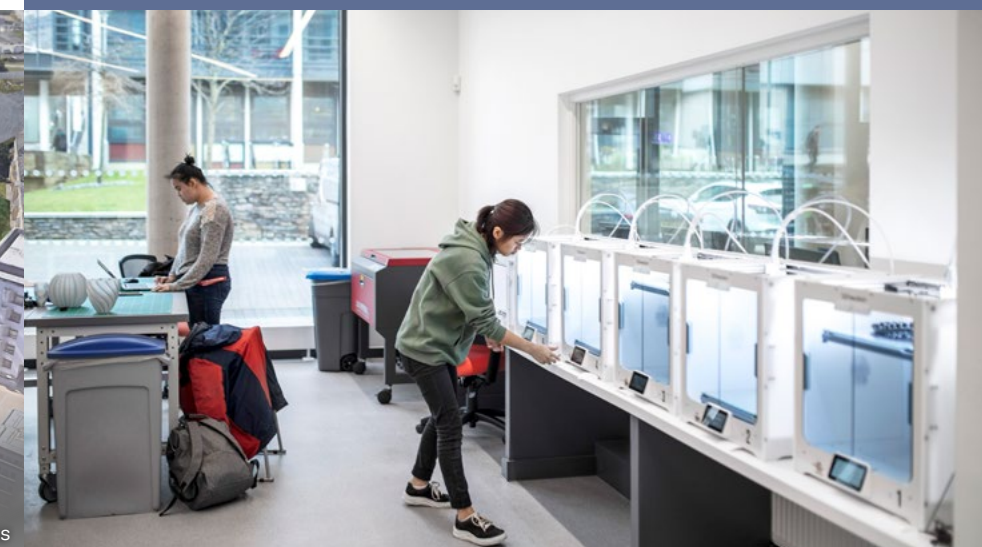
THE DIGITAL FABRICATION AND IMMERSIVE VISION LABORATORY

Two new laboratories containing leading-edge digital technologies have been opened within the Faculty of Arts, Humanities and Business. The Digital Fabrication Laboratory and the Immersive Media Laboratory enable new modes of creative and digital production, promising to transform teaching, research and industry engagement across a variety of areas, including digital media, art and design, architecture, the built environment and engineering. As a result, students can take advantage of new technologies in virtual and augmented reality, robotics, 3D scanning and printing, and motion capture, which together represent a significant investment by the University to support the creative economy of both Plymouth and the peninsula. And through their location on the ground floor of the Roland Levinsky Building, the laboratories have been strategically placed to ensure they are publicly accessible and close to key cultural spaces such as the Levinsky Gallery, Jill Craigie Cinema, The House and The Box.

“

We're excited to be opening these two cutting-edge facilities right in the heart of the campus and the city. They will enable us to close the gap between digital media and physical production processes, fundamentally changing how we design, make and build. Rapid prototyping, new robotic production methods, advanced architectural modelling and building, and cutting-edge visualisation techniques are all now a reality for our students, researchers and partners.

Chris Bennewith, Professor of Interactive Art and Design, and Head of the School of Art, Design and Architecture.



CHIEF DENTAL OFFICER UNVEILS SIMULATED DENTAL LEARNING ENVIRONMENT

The next generation of dentists and dental therapists enrolled at Plymouth benefit from a cutting-edge facility that fully mimics a real dental clinic. The Peninsula Dental School's Simulated Dental Learning Environment (SDLE) features chairs, lights and even patients in the shape of 'phantom heads'. This enables students to practise a full repertoire of procedures – including diagnosis, administering injections and performing extractions – in a safe environment before they move on to human patients. During the year, expanded facilities, in the Portland Square Building, were opened, taking the total number of chairs in the SDLE to 50, to meet the increasing demand for the University's Bachelor of Dental Surgery and BSc (Hons) Dental Therapy and Hygiene courses. The facility was opened by England's Chief Dental Officer, Sara Hurley.

“

With the extension of the SDLE suite, Plymouth again demonstrates why it is a fantastic place to learn. The technology melded with the quality of the multidisciplinary tutor team and outstanding mentorship, together with an understanding of the social context in which our future dental colleagues will be working, is a credit to the whole ethos of the University and Peninsula Dental School. The link to the community through the exemplar social enterprise, to be a force for good in Plymouth and Exeter and ignite the ambition to be a force for good in the wider world, starts here.

Sara Hurley, Chief Dental Officer.



THE STUDENT HUB

A new Student Hub was opened in January, bringing together all central student support services under one roof in the heart of the campus. Located in the Charles Seale-Hayne Library, the Student Hub is a 'one-stop-shop' for advice and support on a range of issues, including funding and budgeting, mental health, disability and dyslexia support, international student and immigration advice, academic help, faith and spirituality, and careers and employability. The opening was marked with a special ceremony, attended by the Vice-Chancellor and senior leaders, and the Hub has been well received and supported by the student body since its launch.

DEVELOPING KNOWLEDGE EXCHANGE

A grant of almost half a million pounds was awarded to the University to help students develop valuable employability skills while simultaneously supporting the region's economy. The £499,000 funding from the Office for Students and Research England will enable the University to advance its knowledge exchange work, with a particular focus on understanding and maximising the benefits to students of working with business and community partners and bodies. The project includes the creation of a dedicated 'KE Academy' that will prepare, train and equip students with the professional skills and behaviours required to deliver knowledge exchange in a variety of settings, including businesses, the public sector, social enterprises and communities. The University is expecting around 1,300 students from within its Faculty of Arts, Humanities and Business to take part over the course of the two-year project.

“

The Faculty of Arts, Humanities and Business has a strong record of working with partners in our local business sectors as well as the community. We also maintain a strong focus on retaining graduate talent in the region. This project will bring those aspects together as we look towards an important period of recovery for Plymouth and the South West, and then the growth that we hope lies beyond.

Dr Bonnie Latimer, Project Lead and Associate Dean for Education and Student Experience, Faculty of Arts, Humanities and Business.

UNIVERSITY LAUNCHES UNIQUE MUSIC TECHNOLOGY DEGREE

A unique degree course has been launched that builds on the University's world-leading expertise in computer music research. The BSc (Hons) Computing, Audio and Music Technology is designed to equip graduates for careers in music, audio, computing and creative technology, providing education and skills development in recording, mixing, mastering, acoustics, digital audio workstations, audio processing, sound synthesis, and many other areas. Complementing these traditional skills in music and audio technology, the research-led degree will allow students to design and program their own software – a unique aspect that ensures students will not be bound by the limitations of what is available commercially.

“

This is the age of technology and online resources, and our students will develop these new technologies. We want to put them behind the curtain, to find out what's behind the screen and ask them: you work with this software, but can you make it, and understand how it works in depth by knowing how it is programmed?

Eduardo Miranda, Professor in Computer Music, School of Humanities and Performing Arts, and Head of the Interdisciplinary Centre for Computer Music Research.



PLYMOUTH VISIT BY THE CHAIR OF THE OFFICE FOR STUDENTS

Sir Michael Barber, Chair of the Office for Students (OfS) – the independent regulator of higher education in England – visited the University to hear of its work to champion positive social mobility. Sir Michael met with representatives and students from all levels of the institution to discuss how the University is supporting social mobility in the South West and raising the aspirations of schoolchildren, young people and other prospective students around the world. This included representatives of Next Steps South West, the OfS-funded Uni Connect programme, regionally coordinated by the University with higher and further education institutions across Cornwall, Devon and Somerset. Sir Michael also spoke with members of the Faculty of Health about the new foundation year for Medicine, focused on providing opportunities to students who may not normally consider a medical career. Finally, he toured the Marine Building and several other research facilities.

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Our universities and colleges can make a decisive contribution in securing greater social mobility for young people, and ensuring that all students have the opportunity to unlock their potential. Forging links with schools, employers and other partners is essential to driving this change – this is why I was delighted to visit both the University and South Devon College. As always, it was helpful to meet with staff at both institutions and inspiring to hear from the hard-working and impressive students that I met.

Sir Michael Barber, Chair of the Office for Students.

Success and Recognition

PLYMOUTH RATED IN THE TOP 25 FOR TEACHING IN THE NATIONAL STUDENT SURVEY

The University has been placed in the top 25 for teaching in the National Student Survey (NSS) 2020. Plymouth registered an increased score of 86.82% (up from 85.97% last year) across ‘The teaching on my course’ set of questions, rising 16 places as a result. Of 57 subjects offered by the University, 25 improved their rank as measured by Overall Satisfaction, resulting in 16 subjects featuring in the upper quartile, and five – Dentistry, Environmental Sciences, History of Art, Architecture and Design, and Ophthalmics – in the top three of their subject groups. Among this year’s standout performers were Economics, which climbed 53 places, and History, up by 47 places. The University also maintained its place in the top 50 HEIs for the key Overall Satisfaction score, which, at 84.92%, remains well above the sector average of 83%. The NSS, run by Ipsos MORI on behalf of the Office for Students, is the biggest survey of students’ views in the UK. Despite the disruption caused by the COVID-19 pandemic, with lockdown in the UK being introduced in the middle of the survey period, nearly 80% of Plymouth students took the time to share their views, a record in itself for the University since the survey began ten years ago.

“

These results demonstrate first-hand the strength of our teaching and learning offer. I am delighted that, in spite of the unexpected changes to the way our courses needed to be delivered as a result of the coronavirus, so many of our final-year undergraduates felt able to express so positively their satisfaction with our teaching and the facilities on offer.

Professor Judith Petts CBE, Vice-Chancellor.



TEACHING FELLOWSHIPS AND AWARDS

The University has a proud pedigree of external recognition for its teaching culture – particularly in relation to National Teaching Fellowships (NTFs) by Advance HE. This trend was continued this year with Fellowships awarded to Professor Kamran Ali and Dr Richard Ayres, both in the Faculty of Health. Professor Ali, Consultant in Oral Surgery, joined the University in 2009 and the accolade rewards his long-standing work on preparedness for practice at regional, national and international levels. Dr Ayres, Clinical Academic and Lead for Population Health, has been teaching a variety of health workers for nearly 30 years and still practises as a doctor in Stonehouse, Plymouth – a GP practice that provides special experience for students in homeless healthcare and substance misuse. The accolades bring the total number of NTFs received by the University to 25.

Also in the Faculty of Health, Clare McIlwaine, programme lead for BSc (Hons) Dental Therapy and Hygiene, became the first dental care professional to win a prize at the Association for Dental Education in Europe (ADEE) awards. Clare won the Oral B Inter-professional Educator award, becoming the first non-dentist to win in any ADEE category, and was selected ahead of entries from dental schools across the continent.

CABINET MINISTER’S PRAISE FOR COMMUNITY DENTAL PROGRAMMES

The Rt Hon James Cleverly MP, Chairman of the Conservative Party and Minister Without Portfolio, has praised the work of the Peninsula Dental Social Enterprise (PDSE) following a visit to the University. Mr Cleverly attended the Devonport Dental Education Facility, meeting staff and students and learning about the community engagement work undertaken, including the weekly community clinic in which free treatment is offered to people currently experiencing homelessness in the city. The centre, which is run by the University and PDSE, is one of four across Devon and Cornwall where students from the Peninsula Dental School treat patients under the supervision of qualified and experienced dental health professionals. Alongside its education role, PDSE focuses on improving oral health and access to dental care for those groups that may feel excluded from mainstream dentistry, including those who are homeless.

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It was fantastic to hear from staff and students at PDSE about the excellent community-focused training at the University. The way the University is supporting homeless people in the city is inspirational and should be celebrated.

The Rt Hon James Cleverly MP.



GRADUATE OUTCOMES ON THE RISE

Graduates from the University are enjoying improved outcomes when they progress from higher education according to the new national survey. The Graduate Outcomes survey, which replaced its predecessor DLHE (Destinations of Leavers from Higher Education), has found Plymouth is performing strongly compared with other HEIs for UK-domiciled full-time first-degree leavers. The employment and/or further study metric (the proportion of graduates in work or further study out of those working, studying or looking for work) is 96.9% for the 2018/19 cohort, which places Plymouth in the upper quartile nationally – 34th out of 153 HEIs, above the sector average. A second metric, looking at highly skilled employment among those in work only, records the University at 71.2%, placing it at 55th in the country, and again above the average.

The Graduate Outcomes survey records its data over a significantly longer time frame than the DLHE did (the census week is 15 months after graduation vs six months with the DLHE). And the process is fully centralised by HESA, providing a more objective picture with no data supplementation or optimisation of results being carried out by institutions.

ENROLMENTS AND GRADUATIONS

The first cohort of students enrolled on the University's MSc Marine Conservation this year, a unique programme delivered in collaboration with a suite of regional, national and international practitioners. The MSc is the only one of its kind where all students have the opportunity to gain direct work experience with such potential employers, including the WWF, Marine Conservation Society, Shark Trust and Blue Marine Foundation. The 2019/20 academic year also marked the first graduations of students at the Exeter School of Nursing and those enrolled on the University's inaugural degree apprenticeships. Nine students graduated from the Chartered Management Degree Apprenticeship, eight of whom secured distinctions. And there was a first-ever online graduation as a new generation of doctors received their degrees at a virtual ceremony in May. A total of 78 medics attended the ceremony, with friends and family able to watch live. The decision to hold the ceremony early enabled the graduates to take up posts in the NHS in its hour of need.



Civic Engagement



A commitment to civic engagement is one of the defining characteristics of the University and has been for many years. The ‘Civic University’ is now an officially recognised model across the higher education sector, and one that Plymouth has helped to shape through its engagement with, and input to, the Civic University Commission. Indeed, it is developing its own Civic University Agreement with stakeholders across the region, which will place the economy and quality of life in the local community among the University’s strategic priorities, and serve to strengthen and celebrate the links between institution and location.



The last 12 months have really proven and tested the importance of the University’s role in the community. Whether it was supporting the national effort against coronavirus, or securing millions of pounds’ worth of European funding for the business community in Cornwall, the University has made a profound contribution. With the Strategy 2030 in place, and its particular focus upon significant industry partnerships, the institution is well placed to go on doing so for many generations to come.



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RESPONDING TO CORONAVIRUS

- Producing PPE for the National Health Service
- Student diaries offer glimpse of life inside the NHS
- Help for home-schooling families
- Arts, education and business
- Students hitting high notes in support of the community

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COMMUNITY, ARTS AND CULTURE

- The Ancient Mariner Big Read
- Legal support for vulnerable communities
- Addressing socioeconomic deprivation through health technology

Responding to Coronavirus

PRODUCING PERSONAL PROTECTIVE EQUIPMENT FOR THE NATIONAL HEALTH SERVICE

The University answered the urgent call for personal protective equipment (PPE) on the frontline of the NHS through two separate projects in the city. Firstly, engineers at the University worked with Plympton-based Prestige Packaging to design and manufacture a new series of recyclable face shields. Fully tested and certified as meeting BSI standards, 20,000 of the shields were readied for procurement by the NHS. The initiative was first conceived by Dr Antony Robotham, Associate Professor in Mechanical Engineering, with the aim of providing a safe form of protection for frontline staff which had the least possible environmental impact.

The institution also joined a city-wide consortium to help manufacture components for medical PPE, including 3D-printed face shields. Technical and research staff from the Faculty of Arts, Humanities and Business, and the Faculty of Science and Engineering, used 3D printing equipment housed in the new Digital Fabrication Laboratory and the Plymouth Electron Microscopy Centre, as well as labs within Smeaton Building and at Plymouth Science Park. The consortium involved a range of partners including Babcock International, Plymouth Science Park, the Royal Navy and Plymouth College of Art, as well as independent 3D printing enthusiasts from the city's maker community.

“

It is a true demonstration of the valuable public contribution this and other universities make. It also exemplifies the value of creative subjects and creative interdisciplinary thinking in relation to innovative and adaptive problem solving.

Chris Bennewith, Professor of Interactive Art and Design, and Head of the School of Art, Design and Architecture.

STUDENT DIARIES OFFER GLIMPSE OF LIFE INSIDE THE NHS

A series of video diaries recorded by University students while working in the NHS during the COVID-19 pandemic reached a national audience in the summer after being featured on the BBC. The diaries, recorded by 2nd-year BSc (Hons) Adult Nursing student Joy O’Gorman, offered a unique insight into life on the NHS ‘front line’ at the height of the pandemic. The project arose from Joy’s participation in the Council of Deans of Health 150 Leaders programme. They featured Joy herself on placement at Cornwall Partnership NHS Foundation Trust, and diaries recorded by final-year BSc (Hons) Dietetics student Olivia Mason while working at Poole Hospital in Dorset, as well as live interviews with final-year Midwifery student Abbie Rich.

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This project is hugely valuable in raising awareness of the contribution students have made over the last few months, particularly in areas like dietetics, which do not traditionally receive much of the limelight. I hope their efforts will help people to see that caring for patients, whether suffering from COVID-19 or anything else, is very much a team effort, and that the contributions of all the professionals involved are equally crucial.

Professor Sara Demain, Head of the School of Health Professions.

HELP FOR HOME-SCHOOLING FAMILIES

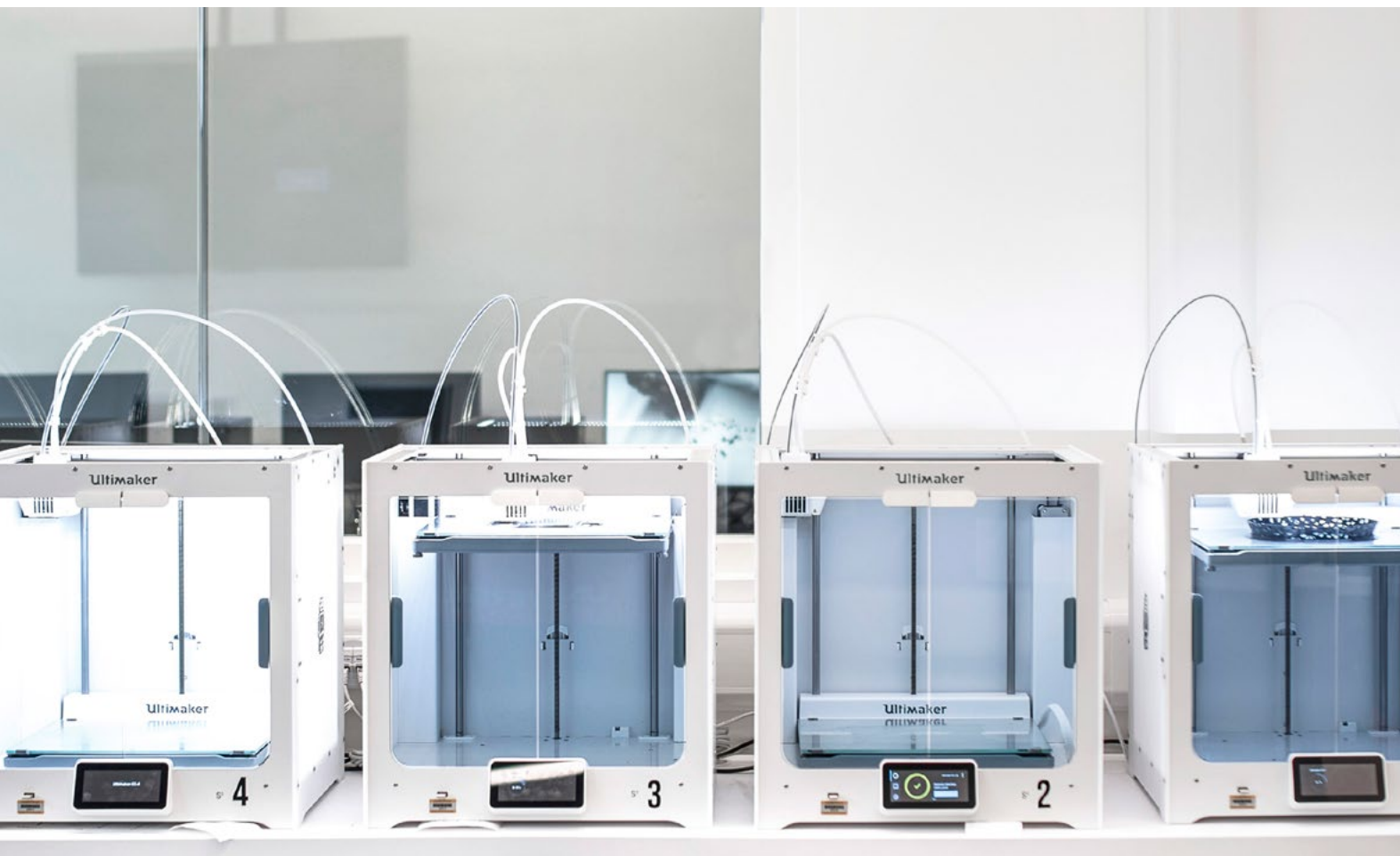
Two projects with a long-running tradition of providing educational and engaging content stepped up to provide new versions for young people being educated at home during lockdown. The first involved the hugely popular podcast series, Histories of the Unexpected, which produced a series of home-schooling ‘specials’ catering for children and parents. Developed by James Daybell, Professor of Early Modern British History, and Dr Sam Willis, author and television presenter, the series outlined the wealth of material available to anyone with access to the internet, such as virtual tours, books and engaging websites. It also launched a campaign to engage youngsters in ‘oral history’, encouraging them to interview their grandparents online and over the phone to find out about their own lives, memories and reflections on their past.

The second project involved the release of the Maths4All website by education experts, targeted at primary and secondary school learners having to work at home. Covering Reception pupils to those sitting GCSEs, the website draws together a broad range of material based upon more than a decade of research and development arising out of collaborative work between the Plymouth Institute of Education and teachers, both in the UK and internationally.

“

We are living through something that could possibly become a defining chapter in tomorrow’s history books. Through our Home-schooling Specials, we’re supporting history teaching and hoping to stimulate the imaginations of budding young historians.

James Daybell, Professor of Early Modern British History, and Associate Dean (Research), Faculty of Arts, Humanities and Business.



IMPACTFUL RESEARCH ACROSS THE FACULTY OF ARTS, HUMANITIES AND BUSINESS

Academics from the Faculty of Arts, Humanities and Business engaged with the pandemic and its implications across a range of projects and initiatives. For example, an international project led by Professor Anthony Caleshu from the School of Humanities and Performing Arts was awarded £110,000 to bring together 40 poets to write about coronavirus. The project will develop an interactive website for members of the public to take part in discussions and even submit their own work. Meanwhile, academics from the Built Environment Research Group worked with a Devon hospital to install thermal imaging scanners for a trial project on whether they could be used to keep the site COVID-19 free. The team worked with Torbay and South Devon NHS Foundation Trust to use thermal imaging scanners, normally used to research building sustainability, on patients and staff entering Newton Abbot Hospital.

Dr Verity Campbell-Barr, Associate Professor in Early Childhood Studies from the Plymouth Institute of Education, has been researching the childminding sector for the past year, funded by the Professional Association for Childcare and Early Years (PACEY) charity, and has documented a number of deep issues that are contributing to an underlying decline in the number of childminders. And a study by academics in the Plymouth Business School found that parents forced to work from home as a result of the pandemic believe the experience could ultimately be a positive one for their family, with better work-life balance and greater connection to their children. These findings were among the preliminary results released by Dr Jasmine Kelland, Lecturer in Human Resource Studies and Leadership in the Plymouth Business School, who surveyed 134 working parents of school-age children, asking them how their daily routines had changed as a result of the lockdown.



STUDENTS HITTING HIGH NOTES IN SUPPORT OF THE COMMUNITY

The University's students took centre stage with two music projects to support healthcare and wellbeing staff in the city. In the first, intercalated BA (Hons) Music undergraduate Sam Adedero recorded a music single with his Creative Change Plymouth group (containing another four University students) to raise money for Trevi House in Plymouth, one of only a handful of residential rehabilitation units for women in the UK and the only one that allows them to remain with their child while in treatment.

The second project saw music students working with their lecturers to produce a video of NHS workers singing, *Lean on Me*. The collaboration between the Emergency Department at the University Hospitals Plymouth NHS Trust and the University involved more than 50 individual videos being mixed together with Bill Withers' music. The production was then released online and has been viewed more than 23,000 times to date.

“

Being a musician is a relatively self-serving pastime, an inward process focused on creativity and expression. But with this, we have all been able to give back something more meaningful than entertainment.

Lee Whittock, Lecturer on the BA (Hons) Music degree, School of Humanities and Performing Arts.



Community, Arts and Culture

PARTNERS ON BOARD FOR THE ANCIENT MARINER BIG READ

Stars of the stage and screen, arts and music helped to transform one of English literature's most celebrated poems for the digital age in a University collaboration. The Ancient Mariner Big Read saw Samuel Taylor Coleridge's *The Rime of the Ancient Mariner* brought to life across 40 separate readings, each broadcast over the internet. Jeremy Irons, Tilda Swinton, Hilary Mantel, Lemn Sissay and Alan Bennett were among those who took part, and each reading was accompanied by work from an international contemporary artist and paired with relevant scientific research in fields including marine science and climate breakdown. The project, curated by author Philip Hoare, artist Angela Cockayne and Dr Sarah Chapman, Director of The Arts Institute, saw the trio re-team eight years on from the Moby-Dick Big Read, which has gathered over ten million hits since first being broadcast.

“

The sea has been a rich source of inspiration for many artists, poets and musicians in creating celebrated artworks that continue to stand the test of time. This project continues that legacy, uniting a love of language, poetry and how words and visual metaphor can cut across time and cultural barriers with a long-standing love of the sea, both as a physical and creative space.

Dr Sarah Chapman, Director of The Arts Institute.

LEGAL SUPPORT FOR VULNERABLE COMMUNITIES

A University project that has established a model of student-led law clinics in the community has scooped national awards for the third year in a row. The Plymouth Law Clinic won in two categories at the LawWorks and Attorney General Student Pro Bono Awards 2020, along with one of its partners, the British Red Cross. They triumphed in both the Access to Justice Foundation category and the Best Team of Students, which celebrate the best pro bono activities undertaken by law students and law schools and the positive impact on those assisted. The Refugee Family Reunion Clinic is one of four that has been created in response to gaps caused by cuts to legal aid. They also include the Employment Law Clinic, the Family Law Clinic, and the Welfare Clinic, and each sits once a week, receiving referrals from partner organisations as well as people walking in off the street. The clinic has helped to reunite vulnerable families forcibly separated by conflict and persecution in countries including Syria, Iraq, Afghanistan, Iran, Eritrea, Ethiopia, Sudan, Cameroon and Malawi.

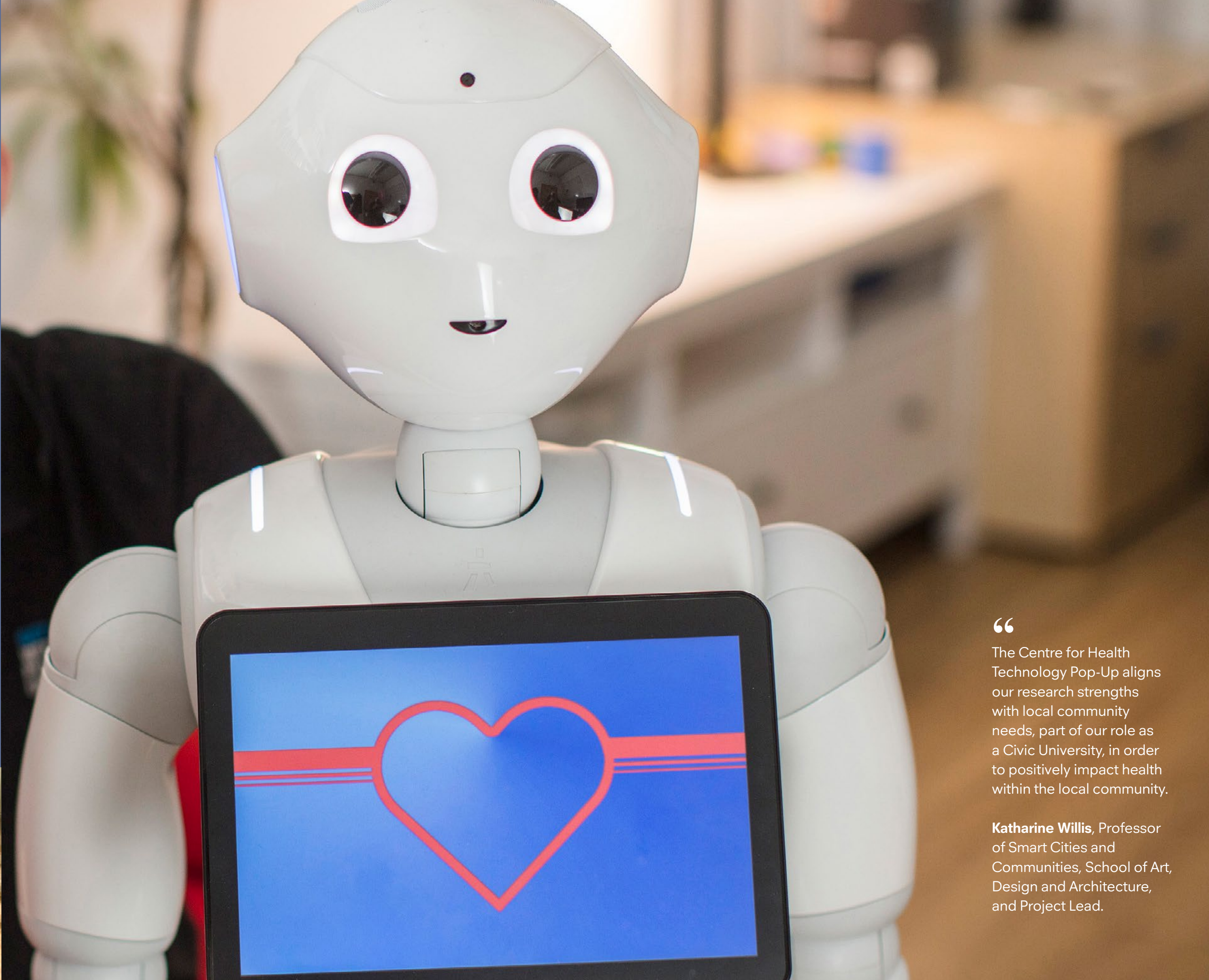
“

This is the third consecutive year that our Law Clinic has been recognised at the awards and I think that speaks to a culture of commitment to access to justice issues and a desire for experiential learning among our students.

Rosie Brennan, Associate Professor of Law, School of Law, Criminology and Government, and Director of the Law Clinic.

HEALTH TECHNOLOGY POP-UP CENTRE TO ADDRESS SOCIOECONOMIC DEPRIVATION

A University-led collaboration received an Enhancing Place-Based Partnership for Public Engagement award, from UK Research and Innovation, to fund the creation of a digital and eHealth centre in the heart of one of the most socioeconomically deprived areas of the country. The Centre for Health Technology Pop-Up has been developed in Stonehouse, Plymouth, and brings together researchers and students from nursing, computing, design, medicine, engineering, architecture, and urban design, with community activity specialists and crowdfunders over the course of the six-month partnership. The pop-up centre is addressing health inequalities and social deprivation using digital technology and eHealth solutions. This includes companion robots as well as apps and internet-based health and welfare resources. It will support business start-ups and the thriving regional, digital entrepreneur network through industry pop-up spaces and involve the public in the co-creation of initiatives. The centre also helped to provide free public Wi-Fi during the lockdown to people in Stonehouse.



“

The Centre for Health Technology Pop-Up aligns our research strengths with local community needs, part of our role as a Civic University, in order to positively impact health within the local community.

Katharine Willis, Professor of Smart Cities and Communities, School of Art, Design and Architecture, and Project Lead.



Awards and Success

THE QUEEN'S ANNIVERSARY PRIZE

The highest award in the education sector was bestowed upon the University this year in recognition of its pioneering research on microplastics pollution in the oceans and its impact on the environment and changing behaviour. The Queen's Anniversary Prize for Higher and Further Education was awarded at Buckingham Palace in February in honour of two decades of scientific breakthroughs that have influenced international legislation. Professor Judith Petts CBE, Vice-Chancellor, and Professor Richard Thompson OBE FRS, received the prize from HRH The Prince of Wales and HRH The Duchess of Cornwall at the ceremony in Buckingham Palace. This was followed by a special reception at which the University was represented by a wider delegation of staff and students as well as the University's Chancellor, The Lord Kestenbaum. It is the third time that the University has been honoured with a Queen's Anniversary Prize, which celebrates excellence, innovation and public benefit. The last occasion was in 2012, when the University was recognised for the breadth and excellence of its marine and maritime research, teaching and training.

“

Receiving the Queen's Anniversary Prize on behalf of the University was a huge honour and recognises the pioneering role that our institution has played in not only defining a global environmental issue, but working to find solutions to it. Challenges on this scale require a coordinated response at a societal level, and what really sets the institution apart is its willingness to engage with all parties in a bid to stimulate change. Richard Thompson and his team's work in microplastics, indeed defining the very problem itself, is part of the University's wider and globally renowned marine and maritime research, which, through a wide range of disciplines, addresses some of the world's most pressing issues.

Professor Judith Petts CBE,
Vice-Chancellor.

50TH ANNIVERSARY FOR GEOGRAPHY

One of the University's oldest and most respected scientific disciplines celebrated a milestone anniversary at the close of 2019, marking 50 years of geography being taught as a degree subject. Launched in 1969, initially as an external degree awarded by the University of London, geography as a subject has flourished at Plymouth with more than 5,000 students graduating in the years since. It has also developed a world-class research culture, one that spans smart transport to soil erosion, climate change to community resilience. To celebrate the anniversary, a VIP event was held drawing 220 people onto campus, and there was an exhibition of materials from the last 50 years, curated by the GeoMapping Unit. There was also the launch of a new book, *Challenges, Changes, Achievements: A Celebration of 50 Years of Geography at the University of Plymouth*, written by Mark Brayshay, Emeritus Professor.

“

At a time when the world has never been in greater need of geographers and environmental scientists, it felt fitting to reflect upon how Plymouth has made such a powerful contribution to knowledge in this field. And as we look forward to the next 50 years, we are all motivated by the thought that it is the generations to come that will play such a key role in addressing these global challenges.

Professor Jon Shaw, alumnus of the Geography degree, and Head of the School of Geography, Earth and Environmental Sciences.

ROYAL SOCIETY FELLOWSHIP

There was to be further recognition for Professor Richard Thompson OBE, following the Queen's Anniversary Prize, when he was elected as a Fellow of the Royal Society. Professor Thompson, the Director of the University's Marine Institute and Head of its International Marine Litter Research Unit, is one of the world's foremost experts on plastic pollution in the ocean and has been leading research in the field for more than two decades. He published the first paper describing the decadal accumulation of microscopic fragments of plastic in the environment in 2004, naming these particles as 'microplastics'. His team has since shown their global distribution, the potential for them to transfer from the gut to the circulatory system, and their ability to transport chemical contaminants. This interdisciplinary work has been pivotal in the recognition of microplastics within policy documents such as the European Union's Marine Strategy Framework Directive, while his research has also guided UK government policy on the release of microplastics from cosmetic products and textiles, leading to domestic legislation on microbeads.

He has previously earned numerous accolades for his research, including the Marsh Award for Marine and Freshwater Conservation in 2017 and an OBE for services to marine science in 2018.

“

It is an immense personal honour to be elected as a Fellow of the Royal Society. This is an acknowledgment of my work on plastics in the environment over the last 20 years, but more widely it is recognition of the work of my team. This is a truly multifaceted problem requiring input across the academic disciplines and I am fortunate to have such fantastic collaborators at the University and internationally.

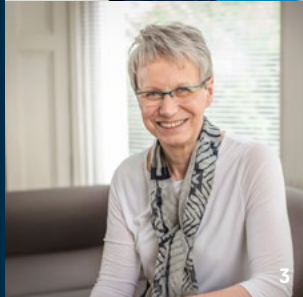
Professor Richard Thompson
OBE FRS.



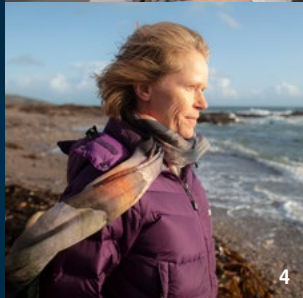
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STAFF HONOURS

This year saw a number of prestigious awards and honours conferred on members of the University's academic community. These included the following:

- 1 **Ian Sherriff**, Academic Partnership Lead for dementia, awarded the British Empire Medal for services to those affected by dementia, in the Queen's Birthday Honours.
- 2 **Professor Christopher Tredwin**, Head of the University's Peninsula Dental School, elected as the new Chair of the Dental Schools Council.
- 3 **Professor Judith Petts CBE**, Vice-Chancellor, appointed one of four sector leaders to head up the new Climate Commission for UK Higher and Further Education Leaders. The Commission is a partnership between EAUC (the Environmental Association for Universities and Colleges), the Association of Colleges, GuildHE and Universities UK, and it will enable universities and colleges to work together in an unprecedented way to tackle the climate crisis.
- 4 **Professor Deborah Greaves OBE FREng**, Head of the School of Engineering, Computing and Mathematics, listed by the Women's Engineering Society (WES) among its Top 50 Women in Engineering: Sustainability.
- 5 **Professor Tom Hutchinson** and **Dr Sian Rees** appointed to the Natural Environment Research Council's Advisory Network, which will help provide strategic or policy advice on nationally and globally important environmental issues to the council.
- 6 **Rob Sneyd**, Emeritus Professor, becoming only the fourth person to receive the Gold Medal from the Royal College of Anaesthetists, its highest honour for Fellows.
- 7 **Professor Iain Stewart MBE** and **Professor Ian Bailey**, invited to join the Net-Zero Task Force, established by Devon County Council.





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