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In this magazine we explore how the work we do here at Plymouth University is helping to change the world, change lives, and change our communities. As you will see over the course of this issue, what we do here matters.

Our research is shaped by the curiosity of our academic community and the needs of our society. Sometimes it reflects the grand challenges of our time, such as investigating the sustainability of our seas or tackling health issues through novel diagnostics or treatment regimens. At other times, our research is applied to societal or community issues such as alcohol-related anti-social behaviour, online ethics and e-safety, or addressing social inequality in medical and dental care. Whatever the research question, our people are seeking to apply their expertise in order to make a positive impact upon people’s lives.

This focus upon research, its application and public engagement is being recognised at the highest levels. Our academics are helping to inform and shape policy at the United Nations in marine renewable energy; they are working with governments in fields as diverse as dementia care, the assisted migration of species, and international business development; and they are delivering transformational support to national charities and organisations such as the Spinal Injuries Association.

Our research excellence has also resulted in a number of prestigious honours for the University. In 2012, we were awarded the Queen’s Anniversary Prize for Higher and Further Education, in respect of our marine and maritime research and education, an award that truly reflects how we have built upon the legacy of excellence of our antecedent institutions over the past 150 years. At the same time, our spirit of boldness and innovation was reflected in our placement as one of the 100 best global universities under the age of 50, a league table that confers upon us the status of the UK’s highest-ranked post-1992 institution.

We have come a long way in a relatively short space of time – and this bodes well for how much more we can do in the future. Our new Marine Building will provide an international platform for innovation and development in these key disciplines. We are also investing in the future of health in our region, both through the foundation of our new Plymouth University Peninsula Schools of Medicine and Dentistry, and our focus upon translational and personalised medicine with new methods of biomedical analysis.

So together, we really are changing lives, changing communities, and changing the world. It is an inspiring story, and I hope you are as proud of this University as I am.

Professor Wendy Purcell
Vice-Chancellor
Our research is helping to define our world and the way it is evolving. But we are also responding to the challenges, working with policy makers to develop the strategies and technologies needed to change the world for the benefit of all who share it.
CHANGING THE WORLD
CHARTING A SEA CHANGE

When Professor Martin Attrill, Director of Plymouth University’s Marine Institute, was invited by the United Nations to address their consultation on marine renewable energy, it demonstrated once again the global reach of our research reputation. It also reaffirmed the impact-driven and applied nature of that research, which is helping to shape our understanding of the oceans in the 21st century.

Ocean acidification and climate change; coastal dynamics and flood risk; species migration and sustainable fishing; renewable energy technologies and their impact upon the environment; port and harbour management; skills development in the naval and offshore sectors – just a sample of the areas informed by the Marine Institute’s expertise.

“The invitation from the UN – not to mention the Queen’s Anniversary Prize for Higher and Further Education in 2012 – was a further sign of the reputation that we have within Plymouth University’s Marine Institute for world-class research, and how we are striving to provide answers to many of the planet’s key marine problems,” said Professor Attrill. “We have also been successful over recent months in winning a range of large projects associated with the monitoring and management of Marine Protected Areas within the UK, indicating we have a lead in helping protect our seas.”

The health of the Earth’s oceans is fundamental to that agenda, and it is an arena in which many Plymouth academics are working. Indeed, one sixth of the £12 million awarded to the UK’s Ocean Acidification Consortium has come to the University for a project to look at the impact of ocean acidification on the marine ecosystem. One of the principal investigators of the consortium is Professor John Spicer, a marine biologist with expertise in how marine animals ‘work’, and how this could be affected by environmental change.

His team, in collaboration with geology colleagues, led by Professor Richard Twitchett, are taking an innovative and novel approach to understanding how marine life might be affected by acidification. By looking at the patterns of the past, they’re drawing conclusions on the status of change in the present and future.

Professor Twitchett said: “As early modern-style ecosystems appeared and evolved, they were struck by a succession of environmental catastrophes similar to what we’re experiencing now, with similar combinations of global warming, elevated carbon dioxide and expanding dead zones (large bodies of water with low oxygen). All of these events caused widespread extinction.

“We are undertaking the first study of the effect that global warming, changes in ocean circulation, and expansion of the oxygen-starved dead zones had on the early evolution of these modern marine ecosystems.”

At the centre of the study is a tiny, bottom-feeding animal called an ostracod, a living relic from a prehistoric era, which is as commonly found in the fossil record as it is in our seas.

Professor Twitchett said: “We will be able to determine, for the first time, how well they functioned, in response to changing environmental conditions; and whether their changing environment led to adaptations and improved resistance to extinction. We can compare our results with the results of experiments on modern living forms to see if this throws any light on what’s happening now.”

And that’s where Professor John Spicer and Dr Piero Calosi, a Senior Research Fellow, enter the picture. Their task within the consortium is to probe the potential for evolutionary change and adaptation of a suite of marine animals in response to environmental catastrophe.

With a relatively short lifespan, ostracods can be observed over the course of a number of generations, in strictly-controlled, changing environments. As the acid levels rise, so the researchers can measure responses such as structural changes to their shell; body size; their oxygen usage; or feeding patterns and habits.
Professor Spicer said: “We can observe the impact of ocean warming and acidification over key parts of an ostracod’s life. And more than that, we will actually be able to record any evolutionary adaptations as they occur. We are using temperatures and carbon dioxide levels as they are predicted for the end of the century, with today’s data acting as a control.

“Ostracods feed on detritus, dead animal and plant material on the sea floor. In this way they are important ‘recyclers’ of the oceans. Without them the health of our oceans and seas would be compromised. They’re also a vital indicator of a healthy ecosystem, which means they can offer us a real insight into some of the potential effects of global warming.”
There is nothing ‘artificial’ about the intelligence of Plymouth’s world-leading research hub into robotics and cognition. The Centre for Robotics and Neural Systems (CRNS) has won grants and awards worth more than £20 million in the last five years, from organisations including the European Union (FP7 programme), the European Space Agency, and the US Air Force.

Now CRNS has teamed up with one of the ‘founding fathers’ of modern microprocessors, Professor Steve Furber, on a project which is seeking to push back the boundaries of computer processing by integrating a more human-like neural network capability. Funded by the UK Engineering and Physical Sciences Research Council to the tune of £1.6 million (£1.2 million of which goes to Plymouth), the four-year BABEL project (Bio-inspired Architecture for Brain Embodied Language) will bring together the iCub baby robot, and the prototype chip-set designed by Professor Furber.

Centre director, and project lead, Professor Angelo Cangelosi, said: “Today’s computers struggle to do things that humans take for granted, such as identifying people through vision, or picking up objects. They are limited by the sequential way in which they process information.

“Using iCub, the BABEL project will look at the neural structure of the brain, and how its interconnected neurons simultaneously fire and communicate with each other. Until now, computer scientists have struggled to build artificial networks of sufficient size to produce human-like functionality.”
The team has taken delivery of the new processor developed by Professor Furber, who has been shaping the landscape since his work with Acorn in the 1980s when he was lead designer of the BBC Micro and the ARM microprocessor. This has now been ‘plugged into’ the hardware that runs iCub, and Professor Cangelosi will be working alongside Plymouth’s computational neuro-scientists Associate Professor Thomas Wennekers and Professor Sue Denham to study how it improves the robot’s learning capabilities, and compare the neural performance with brain imaging studies on people.

Professor Cangelosi said: “What this will lead to is a completely different way of computing. We have roboticists from industry working with us as well, including the Honda research institute, so we will be able to explore how the BABEL technological advances can be exploited in things like autonomous robots and cars.”

BABEL is one of just a number of major international projects and collaborations taking place in CRNS. For example, iCub is also at the heart of the EU-funded Poeticon++, which will take forward the work done on language acquisition. ALIZ-E, recently highlighted by The Daily Telegraph as one of the ten most life-changing research projects in the UK today, is investigating how robots can be used in hospitals as ‘social mediators’ and communicate with children who have long-term illnesses and conditions. And the multi-million Euro Robot-Era project (of which Plymouth is receiving €850,000) is designing and building robots capable of acting as home helps to the elderly or housebound.

Associate Professor Tony Belpaeme, project lead of ALIZ-E and co-lead on Robot-Era, said: “So far, the use of robots in our society has been very limited because they haven’t been able to interact with people in a natural way. But we’re doing ground-breaking work that could completely change that.

“We’re changing the interactive operating span of robots from the ‘here and now’ to minutes, and eventually days, so that, for example, they can interact with children over an extended, and possibly discontinuous, period of time. And in the case of the Robot-Era project, we’ve already had robots putting the rubbish out, and now we’re trying them on more challenging tasks like shopping and checking medicines.”

The 4ft tall robots are being tested in Tuscany and at a special residential centre in Sweden, and the work could lead to a number of fundamental questions and changes – such as how do we accommodate robots on our roads?

“We’re nowhere near developing artificial intelligence to match the human brain, but interactive robots with a real social use are now a reality,” said Dr Belpaeme “We have to make sure we are educating people about robots moving in our midst.”

CRNS is also helping to shape funding policy after it brought together scientists, industry and European commissioners at a special event at the European Parliament. The European Research Leadership in Robotics workshop was designed to showcase the importance of funding in ensuring the continent remains at the cutting edge of robot advancement. As Professor Cangelosi said: “Not only did it put Plymouth University’s expertise in the shop window, but the feedback we have had has been incredibly positive. Several organisations have pledged to continue their funding of robotics research as a direct consequence.”
Plymouth University leads the sector in sustainability both as a green institution, and a thought-leader committed to tackling the grand challenges of the day. Academics across the spectrum are making research breakthroughs that shape understanding of the planet and the way it is evolving. And crucially, we use this information to help inform policy and engage with the public.

Leading the debate on climate change and how humankind can mitigate against some of the more dramatic consequences is Professor Camille Parmesan, a Nobel Peace Prize-winning scientist. In her role as Chair in Public Understanding of Oceans and Human Health, within the Marine Institute, Professor Parmesan advises governments, international agencies and conservation organisations on a range of issues relating to climate change, sustainability, and ecology. It is a commitment to engagement and communication that has seen her named as one of the ‘brave thinkers of our time’ along with Barack Obama, and the late Steve Jobs.

One of Professor Parmesan’s key contributions has been her call for new conservation measures in the face of the growing threat of climate change. She has found that man-made barriers are preventing species from shifting where they live in response to this change. So her call is for assisted migration or colonisation – moving species to entirely new and suitable areas for their ongoing preservation.

“When I first brought up this idea some 13 years ago in conservation meetings, most people were horrified. But now, as the reality of global warming sinks in, and species are already becoming endangered and even going extinct because of climate change, I’m seeing a new willingness in the conservation community to at least talk about the possibility of helping out species by moving them around. In some areas, they’re even putting it into effect,” said Professor Parmesan.
Professor Parmesan, whose contribution to the Intergovernmental Panel on Climate Change earned her a share in the Nobel Peace Prize in 2007, says that assisted migration could not be a major solution for wildlife, but could conceivably be used to help a few species that both biologists and the public deem to be important enough for the effort and could otherwise become extinct. The species would need to be easy to collect, raise or move; its habitat requirements would need to be well understood; and there would need to be viable habitat options outside of the species’ current range.

Working with colleagues in the US and Australia, Professor Parmesan created a conceptual framework, which includes both biological and social questions and considerations that have to be addressed before any decision is taken. These include balancing the risk of extinction to the species if nothing is done versus the potential impact on the new community, and the cost and inherent value people place upon the species.

“Passively assisting coral reef migration may be acceptable, but transplanting polar bears to Antarctica, where they would likely drive native penguins to extinction, would not be acceptable,” she explains.

“Ultimately, the decision about whether to actively assist the movement of a species into new territories will rest on ethical and aesthetic grounds as much as on hard science,” she says. “Conservation has never been an exact science, but preserving biodiversity in the face of climate change is likely to require a fundamental rethinking of what it means to ‘preserve biodiversity.’”

Professor Parmesan’s research has also taken her into the realm of horticulture. She has found that warmer winters are causing cold-adapted plants to become confused, as they ‘wait around’ for cold winter to come. She said: “Two-thirds of plants that we thought were resistant to climate change are actually responding to warmer winters by delaying leafing, budding and blooming. This could be affecting fruit and nut trees that typically require a fixed cold period for highest yields.”

On these issues and more, Professor Parmesan advises international governments and bodies such as the United Nations Environment Programme and the International Union for the Conservation of Nature, as well as engaging the public in the issues of climate change.

She said: “It is crucial that forward-thinking universities such as Plymouth take their scientific expertise and engage in debate in public and policy arenas. We need to inspire people to change the world and give them solid reasons to do something different tomorrow.”
A top 40 UK research institution with an intake of 95 per cent from state schools, we are in a league of our own in what we stand for – as a university that is equally committed to world-class research as it is to social inclusion.

We think global but act local...
Rewind ten years: Plymouth University becomes a founding partner of the first-ever medical school in Devon and Cornwall, in a bold move to redress health and social inequalities in the region. Five years later, it takes the story forward with the first dental school, nationally, for over 60 years, helping to provide free treatment to 500 members of the community every day. Now, in 2012, the University is building on this legacy to become the first post-1992 university in the country to establish its very own medical and dental school – right in the heart of the community.

The Plymouth University Peninsula Schools of Medicine and Dentistry launched in September with a mission to deliver an outstanding student experience, patient-centred care, and life-changing research underpinned by a firm commitment to social inclusion. Led by locally practising and globally renowned researchers and clinicians, it is focused on the future of NHS healthcare, patient empowerment and choice.

Teaching staff are active in the community, focusing on ‘real’ research that directly benefits local patients – the ‘bench to bedside’ approach. With £25 million investment in staff and facilities for research, Plymouth is affirming its commitment to pushing back the boundaries to improve medical knowledge, address local health inequalities, attract inward investment and promote closer partnership working with the NHS – news which has been warmly welcomed by Trust heads and consultants alike. Dr Alex Mayor, Medical Director of Plymouth Hospitals NHS Trust, said: “This significant investment by Plymouth University in biomedical research offers very exciting opportunities for Plymouth Hospitals NHS Trust to work in partnership with the University for the benefit of patients both in the South West and the wider UK.”

And distinguished cardiac surgeon Mr Terence Lewis commented: “Everyone wins from healthcare research, most importantly patients, but also medical students and doctors learning and working in an environment in which evidence leads care. Research is about producing that evidence and Plymouth University’s intention to invest so heavily in it can only be good for the people of the South West peninsula.”

At the state-of-the-art headquarters immediately adjacent to Plymouth’s Derriford Hospital, the region’s premier trauma centre where the students train exclusively, Plymouth scientists are conducting research on cells, genes and molecules. Nearby in its clinical research facility they are working with multiple sclerosis patients and those with long-term conditions, to better understand their diseases and develop new treatments. Leading by example ‘from the top’, both Professor Sneyd and Associate Dean, Professor John Zajicek, are amongst the active researchers and consultants at Derriford and other surrounding hospitals.

The Schools’ inaugural Dean, Professor Rob Sneyd, said:

“The Schools of Medicine and Dentistry have at their heart a commitment to improving lives. This they do through a focus upon ground-breaking medical research; through the delivery of expert care and treatment; and through the provision of an experiential education for students, ensuring they have the opportunity to apply their scientific learning at the earliest stage so that they can develop a more holistic approach to patient care.”
Professor Sneyd said: “We are passionate about clinical and research leadership and the best people to train the doctors and dentists of the future are those who have first-hand experience. Having senior staff who work regularly in the NHS also helps us to maintain close links with the health service and keep our training programmes relevant to patient needs.”

Everything the Schools of Medicine and Dentistry do is shaped and driven by Plymouth University’s firm belief in social engagement. Staff and students work closely with the health service on health education and community projects. Its engagement extends beyond patients to schoolchildren who are interested in science and medicine, as the University continues to seek to raise aspirations in the community. As Professor Sneyd concludes: “We refuse to recognise any ‘no go’ areas. The greater the health and social need, the more important it is for us to be there, as we seek to inspire the next generation of health professionals and produce doctors and dentists who know, understand and respect their patients’ needs.”
Examining the grieving process of young children, raising dementia awareness in the community and evaluating the impact of a support service for the newly-paralysed are just some of the community projects made possible thanks to Plymouth University’s unique community research programme.

The Vice-Chancellor’s Community Research Awards connect world-class researchers with local charities, social enterprises and voluntary organisations to tackle specific issues and problems in the community. The awards, now in their fourth year, are the only ones of their kind in the UK higher education sector and see the University pledge tens of thousands of pounds and hundreds of staff hours to create community and societal benefit. Vice-Chancellor Professor Wendy Purcell said: “We are embedded and rooted in the community, and we are inspired by the people and the world around us. These awards demonstrate our commitment to using our knowledge and research to enrich society and transform lives.”

The projects funded through the scheme have spanned a broad spectrum of research, including: health and wellbeing; history; culture; e-safety; road safety; legal advice and science; delivering solutions for the community; and with a legacy that is evident not just through the impact they have had through the fund, but also in how it has enabled partners to build sustainably upon the initial work.

Children’s charity Jeremiah’s Journey has been working with the University to develop clinical insights into bereavement in children in a bid to reduce the risk of psychological damage and ill health in later life. The project will investigate whether narrative techniques used with adults, around attachment theory and meaning-making, can help children through the grieving process. Joanne Anning, from Jeremiah’s Journey, said: “The models that we work from in supporting children are based upon theories that came out in the 1990s – and we want to challenge these. So this research really could benefit all agencies who work with children and bereaved families across the country.”

The awards made it possible for a community-based peer support service, for people who have recently sustained a spinal cord injury, to be extended across England. The Spinal Injuries Association (SIA) turned to the Community Research Awards to help it provide the high level of research it needed to back up its bid to the Big Lottery Fund in order to secure its immediate future and cement plans to develop the service into a nationwide provision. Thanks to the University’s research, it successfully secured the £350,000 it needed to offer practical and emotional help to newly-paralysed people across the country, working in over 450 hospitals and rehabilitation centres. Paul Smith, Executive Director of the SIA, said: “We were absolutely delighted to be awarded such a large grant. This money will impact on hundreds of people’s lives over the coming years. The research by the University undoubtedly helped us to secure these funds by helping us to demonstrate the value of the service.”

REAL LIFE SOLUTIONS FOR THE COMMUNITY
The legacy is also evident in the recent appointment of Plymouth University dementia researcher Ian Sherriff to Prime Minister David Cameron’s national ‘Dementia Friendly Communities’ advisory panel. The awards made possible vital research into the early diagnosis of dementia, resulting in new training for GPs. This research in turn inspired the idea of establishing a city-wide approach to supporting people with dementia and setting up the first local Dementia Action Alliance in the country – work which then put Plymouth on the national platform. Indeed, the Prime Minister urged communities to follow Plymouth’s example in raising awareness and supporting people with dementia, singling out the work being undertaken in the city as “incredibly heartening” and commending how “everyone from the naval base to the Raiders basketball team has joined forces”.

Ian Sherriff said: “Plymouth is leading the way in its community approach to raising awareness of dementia. We are an example of ‘how to do it right’ and we have a very real opportunity to not only make a difference nationally by sharing our best practice and inspiring other communities, but we could become one of the first ‘official’ dementia friendly communities in the UK. From little acorns grow big oaks and this is very much the case here with much thanks to the Community Research Awards.”

As well as advising the PM, Ian, on behalf of the University, has also been sharing best practice with the Welsh Assembly and major cities across the UK.
Researchers from the University’s Institute for Health and Community have found the crackdown on cheap drinks in licensed premises is leading to a new ‘pre-loading’ culture ahead of a night out – contributing to the rise in alcohol-related crime and disorder, as Associate Professor Adrian Barton explains: “It would appear that previous government policy around alcohol, such as the restrictions on discounted drinks promotions, could be at the root of some of these problems. There is a clear demand for cheap early evening drinks and it is possible that reducing the availability of these in licensed premises has contributed to the rise in pre-loading.”

The research team worked with Devon and Cornwall Police over a six-month period in which they surveyed nearly 600 people who had been arrested. They questioned them on their pattern of drinking in the hours before their detention, and found that two-thirds of the interviewees aged 17–30 had been drinking in domestic premises before moving into the town, with the majority reporting that they were already drunk by the time they reached it. Eighty three per cent of those people had purchased beer, wine and spirits from a supermarket.

The research findings have clear implications for the government’s forthcoming strategy to tackle a pub-club model – something which fails to take account of evidence that suggests up to 50 per cent of people drink at home before leaving. Dr Barton said: “It may be that in order to better control violence in the night time economy, government policy needs to entice people back into the pubs, especially for the crucial early evening period, where they can at least be monitored by staff, and where their drinking patterns will have natural breaks when they move from place to place.”

This builds on Dr Barton’s other recent key research in which he highlighted that underage drinkers are increasingly turning to the internet to buy alcohol as high street retailers crack down on proof of age checks.
Plymouth University is leading the way in partnership with the UK Safer Internet Centre to help young people in more than 3,000 school communities to stay safe online.

Andy Phippen, Professor of Social Responsibility and Ethics in IT, is one of the foremost British researchers on the social impact of technology and has carried out major studies into trust and engagement of online services, young people and identity, and sexual practices among the youth of the UK.

Through his research-informed outreach work he is tackling issues such as sexting and cyber-bullying and believes education has a much more powerful impact than measures such as filtering policies because, as he says, “You can’t throw technology at social problems”.

His research has challenged perceptions, showing that children as young as 13 are engaging in explicit online conversations, and a key part of online education focuses on using it both safely and responsibly.

Professor Phippen believes celebrity culture also has an impact on what young people see as right or wrong in terms of how they use the internet: “When you consider the online behaviour of celebrities that is increasingly reported in the media – what kind of message does that give impressionable young fans?”

Education doesn’t stop with pupils; it also extends to teachers and parents and their responsibilities. Professor Phippen said there needs to be a fully joined-up approach to online safety education: “Policy is not enough on its own, as while it is easy enough to set it, it is a different story to implement it. Everybody needs to step up to the plate and take responsibility for online safety education – teachers, parents, the media and government.”

This understanding of the virtual world is changing – and saving – the lives of young people in the real world. And Professor Phippen knows the impact his work is having when he gets a tweet like this one from a year 9 pupil: “@profandyphippen you made fantastic point: you can never be too safe online and I’ve changed my privacy settings!”

Professor Phippen explains:

“We want others to be interested in what we are doing so we collect friends and post things and sometimes we reflect and think it wasn’t such a good idea. Children don’t have the life experience to reflect on what they are doing and the harm it might cause, so we need to get them to have a more balanced and informed view of the internet from the outset.”
A critical part of the University’s ethos is around transforming the lives of our students, and enriching the lives of our staff. But through groundbreaking and world-leading research, our academics are changing the lives of millions of people right across the globe as well.
LEADING THE FIGHT AGAINST DISEASE

There can be few greater heartaches in life than watching a loved one’s health slowly deteriorate because of a progressive condition of the brain. Diseases such as multiple sclerosis, Parkinson’s and Alzheimer’s have a catastrophic impact on not just those people with the condition, but on the families and friends who try to make their plight somewhat easier.

New treatments are being worked on all the time as neuroscientists’ understanding of the brain grows, and one of the leaders in the field is our Professor of Clinical Neuroscience, John Zajicek.

Since his PhD in cell biology, he has been passionate about the workings of the human brain and has devoted much of his career to studying the effects of certain treatments on some of its cruellest medical conditions.

Earlier this year, he released a groundbreaking piece of research centred on the perceived effects of the active ingredient in cannabis on people with MS, and whether it actually slowed the progression of the disease.

The eight-year CUPID (Cannabinoid Use in Progressive Inflammatory brain Disease) study was funded by the Medical Research Council (MRC) and managed by the National Institute for Health Research (NIHR) on behalf of the MRC-NIHR partnership, the Multiple Sclerosis Society and the Multiple Sclerosis Trust.

Led by Professor Zajicek, and researchers at the Peninsula College of Medicine and Dentistry, it enrolled nearly 500 people with MS from 27 centres around the UK.

People with progressive MS were randomised to receive either THC (tetrahydrocannabinol) capsules or identical placebo capsules for three years, and were carefully followed to see how their MS changed over this period.

Overall, the study found little evidence to support an effect of THC on MS progression; however, there was some evidence to suggest a beneficial effect in participants who were at the lower end of the disability scale at the time of enrolment.

“Essentially our study showed that cannabinoids may have an effect on people in the early stages of MS, but it became evident that once people required the aid of sticks to walk, the effects were not obvious,” he said. “Overall our research has not supported laboratory-based findings and shown that, although there is a suggestion of benefit to those at the lower end of the disability scale when they joined CUPID, there is little evidence to suggest that THC has a long-term impact on the slowing of progressive MS.”

Professor Zajicek said the research findings, which were published in media across the globe, had been greeted with a sense of disappointment among the MS community. But it was still strong evidence which could be developed on by his research team, as they strove to find treatments to slow the progression of MS.

He said: “MS is mostly a two-phase condition – the early stage, where people relapse but improve with treatment, and the second, where there is a gradual deterioration. Current treatments for MS are limited, either being targeted at the immune system in the early stages of the disease, or aimed at easing specific symptoms such as muscle spasms, fatigue or bladder problems. At present, we have no treatments for that progressive phase and the Holy Grail would be to find that neuroprotective agent.”

The CUPID research will be fully analysed and published over the coming weeks and months, but Professor Zajicek is already working on a project to test the effects of cannabinoids on Parkinson’s Disease.

“The issues surrounding treatments for conditions such as Parkinson’s and Alzheimer’s are very similar to those with MS, and testing the effectiveness of treatments is also proving difficult,” he said. “But working with other areas of the University, such as the Centre for Health and Environmental Statistics, led by Professor Dave Wright, we are developing revolutionary new methods of assessing the progression of these conditions. Our new Institute of Translational and Stratified Medicine, in the Plymouth University Peninsula Schools of Medicine and Dentistry, is establishing the perfect platform to build upon our strengths in this field.”
Scientists have long identified links between smoking and various types of cancer. But research conducted here at the University has shown the habit can also impact on a person’s attitude towards the disease.

Through an international research collaboration, academics showed that while smokers are more likely to develop prostate cancer, they are only half as likely to get themselves tested for the condition.

Those behind the research, including our Associate Professor of Psychology Yaniv Hanoch, are now looking to push the message that health professionals need to do more to help those people realise the potential risks.

Dr Hanoch, who worked on the research with Dr Jonathan Rolison, from the Università IUAV di Venezia, and Dr Talya Miron-Shatz, from the University of Pennsylvania, said: “Health professionals have an important role to play in making people aware of the risks of smoking, and health concerns are one of the top reasons why people quit. However, our study indicates that smokers are less likely to undergo screening and may miss a vital opportunity to receive the necessary health advice. Clearly, increased emphasis needs to be made by healthcare providers when discussing issues with smokers. In doing so, this may provide an important means for delivering the necessary health advice.”

The study questioned around 300 men aged 46 and above on topics including their current smoking habits and whether they had previously undergone prostate cancer tests.

The study showed more than half (50.4 per cent) of non-smokers and almost two-thirds (63.5 per cent) of ex-smokers had been screened for the condition, while less than a third (31.7 per cent) of smokers had done so.

Of those who had been screened, more than three-quarters of the non-smokers and quitters had been tested more than once while the majority of smokers had only undergone one test.

Dr Hanoch added: “Smokers, by the nature of their habit, are seemingly less concerned about their general state of health than the rest of the population. But individuals who engage in unhealthy behaviours such as smoking are at increased risk of both suffering a disease and failing to detect it.”
There are around 40 million injections administered on a daily basis, according to the World Health Organisation, for both preventative and curative measures.

And there is no escaping the fact that for some, it is an intensely painful experience, while for others, it can be potentially life-threatening due to poor sanitation and the risk of infection.

But two of our former students have come up with designs which could save hundreds of thousands of lives across the globe, and make medical treatment for millions more a much less painful experience.

Oliver Blanchard, who graduated last year, developed his Sachet Syringe prototype while studying on the BA (Hons) 3D Design course.

Oliver’s design is such that the cap is able to lock in place over the needle once the drug has been administered from a pre-filled sachet, ensuring it can be disposed of safely and with a vastly reduced risk of spreading disease.

Deconstructing the syringe into its component parts – needle, needle cap, syringe barrel, plunger, rubber seal, medicine vial and vial cap – Oliver simplified the design to create a sachet syringe consisting of just the needle and cap, reducing manufacturing costs by 50 per cent in the process.

It won him $35,000 in the India Future of Change Design Contest, where his creation was chosen ahead of more than 760 designers from 50 countries.

Oliver Blanchard, who graduated last year, developed his Sachet Syringe prototype while studying on the BA (Hons) 3D Design course.

Oliver said: “The idea came to me after I began investigating how syringes were used around the world, and I discovered that every year 1.3 million people die from the reuse of dirty syringes in healthcare environments in developing nations. My design eradicates the risk of diseases being spread and could, I believe, help millions of people worldwide.”
Fellow 3D Design graduate Oliver Blackwell’s design is just as simple in its concept, but could again be used in millions of procedures each year and make treatment much more bearable for patients and medical staff alike.

In appearance, his pain-free cannula is little different to the needles used on wards across the world every day. But attached on the front, there is a much smaller needle which administers around 0.2ml of local anaesthetic, to ease discomfort from the larger needle that follows.

He has spent 18 months working on the design, alongside two GPs and the former president of the Royal College of Anaesthetists.

Oliver said: “We knew doctors would not want an instrument that was hugely different to the ones they use now. But at the moment, if they want to use a local anaesthetic they have to use two needles, find keys and go to the medicine cupboard separately and it all takes time and effort. Our design cuts down that process but still ensures the patient’s comfort, meaning they have less pain and the doctor isn’t dealing with a traumatised patient. It also eradicates the risk of confusion or contamination because hospital staff will only have one needle instead of two.”

Professor of Design Roberto Fraquelli, who leads the BA (Hons) 3D Design degree, said their success and inventiveness were the tip of the iceberg.

He said: “We have helped many students develop the skills, knowledge and characteristics modern designers require particularly for industry, be it vision and strategy, humility and ethics, and specialism and passion. They demonstrate how to combine creative design thinking with an entrepreneurial spirit that places people and our environment at the very heart of their ideas.”
Few scientific discoveries have had such a remarkable impact on so many lives as the discovery of DNA in the 1950s.

But genetic scientists here in Plymouth are at the forefront of international research looking at how those medical advances can be used to transform even more lives over the coming years.

Earlier this year, as part of a £2.5 million investment programme in post-genomics technology, we became the first institution in Europe to take delivery of a next-generation machine able to analyse DNA molecules in minute samples of blood and other fluids.

And the Head of the School of Biomedical and Biological Sciences, Professor Neil Avent, is also participating in a Europe-wide project pushing the implementation of non-invasive prenatal diagnosis, which aims to eliminate risky procedures such as amniocentesis.

At present, mothers whose babies are deemed to be at risk of having conditions such as Down’s Syndrome are subjected to the amniocentesis test. But it is a risky procedure, carrying a 1 in 100 chance of mothers losing the baby.

Professor Avent, who led an EC-funded project looking at the issue from 2004 to 2009, said: “The mothers are very stressed both before and during the procedure, but the main focus of our research is to find a way of eliminating risk to both mother and baby. At present, when they are given the choice, most parents opt for the amniocentesis test because they simply want to know that their baby is OK. If we can continue to do that, but in a far less risky way, it has to be a positive step.”

The technique is already being used at some hospitals in the Netherlands, while small-scale trials are also being conducted at University College London, Oxford University, the National Genetics Reference Laboratory in Salisbury and Plymouth University.

Professor Avent says those trials, and the work carried out here in Plymouth, could see Non-invasive Prenatal Diagnosis available at centres across the UK over the next few years.

The University is also working in partnerships with institutions across the globe, including in Delhi and South America, to spread the benefits of genetic research.

The new machine installed in Plymouth earlier this year means scientists will be able to study multiple gene sequences in multiple samples simultaneously, each contained within minute wells of just 33 nanolitres in size.

Professor Avent said: “This will enable us to conduct highly specialised research into the human genome, which is crucial as we move towards a future where personalised medicine will become the norm. Using this state-of-the-art equipment, we can look at thousands of regions of the genome at once. It is a bit like having a ‘molecular abacus’ - we’ll be able to count the number of chromosomes, as well as conduct tests to identify any irregularities.”
The inner workings of the human brain continue to fascinate and perplex scientists all over the planet in almost equal measure.

While huge breakthroughs have been made in recent years, there are many mysteries yet to be explained as to how a complex structure of tissue and nerves can contain so much information, and have control over so many functions.

One area yet to be fully understood is the brain’s reaction to music, and our Professor of Computer Music, Eduardo Miranda, is a leading researcher in this field.

With a background in composition, his intuition for how certain music will stimulate an audience was already well honed.

But he is now expanding that to try and transform the lives of people with disabilities and mental health conditions, as well as developing scientific formulae for what sounds really make our brain cells tick.

Last year, Professor Miranda made national headlines when he developed a system through which tiny electrical signals were detected on the scalp of a person with limited physical capabilities, eventually enabling them to make music with those signals.

Following that breakthrough, and working with scientists from the University of Reading, he secured around £1 million in funding to expand on his research.

“Up until that point, funding agencies were not interested in my idea of developing brain-computer interfacing for music because they simply did not feel it was possible. We showed categorically that it was,” Professor Miranda said.

“There are plenty of scientists looking at ways to make disabled people’s day-to-day lives more comfortable, whether it be by sourcing ways for them to control their wheelchairs or pick up objects. But music is the language of emotion and we are focusing on how entertainment can spark activity, inspiration and possibly even an element of recovery, within a person’s brain.”

Professor Miranda, who founded his Interdisciplinary Centre for Computer Music Research here at Plymouth in 2005, believes music will dominate the field of sensory neurological research for at least the next decade.

“Understanding of how the brain enables people to see and speak is already well advanced, but music is not and there is so much to explore,” he said. “We know the brain is geared to react and know where a sound is coming from; it enables us to listen and learn language and it stimulates movement and the power of thought. But why this happens is not wholly clear.

“Working collaboratively with our partners, we will be seeing whether we can detect patterns as to precisely what sounds and music stimulate certain emotions within the human brain.

“Once we have done that, the findings could not only be used to assist people with limited physical movement – which we have already shown is possible – but also potentially to alleviate mental health conditions such as depression.”
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