

Conferment of the Degree of Doctor of Science, *honoris causa* A Citation

Professor Sir Shankar Balasubramanian

Professor Sir Shankar Balasubramanian was born in 1966 in Madras, now known as Chennai, in India. His parents moved to the UK the following year, and their infant son went with them. They settled just outside Runcorn in Cheshire, now all administratively part of the Liverpool City Region; this is where he grew up. Many will have envied him: Liverpool was the city to be in that year in Britain. The Liverpool Beat could be heard worldwide, and The Beatles released their most iconic album, Sergeant Pepper's Lonely Hearts Club Band. One of its two most ground-breaking tracks was 'Lucy in the Sky with Diamonds', whose contextual mood derived from a chapter in Lewis Carroll's *Alice Through the Looking Glass*. Carroll's name is usually associated with Oxford, but he was actually born right in the vicarage at Daresbury, mere yards from Daresbury primary school, which is where Professor Balasubramanian began his formal education. He and his family were making their new lives against a distinctively inventive background.

From Daresbury he went to Appleton Hall High School and from there to Fitzwilliam College Cambridge where from 1985–1988 he read Natural Sciences as an undergraduate, taking a first-class degree – inevitably, as we are all tempted to say, with the clarity of vision that hindsight confers on us. He stayed on to take a PhD, in Enzyme Chemistry supervised by Professor Chris Abell. That is a very significant step for the way that his career developed. Enzymes are biological molecules that act to catalyse reactions. They are molecular enablers – facilitators if you will – which speed up chemical reactions between other molecules

(without being consumed themselves: they are always ready for more...).

We depend on them utterly. Almost all the metabolic reactions within the individual cells of which we are built rely on enzymes. Otherwise those reactions would be too slow to support life. Here is an extreme example: there is an enzyme which enables a process that would otherwise take millions of years to happen in thousandths of a second. This makes them great targets for drugs – whether health-giving or toxic. Cyanide snuffs us out so rapidly by acting on an enzyme, *cytochrome c*, to block a key oxygen metabolism pathway in the cell. Fortunately, our honorand is no poisoner; his studies of enzymes are distinctly benevolent. He has used them to provide keys to enable us to understand our own genetic make-ups – and I use the plural to mean not just yours or mine; I am also referring to the different expressions of genes within each of us. How did he do this?

Dr Balasubramanian – as he was by 1991 – made a move reciprocally matching the one that Professor Harvey Lodish had made exactly a quarter of a century earlier. He crossed the Atlantic from East to West – though this is the one time that our honorand escaped Cambridge of one kind or another. His postdoctoral fellowship took him to Pennsylvania State University where he spent two years with Stephen Benkovic. This extended his work in enzymes; the most highly cited of their resulting joint publications focussed on an enzyme derived from the human immunodeficiency virus (HIV). But, despite the appeal of Pennsylvania, Cambridge enjoys an undoubted magnetism

(honesty compels me to admit that it is detectable even in Oxford). The award of a Royal Society University Research Fellowship – at that time a relatively new scheme aimed at giving formative, research independence to the UK's most promising young scientists – represented a wonderful way to return there. 1994 found him back in Cambridge once more; and I do mean once more. He has been there ever since.

Cambridge is, of course, the place where the structure of DNA was solved. That fundamental discovery offered a key, in principle, to an extraordinary, virtual landscape of possibilities; but to realise those possibilities – even to see, let alone to sculpt, that landscape – we needed to find practical ways to read genetic codes; finding ways to manipulate them followed. A critical first step was taken in Cambridge when Frederick Sanger showed a practical way to read – or sequence – DNA. Sanger's methods led to a Nobel Prize (his second), and made the Human Genome Project possible. That monumental work took more than 13 years and cost over US\$3 billion. It started in 1990 and was deemed to have concluded (with at least a good draft specification) in 2003. But, while this huge, international project was going on, other work in Cambridge was already laying the ground for a radical change of speed. Having returned to Cambridge and taken up a Fellowship at Trinity College – following in the footsteps of Sir Isaac Newton – Professor Balasubramanian was working with Professor Sir David Klenerman on DNA polymerase. You will at once realise that this has something to do with DNA. Polymerases are enzymes that enable the formation of polymers –

large molecules that are constructed by connecting together the same smaller molecules over and over again. This work led to the discovery and eventual application and commercialization of a new way to sequence DNA.

Moore's Law suggests that computing power doubles every 18 months. But the deployment of this new sequencing method produced far more dramatic changes. Something that had very recently taken a massive, extended, international programme to do could now be done for less than a millionth of the original cost, and a million times faster. The increase in raw computing power is of course part of that, but we would have to have lived a lot longer than we have for Moore's Law to have been able to make this gigantic difference. What mattered was the new method that Professor Balasubramanian had worked out.

Dominus illuminatio mea. Oxford University's centuries-old motto means the Lord is my light. But many scientists and clinicians today might say *Illumina dominus meus*: Illumina is my Lord, because that is the name of the company that provides the fast, sensitive and reliable but, crucially, affordable DNA sequencing on which they – and, increasingly we – depend. Balasubramanian and Klenerman's work is Illumina's core technology. Without it much of modern pre-natal diagnostic testing or cancer diagnostics would not be possible. This is an immense contribution both to science and to welfare, and you might think that I would have to stop at this point, with a well-rounded concluding phrase. But there is more.

Our genes are all in our DNA; they make us what we are and they determine what we can pass on to our descendants. And yet our different component parts really are different – skin, liver, teeth, guts, taste buds, hair and brains: all these different bits are constructed from the same DNA. This is possible because, during development, the basic genes themselves are turned on or off by further mechanisms. Those higher order switches can include environmental events or drug treatments, and at least some of the resulting changes in gene expression, as well as the genes on which they operate, can be passed on to our descendants, dialling up or down expression of particular genes in our children and even our children's children. They are called epigenetic changes and add a new complexity to understanding inheritance. They are not in the genes themselves but in the genes' abilities to exert their effects, rather like a voiceover constantly commenting on the message conveyed by the fundamental structure of the DNA. Wittgenstein once asked, 'if a lion could talk, could we understand him?' (The best answer is, 'No'.) So it is with the genes encoded in our DNA, unless we understand epigenetics as well as genetics. You will therefore understand why, not content with what he had achieved in conventional DNA sequencing, Professor Balasubramanian turned his attention to epigenetic sequencing. And, knowing even the little that I have been able to tell you, you will be unsurprised – though impressed – to hear that by 2012 he had revolutionised this field as well. That too has led to the formation of a company that makes the method available to the wider world outside academia, where basic biologists use it – as,

too, do clinicians. Ideas that have real consequences are surely the most valuable of ideas, and the promise of personalised medicine with all its potential benefits leans heavily on the application of Professor Balasubramanian's ideas.

Many honours and distinctions have rightly been accorded to him: ours is one voice among many. We can recognise this by using the title conferred upon him in 2017: Mr Chairman, it is my privilege to present to you Professor Sir Shankar Balasubramanian, *illuminator sequentiae* who has used fluorescence to shine a light on our inheritance, for the award of Doctor of Science, *honoris causa*.

This citation is written by Professor Nicholas Rawlins

Conferment of the Degree of Doctor of Science, *honoris causa* A Citation

Professor Sir John Irving Bell

Professor Sir John Bell is another illustrious medical scientist whom we honour today. He is today's Regius Professor of Medicine at University of Oxford. The title reflects its establishment by King Henry VIII, best known for his single-minded devotion to methods for ensuring the early retirement of a succession of queens, but also an important supporter of academia. He founded what remain two of the wealthiest colleges in Oxford and Cambridge as well as five Regius Chairs at each place. These 'Henrician' Professorships were a highly significant step in the secular development of Oxford and Cambridge, and the appointments still rest with the Crown. Although not the oldest endowed post in medicine at Oxford – that dates back to the foundation of New College by William of Wykeham in 1379 – the Regius is the senior post and the academic head of the Medical School.

Status does not, of course, guarantee excellence. Among Sir John's 19th century predecessors, John Kidd, in post for almost 30 years, opined, on philosophical grounds, that, 'a science of observation cannot claim certainty for its inferences as to causes, and that consequently theoretical geology cannot stand against an indisputable authority such as revelation.' He set out this view three centuries after Andreas Vesalius, in Padua, had so influentially advocated the demonstrative method in medicine – relying on observation to inform opinion and analysis – and some two and a half centuries after William Harvey had brought that empirical tradition from Padua to England, and Oxford. Harvey 'profess[ed] both to learn and to teach anatomy, not from books but from dissections; not from positions of philosophers but from the

fabric of nature.' Kidd's immediate successor, James Ogle, has only one recorded publication: a letter, in 1841, to the Warden of Wadham College, outlining a new scheme for examining. We have come a long way since then.

Sir John Bell is Oxford's 30th Regius Professor of Physic (now known as Medicine), and the third Canadian to have held that Chair. The first was Sir William Osler, one of the four founding professors at Johns Hopkins University School of Medicine who is often described as the founder of modern medicine, a man as influential as Vesalius had been. Oxford, though a distinguished University, had – and still has – a comparatively small medical school. Yet its influence vastly outstrips its size. Sir William Osler and Sir John Bell are two, notable transatlantic Regiuses why.

John Bell was born in Edmonton, Alberta, in 1952. He headed east, aged 14, to Ridley College in Ontario. Ridley was, and remains, a famous rowing school. It was the first Canadian institution to win the Princess Elizabeth Cup at Henley Royal Regatta. John Bell was awarded his school rowing colours in 1969, and rowed in the 145lb lightweight crew in 1970 – the year that Ridley first won at Henley – and again in 1971. His interest in rowing has lasted ever since. He owns his own sculling boat – the most technical and stylish end of the sport – and sculls regularly from his house by the river Thames.

From Ridley, Bell headed back west to the University of Alberta in Edmonton, a source of more Rhodes Scholars than any other place in Canada; he became one of that select group. With

a Bachelor's degree in Medical Sciences from Alberta, he moved to Oxford. 'I arrived in Oxford in October 1975, the weather was unseasonably cold and they hadn't turned the heating on in the Radcliffe Science Library. I found myself doing my initial studies with my coat and gloves on, and my first purchase was a duvet. I remember thinking to myself that I wouldn't be sticking around for long.' Oxford educations are broad. Canadians, like Russians, think that they know what cold is, until they have to live in an Oxford college. The outdoor air temperature is by no means the whole story...

Despite the shivers, John Bell obtained First Class Honours in Physiological Sciences at Oxford in 1976. Forty-five years on, his College Tutor, a friend of mine, remembers him, 'correcting me about the minutiae of the Hodgkin-Huxley equations oh so tactfully, which was remarkable as he didn't do biophysics at all... but immunology etc. I realised then he was always going to teach me more than I ever taught him.' That was quickly followed by a Bachelor of Medicine and Bachelor of Surgery degree (BM BCh) in 1979 – a lot of degrees in a short time. You might infer that his life was nothing but study, but he nonetheless managed to find the time to row in Oxford's 1978 lightweight crew against Cambridge – perhaps it offered a way to get warm?

Postgraduate clinical training followed, in London and in Oxford, and then came a big move to Hugh McDevitt's laboratory at Stanford University. He spent five years there. The lab was famous for work on the Major Histocompatibility Complex (MHC), a key component of the system that enables our immune system to recognise what

is us, and what is not. MHC dysfunction can result in autoimmune diseases, in which we are attacked – potentially catastrophically attacked – by our own immune system whose evolutionary function is of course to identify and destroy foreign pathogens. Work on the immune system, and on genomics in human health, is a distinguishing and influential mark of Bell's research interests – initially in diabetes and rheumatoid arthritis. Beyond those starting points it provides entrées into crucial aspects of personalised medicine including, for example, better targeting of drug treatments with fewer side effects and the differential management of cancer metastases, as well as playing into vaccines and vaccine development: very clearly medicine for our times.

California's powers of seduction eventually faded. The West Coast came to feel too 'parochial' and Sir David Weatherall's newly founded Institute of Molecular Medicine was a magnetic attraction, drawing John Bell back to Oxford. This was a critical step. Within three years he had succeeded Weatherall as Nuffield Professor of Clinical Medicine, and had spearheaded the funding for Oxford's Wellcome Trust Centre for Human Genetics which opened in 1994. This began a whole series of new developments which he has masterminded since then. These now constitute an entire, new medical research campus for Oxford, which has not only ramped up its already impressive research volume but has also pushed its impact further and further into translational medicine and health policy. In 2000, Weatherall stepped down from the Regius Chair. Bell again succeeded him (and his own successor in the

Nuffield Chair, Sir Peter Ratcliffe, became a Nobel Laureate in 2019).

During John Bell's tenure as Regius, Oxford medicine went from strength to strength. The Times Higher Education supplement has ranked it as the best in the world for nine years in a row. Its impact is not just national but global – famously in epidemiology, tropical medicine, the treatment of malaria, and the development of anti-malarial drug resistance. Its profile during the current COVID-19 pandemic could scarcely be higher. Oxford's 'RECOVERY' programme is the biggest clinical trial of candidate drug treatments, and the Oxford vaccine programme was exceptionally quick off the mark and thorough, yet ambitious. It is designed to manufacture on a global scale and offer affordable access, while its assessment protocols are exemplary. Whatever their outcomes, developments like these depend on having an infrastructure already in place and processes ready to roll, plus the flexibility, the capacity, and sometimes the sheer negotiating skills, to bring together an effective combination of resources. This, in turn, requires foresight and imagination, and an enlightened operating context; and that means leadership, which this Regius provides. And that leadership extends beyond the local: regionally, nationally, and internationally.

John Bell is a UK Life Sciences Champion, reporting to the Prime Minister, and oversaw the UK Life Sciences Industrial Strategy Report. He was President of the UK's Academy of Medical Sciences and is currently the Chair of the Bill & Melinda Gates Foundation's Scientific Advisory Committee. He has participated in advisory panels – both

private and public sector – in Canada, Denmark, France, Singapore and Sweden as well as the UK, and is a founding director of three biotechnology start-up companies. With responsibilities has come recognition: amongst many honours, he was elected to the Royal Society and created a Knight Bachelor in 2008, becoming a Knight Grand Cross in 2015. Alongside these, his roles as Chair of the Rhodes Trustees and as Senior Member of the Oxford University Boat Club may seem less extraordinary, but I would wager that Oxford's win by one foot at the end of a 4.2 mile, 18 minute-plus battle in the 2003 boat race will have generated as much tension, anxiety, relief and utter satisfaction as anything else he has ever done.

Christ Church, his college at Oxford was, like his Chair, established by Henry VIII. Above its entryway hangs Great Tom, the largest ancient bell in England, taken from nearby Osney Abbey which the King suppressed to add to its revenues to his own. Great Tom famously tolls a curfew each night: 101 strokes, commemorating the 100 original students plus one added in 1663, at 21:05 Greenwich Mean Time. (London is roughly sixty miles to the east, hence this is precisely 9pm – real, Oxford, time. In the 19th century London time was a mere convenience for railway timetablers. Why accord it priority?)

Great Tom remains *in situ* but is no longer *sui generis*. Mr Chairman, it is my privilege to present to you his twin, Professor Sir John Irving Bell, Oxford's other Great Bell, for the award of Doctor of Science, *honoris causa*.

This citation is written by Professor Nicholas Rawlins

Conferment of the Degree of Doctor of Social Science, *honoris causa* A Citation

Dr Chen Yidan Charles

In *Shuo Yuan – Tan Cong Pian*¹, there is a saying: ‘The keen-sighted looks into the unknown; the wise plans before things take shape; the sharp-eared hears when void of sound; and the thoughtful forever on the watch’. What these sets of phrases mean is that the wise man predicts and looks into the future with penetrating eyes; is prepared for the coming of monumental changes to catch the emerging opportunities, and in the end builds up an impressive enterprise that heralds an era and brings both benefits and blessings to the whole world.

Dr Chen Yidan Charles completed an undergraduate programme at Shenzhen University in 1993, graduating with the degree of Bachelor of Science in Applied Chemistry, and then went on to get a Master’s degree in Economic Law at Nanjing University in 1996. In 2019, he obtained from the Singapore Management University a Doctoral degree in Business Administration. Since the start of the 1990s, Shenzhen Time Square has been adjacent to the gate of Shenzhen University, with a giant sundial towering on the University’s vast piece of grassland. Here, dawn and dusk interchanges tirelessly and seasons rotate indefinitely, constantly reminding students of the inevitable slipping away of time, day and night, year after year. What and who can one cling on for support as time goes by? This sundial imagery has greatly inspired Dr Chen as a student. He deeply felt that to stand out amongst fellow competitors, he must move with the times and make headway towards his own goals without hesitation. In 1998, Dr Chen, Mr Ma Huateng and two other fellow students, all of Shenzhen University, foresaw the

enormous potential of the social media on the internet platforms on the mainland even at its early stage of development. Without a second thought, they made the decision to pool their resources to set up Tencent, with Dr Chen becoming the Chief Administrative Officer of this young but promising company. Nowadays, the Internet has become an inescapable communication tool in society, and Tencent, with a staff establishment of over fifty thousand and a market value of above HK\$3 trillion, has become the most important and impactful internet enterprise among its competitors, whether in China or around the world, serving the greatest number of people and making great contributions to people’s life. In *Lu Shi Chun Qiu – Shou Shi Pian*², it is stated that: ‘What makes a task easy or difficult is not about its size or magnitude, but rests upon knowing how best to respond to it, and at the opportune time’. Dr Chen understands well the importance of making a tactical move at the right time to seize the golden opportunity, and is able to foresee the tides of the internet industry, all of which contributes to the great success of Tencent, enabling the company to win unanimous respect from the information industry and high praises from both the business and education sectors.

The wise plans for the future and at the same time cares for the betterment of mankind. Just as Tencent’s business was flourishing at an unprecedented rate and becoming the major player of the internet industry, Dr Chen made the difficult decision of stepping down from the Chief Administrative Officer post in 2013 and instead assumed the position of Lifetime Honourable Consultant of Tencent. He wanted to devote all

his effort and time to the promotion of community welfare on the internet. He understands that a proper social security network will ensure peace in community and promote people's welfare. He always thinks about ways to give all possible help to people by leveraging the power of the internet. To plough back to society, Dr Chen worked together with several co-founders of Tencent to set up, as early as 2007, the first charity foundation of the internet sector of China: Tencent Charity Foundation. He also spearheaded the strategic plans of Tencent's 'Corporate Social Responsibility', putting a lot of time and effort into harvesting the capability of the internet platform for the promotion of public welfare and charity work. He was the first internet entrepreneur to win the 'China Charity Award'. For all his charity work, he was awarded: 'The Most Compassionate Philanthropist'; 'Top Ten Philanthropists of China'; 'Godfather of Internet Philanthropy in China'; and 'The Pioneer of China's Internet Philanthropy'.

Dr Chen not only concerns himself with public charity work, he also cares for intellectual property, and the protection of copyright and patent technology. In 2006, he initiated the setting up of the first copyright protection organisation in China, Shenzhen Copyright Society, and became its Founding President and now, its Lifetime Honorary President. Besides professional involvement in the intellectual property sphere, Dr Chen also took up positions in a number of community ventures, including that of Vice Chairman of Copyright Society of China; Deputy President of the Committee of Corporate Citizenship, China Association of Social Workers; and Member, Policy

& Resource Working Committee, the Internet Society of China. For his outstanding achievements, he was elected Deputy of Guangdong Province in the 12th National People's Congress, China. Since 2018, Dr Chen has been the Chairman of the Organising Committee of the China Internet Public Welfare Summit.

In the book of *The Mencius – King Hui of Liang*³, there is the saying: 'Teach with care; expound the virtues of filial responsibility; and ensure that the elderly need not shoulder heavy loads'. This saying of the book, to Dr Chen, embodies the importance of 'Love for Mankind', how it should be practised, and what role education has to play to that end. Dr Chen totally agrees with the wisdom in the saying, and has thus always accorded the greatest importance to education. Since 2009, he put his belief into practice, investing heavily on education. His deeds included rendering assistance in the setting up of Wuhan College, the first non-government not-for-profit public university on the mainland. Following that, he made a generous donation to the College for the construction of a new library and the procurement of its holdings. In 2012, he again generously donated through the China Children and Teenagers' Fund to sponsor the construction of Ciying Building at the senior secondary division of Tianxin Middle School, and to set up scholarships for the school as well. In 2013, he provided funds to help establish the 'Chen Yidan Foundation' at Shenzhen, and through the injection of funds from the Tencent Charity Foundation, also helped set up the Shenzhen Mingde Experimental School. Furthermore, he gave his consent to serve as the first Chairman of the School Board. Starting

from 2018, he has been a Founding Member of the Council of West Lake University. In 2016, Dr Chen made a generous donation of HK\$2.5 billion for the institutionalisation of the 'Yidan Prize', the world's most well-endowed education award. The aim of the Yidan Prize is to commend and support innovative endeavours in education and also to honour individuals or groups who have made great contributions in the field. Dr Chen hopes that through the Yidan Prize awards, society will be made aware of the innovative ideas or laudable accomplishments of the Yidan Prize recipients, all outstanding educators. In the end, the community will benefit from these ideas and accomplishments, and be able to understand, through better education, the importance of 'Love to Mankind', as proclaimed by *The Menci*, and that people should practise this core value of mankind under whatever circumstances and in step with the times. In addition, he donated US\$1 million to Stanford Law School in the US to sponsor eligible students from China to pursue law studies at Stanford. Dr Chen places great importance on education. A gentleman of integrity and uprightness, Dr Chen wins the praise and respect of the whole country. He received a number of honours and accolades, including: First on the Forbes China Philanthropy List (2017); First on Chinese Philanthropist Chart of the 13th China Philanthropy List (2016); Top Philanthropist Prize, China Charity Alliance (2015); The Most Charitable Donator, The 9th China Charity Award (2015); China Children Charity Award – Touching Spring Buds (2014); Outstanding Award of the China Copyright Enterprise (2013); The Most Influential Person in the Protection of Intellectual Property, China (2012); and Outstanding Contribution Medal

of the Children Charity Award, China (2012). Dr Chen was also conferred the degree of Doctor of Humanities, *honoris causa*, by The Hong Kong Polytechnic University in 2017. Honours and laurels for Dr Chen follow one another.

Dr Chen has always been a great friend and steadfast supporter of CUHK. Since 2012, he has made numerous donations, through Tencent Holdings and its subsidiaries, to the Faculty of Engineering of the University in support of research work on digital communication and the like. His contributions, in kind or in cash, are countless and benefit both students and teachers.

Mr Chairman, in the 1960s, the late Professor Sir Charles K. Kao, former Vice-Chancellor of CUHK, was the first person to publish a dissertation in which he suggested using optical fibre for high speed transmission of digital data in telecommunications. That innovative idea paved the way for the birth of the internet. In the 1990s, Professor Kao set up the Faculty of Engineering at CUHK, which promotes teaching and research in information technology in the region. About this time in Shenzhen, Dr Chen started garnering the capability of the internet to set up the most extensive and diversified social media platform in China. To plough back to society, Dr Chen later developed an expansive and comprehensive charitable project to promote, this time, education enterprises, making use also of the strength of the internet. His charitable project has achieved similar success. Among the many meaningful charitable endeavours Dr Chen has undertaken are a number of generous donations to various engineering

departments of this University, benefiting students and teachers of the Faculty. For all his kindness, we at CUHK are forever grateful. Dr Chen is both enlightened and visionary. For the internet industry, he provided the paradigm that has the greatest applications and most significant impact on society. Its effects are far reaching and its significance unfathomable. It is therefore not entirely coincidental that we confer an honorary degree on Dr Chen today. Mr Chairman, it is my privilege to present to you Dr Chen Yidan Charles for the award of Doctor of Social Science, *honoris causa*.

¹ *Shuo Yuan* or *Garden of Stories* is a collection of stories and anecdotes from the pre-Qin period (Stone Age to 221 BC) to the Western Han Dynasty (220 BC–9 AD) composed and annotated by Liu Xiang, a historian of Western Han Dynasty, China. *Tan Cong Pian* is a chapter of *Shuo Yuan* on 'abundant discussion'.

² *Lu Shi Chun Qiu*, also known as *Lu's Commentaries of History*, is an encyclopedic classic text of early thought and civilisation of the State of Qin, China, compiled around 239 BC by the Qin Dynasty Chancellor Lu Buwei; *Shou Shi Pian* is a chapter of the book, about 'biding one's time'.

³ *The Mencius* was a collection of anecdotes and conversations of the Confucian thinker and philosopher Mencius on the topics of moral and political philosophy, often between Mencius (or Mengzi, 372–289 BC) and the various state rulers of the warring states period of China (476–221 BC). In the chapter *King Hui of Liang*, Mencius was having dialogues with the *King Hui of the State of Liang*.

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Professor Harvey F. Lodish

Academic life is about making connections. We connect different methods and technologies to make new observations. When we see new connections between observations we can outline new predictions, hypotheses and theories. Isaac Newton's comment about standing on the shoulders of giants reflects our connections with, while equally acknowledging our debt to, the past. There is a related, contemporaneous component, too: the network of individuals and institutions who participate in our increasingly collaborative academic programmes. The ability to marshal and deploy all these kinds of connections is a key attribute for progress in research.

But there are at least three further connections that help to determine the value of that research. One is the connection with those new to the field – the ability not just to attract them in but then to pass on the research skills or even entire research programmes that will let them flourish and contribute as researchers in their own right. Another is the connection between academic and practical worlds – putting discoveries to work. And, of course, we all hope that one day someone will stand on our shoulders to see further than otherwise they could (and that those we educate who don't choose an academic life will nonetheless benefit from the clarity of thought we seek to instil and put it to good use in other walks of life).

Today's honorand, Professor Harvey Lodish, is a Master Connector. His university life began at a distinguished liberal arts college with a long history and some remarkable alumni: Kenyon College, in Gambier, Ohio. It was founded in

1824 by Philander Chase (an Episcopal bishop with a name one simply could not give in the #MeToo era) largely depending on benefactions from England. Lord Kenyon gave his name to the College. Admiral of the Fleet Lord Gambier ('Dismal Jimmy' to the Royal Navy in which he served) gave his name to the town. Jane, Dowager Countess of Rosse, the most generous donor was less clearly commemorated, though her family is far more memorable than either of theirs. Her family at Birr Castle in Ireland became extraordinary scientist-inventors: the reflecting telescope they built there was the largest in the world for over 70 years; the steam turbine was invented there; the 3rd Earl became President of the Royal Society; and a steam-powered carriage that his sons designed and built clipped the kerb turning a corner, and threw out a passenger who died instantly, on 31st August 1869, almost exactly 150 years ago. She was the world's first recorded automobile fatality. (Her name was Mary Ward, and she was my partner's great grandmother: a connection for me.) How appropriate that Countess Rosse's benefaction helped to produce one of the leading scientists of our time.

Professor Lodish graduated from Kenyon College *summa cum laude* and with the Highest Honours in chemistry and mathematics. Graduating is not the same as leaving: a quarter of a century later he became a member of the College's Board of Trustees on which he served for almost 20 years. He remains an Emeritus Trustee. Here is a connection which has truly lasted.

What might an adventurous scientist with his qualifications do next, in the early 1960s? The Life Sciences called – a big step then, but, as the benefit of hindsight allows us all so clearly to see, a field with enormous potential that needed to bring chemists and mathematicians on board if it was going to be able to exploit the extraordinary advances made over the preceding decade. Surely nothing was more exciting than what was happening in genetics, and that is where Harvey Lodish took his skills. The Rockefeller Institute, which had focused first on public health and then, increasingly, on cell biology wanted to draw in physicists and mathematicians. Genetics was a particular strength there, and Harvey Lodish joined Dr Norton Zinder's laboratory which was carrying out pioneering work on bacteriophages, their genetic makeup, and their ability to manipulate the genetic makeup of bacteria. These natural genetic engineers have become increasingly prominent items of interest in an age of developing antibiotic resistance, through their roles as tiny, intracellular Trojan horses. *'Timeo Danaos et dona ferentes: I fear the Greeks even when they bring gifts'* as Virgil tells us – and yet what potential for good these tiny Trojan can offer, if only we can control them. You can see the concepts of signalling between cells, and of using tiny, natural vehicles to carry therapeutic agents to otherwise inaccessible targets, in the work carried out in Professor Lodish's laboratory to this day.

With a doctorate at what had by then just become the Rockefeller University could there be a place that might still attract a young scientist away? The Medical Research Council Laboratory

of Molecular Biology in Cambridge, England, was just such a place. It was undoubtedly the most extraordinary biological research establishment in the world at the time. Crick and Watson were awarded the Nobel Prize in Physiology or Medicine in 1962 for elucidating the structure of DNA, and at the same ceremony Kendrew and Perutz received the Nobel Prize in Chemistry: they had solved the structures of myoglobin and haemoglobin. (Sanger had received the first of his two Nobel Prizes – in Chemistry – four years earlier, but had to wait until 1980 for a second.) Crick was working at this extraordinary place with Sydney Brenner, a thoughtful, witty and delightful South African and a key member of what is sometimes called 'the phage group' (a connection, therefore, with Zinder). Brenner's own Nobel Prize was awarded in 2002; he died in 2019. Those are the people with whom Harvey Lodish went to work. What a place to be a post-doc interested in protein structures and genetics – or in inspiring other scientists.

From Cambridge, England, he moved to Cambridge, Massachusetts – from LMB to MIT, where he has been since 1968 – initially in the Department of Biology and then at the Whitehead Institute for Biomedical Research. He is a Founding Member of Whitehead and also a Professor of Biological Engineering at MIT. He has worked on protein synthesis and structure – particularly of glycoproteins which we can think of as being part protein, part sugar. These are molecules whose complex shapes can be altered by folding, and this in turn can change their biochemical properties. The devastating 'Mad Cow Disease' which destroyed brain structures in humans unlucky enough to

have eaten the wrong part of infected cows results from the mis-folding of a brain protein. Parkinson's disease may be another protein misfolding condition of the human brain. Protein conformation is crucial for us all. His lab has a particular focus on red blood cells – at least in part because he showed that they can be used as tiny vehicles to deliver therapies – and on the paths which red blood cells and fat cells follow during development, as well as on ways they change their properties once developed. All these projects link gene function and protein biology to human physiology in health and disease, with a particular emphasis on treating rare diseases – conditions that the leviathans of the pharmaceutical world typically ignore, yet whose sufferers deserve just as much help as any other sufferer. He has founded seven biotechnology companies including three that became publicly traded: Genzyme, Millennium, and Rubius; written well over 600 peer-reviewed papers; and is lead author of the definitive textbook *Molecular Cell Biology*, now in its 8th edition and translated into 12 languages. These are outputs with real world consequences. Indeed, in the 1980s he helped develop Genzyme's first therapeutic – an enzyme replacement for Gaucher Disease, an inability of the body to degrade a certain fatty substance. Fifteen years later he learned that one of his grandsons has this rare disease; Andrew is now 16 and for the past 6 years has been treated successfully with the drug his grandfather helped develop. What a fitting, personal benefit to arise from a public good.

Cells have developmental lineages. So do scientists. Over half a century Professor Lodish has passed on to others the knowledge, experience

and connections from which he has so clearly benefited himself. He is a renowned mentor. One distinguishing mark of some of the very best of us is that they not only make major discoveries but also enable and inspire others to make their own major discoveries. They combine with the motivation and drive of the explorer a generosity of spirit whose rewards lie – at least in part – in *what* is discovered and not just in the glory of themselves being the discoverer. The 200 or more scientists who have gone through the Lodish lab include two who are already Nobel Laureates and Lasker Prize winners, as well as a substantial group whose remarkable achievements have been recognised in other ways. Harvey Lodish's thoughts and writings about mentoring explain that to bring exceptional people to his lab and ensure that they flourish there he makes it a family-friendly place. People are not excluded in virtue of having children; indeed, parents thrive there. One notable consequence is his 2017 Women in Cell Biology Senior Leadership Award from the American Society for Cell Biology¹, which followed an earlier Mentor Award from the American Society of Haematology.

'Only connect', said David Hume. But he could have said more. Disconnection also has a role. One striking aspect of Professor Lodish's exceptional mentoring is that he supports and never competes with his former post-docs, letting them take with them large parts of their current research programmes. Yet at the same time he organises gatherings of past and present trainees to expand their networks and encourage new collaborations: truly he enables them to have their cake and eat it.

An Engineer of Tiny Things; a Master of Connections, yet a generous disconnecter, Mr Chairman, it is my privilege to present to you Professor Harvey F. Lodish for the award of Doctor of Science, *honoris causa*.

This citation is written by Professor Nicholas Rawlins

¹ *Each year, the American Society for Cell Biology honours three investigators at distinct career stages through recognition awards. The first two awards are given to woman scientists who have held an independent position within 7 years and 7–15 years respectively. The third award recognizes a woman or man at a later career stage whose outstanding scientific achievements are coupled with a record of active leadership in mentoring both men and women in scientific careers.*

Conferment of the Degree of Doctor of Social Science, *honoris causa* A Citation

Dr Shen Jinkang

Han Yu, a famous prose writer of the Tang Dynasty, once said that without a master scout like Bole, the world would know very few Seabiscuits or other famous equines. In the cycling sport arena of Hong Kong, we can borrow Han Yu's saying to the effect that without Dr Shen Jinkang taking up coaching in Hong Kong, the world would know very few star cycling athletes. This is indeed not an overstatement. When you have outstanding sportspersons, you are sure to find an eminent coach behind them. Another way of putting it is: Hong Kong now has scores of outstanding cycling athletes, therefore we are bound to have a distinguished coach like Dr Shen. Miss Lee Wai-sze, one of the eminent athletes who received training from Dr Shen, once summarized her bonding with Dr Shen with the Chinese character *cheng* (承). The character first appeared in the ancient Oracle Bone Script, with its lower portion resembling two raised hands whereas the upper portion is like a man kneeling. It is as if someone is firmly supporting another in both hands, just like Dr Shen, her beloved mentor, supporting her steadfastly throughout her journey in sports. The ancient anthology of lexicons *Shuowen Jiezi* defines the character's meaning as 'dedicate oneself and bear responsibility'. The definition is a good illustration of a first-class mentor who looks upon his mentees as his own children, and who will wholeheartedly provide guidance and advice for them, point them to the right direction and help them open up new paths, all of which lead to spectacular achievements again and again.

The bicycle, a two-wheel manually-driven vehicle, is called 'zi xing che' in Putonghua and 'dan che' in Cantonese. Either appellation fits nicely in the universal recognition in both mainland China and Hong Kong of Dr Shen as the most outstanding cycling athlete and coach. Since his birth in Shanghai in 1953, cycling has been Dr Shen's lifelong passion. At the age of 20, he won the cycling championship at the county level and was recruited by the Shanghai Cycling Team. Within a year, he was selected into the China National Cycling Team. As the most outstanding cycling athlete, he pocketed all the championships of the mid to long distance road cycling competitions in China. Unfortunately, during a morning training session with his teammates in Taicang City of Jiangsu Province in 1980, Dr Shen had a road accident. In an attempt to protect his teammates, he purposely did not steer away from an approaching truck. While his teammates could avoid the accident unscathed, Dr Shen ended up being struck by the truck and had to have his left leg amputated. This horrible accident meant that Dr Shen had to retire, albeit reluctantly, from cycling, putting an abrupt end to his athlete's career. The accident had not thwarted Dr Shen's passion in the cycling sports. A youngster with a strong will and astonishing tenacity, Dr Shen believed that even with just one leg, he could still make good use of his brain. Three days after the accident, he picked up his books, while still lying in the hospital bed nursing his wound, and started preparing for the 'gao kao', China's National College Entrance Examination (NCEE). Deep in his heart, he knew that only knowledge is able to revolutionize

the cycling sports in China. As soon as he was discharged from the hospital, he took the NCEE. In the end, he was admitted to the Shanghai University of Sport (SUS).

Dr Shen was an outstanding student at SUS. Upon graduation, he was accepted by the Beijing Sport University, where he obtained a Master's degree. He was by then deeply convinced that when one could no longer continue to be a sportsperson, one still could choose to be a coach. His top priority was always to give the best he could to his motherland. During his university years, he continued to train the Shanghai Cycling Team. He applied various sports science techniques in the training of cyclists, such as the control of blood lactic acid, the monitoring of heart rate, and the use of wireless intercom, etc. All these had helped the Shanghai Cycling Team win a great number of gold medals. He also wrote a research paper on the adoption of heart rate control in training, introducing a revolutionary concept into competitive cycling. This paper brought him the most prestigious award in sports science research. It could be said that Dr Shen is the first person in China to have adopted sports science and technological measures in the training of cycling athletes.

In 1985, Dr Shen was elected by unanimous votes as the Head Coach of the National Men's Cycling Team. This was the first time China had ever held a popular vote for the selection of a head coach. The following year, Dr Shen led the National Team to participate in the Asian Games in Seoul, and the Team won the first ever Gold

Medal in cycling. He was later appointed Chief Coach of the National Cycling Team of China. Under his leadership, the National Team enjoyed a long period of dominance in the cycling sports. Because of his tenacity and foresight, he had garnered both fame and glory for his motherland. From an outstanding cycling athlete to a master cycling trainer, Dr Shen has rightfully deserved his fame and stature in the cycling sports.

The year 1994 marks another turning point in Dr Shen's life, and a big challenge for him as well. That year, he was sent to Hong Kong by the State Physical Culture and Sports Commission for six months as visiting coach. His mission was to help the Hong Kong cycling teams get into the top six positions in the Asian Games at Hiroshima. In those days, the Hong Kong cycling teams had no full-time coach, were rather disorganized and, on top of all these, lacked sufficient funding and training facilities, all of which put the teams under the most undesirable condition and great strain. Dr Shen, however, was not to be daunted. Shortly after arriving in Hong Kong, he started recruiting young and talented cyclists into his teams. As it turned out, he enlisted the first and the only full-time cycling athlete in Hong Kong, Mr Wong Kam-po. To alleviate the financial worries of Mr Wong so that he could devote himself fully to training, Dr Shen even gave him half of his salary to put his mind at ease. He even approached the Cycling Association of Hong Kong in order to raise additional stipend for the athlete. Adversities, however, did not prevent Dr Shen from turning Wong into a sterling athlete within six months

through hard drills. Mr Wong finished fourth in the Men's Road Race Competition in the Hiroshima Asian Games. After that event, Mr Wong gratefully said to Dr Shen, 'For as long as you are the coach of the Hong Kong team, I will follow you and remain a team member.' Because of this pledge, Dr Shen made up his mind to stay behind to continue his tutorship of Mr Wong and other athletes. Since then, Mr Wong, under the guidance of Dr Shen, continued to break new grounds in the cycling sports arena and ultimately became a star cyclist, earning himself the accolade, 'Asia's God of Cycling'. The story of mentor and protégé has become an oft-told legend in the sports circle.

Dr Shen is famed for his strenuous demands on athletes. He wholeheartedly devotes himself to coaching, often forsaking rest and even sleep. He puts his trainees through the most strenuous physical training, thus earning himself the nickname 'Devil Coach'. Although his demands are arduous, he is caring and patient with his trainees. He also places great emphasis on integrity and morality in sports, and sets a good example himself for his trainees to follow, hoping to turn them all into upright and all-round sportspersons. His support and care for his trainees, whether in practical or spiritual terms, are full and unsolicited. He is affectionately described as the coach who upholds stern discipline but has the tenderness of an angel. Under the wings of Dr Shen, a great number of outstanding cycling athletes have emerged in Hong Kong, such as Chan Chun-hing, Kwok Ho-ting, Wong Wan-yiu, Lee Wai-sze,

etc. All of them have won accolades at national and international competitions and help elevate the standing of the Hong Kong Cycling Team, and each story a homemade miracle in itself.

To acknowledge the exceptional contributions of Dr Shen, the Hong Kong Special Administrative Region (HKSAR) Government awarded him the Chief Executive's Commendation for Community Service in 1999, followed by the Medal of Honour in 2006, and the Bronze Bauhinia Star in 2011. Furthermore, since 2000 Dr Shen has repeatedly received the Hongkong Bank Foundation Coaching Awards in Cycling. He was also invited to serve as a member of the Elite Sports Committee under the HKSAR Home Affairs Bureau, devoting his time and energy to the development of strategies and long-term objectives for elite athlete training programmes in Hong Kong.

Mr Chairman, Dr Shen is not only an outstanding cycling athlete but also an ingenious coach. He applies technological means to help raise the sport. He trains athletes through sharing his battle-hard experiences. To that end, he has served the nation well and helped bring honour to his motherland. His contributions to the cycling sports are exemplary and the dazzling accomplishments of the athletes under his tutorship speak volumes about his efforts. The training style of Dr Shen is strict but superb, and he is deeply trusted and respected by his students. For many years, he has been selflessly championing the novice athletes in Hong Kong. He is the Bole of star athletes, passionately

dedicating his service to, and passing both his valuable knowledge and counsel on, the young cyclists. The relationship between mentor and protégés can be vividly portrayed by the Chinese character *cheng* (承), which means 'inheritance'. The outstanding students very often have a stern and demanding teacher behind them; and students and teacher will together bring about miraculous results in any field they participate in. Mr Chairman, in view of the aforesaid distinguished achievements of Dr Shen, it is my privilege to present to you Dr Shen Jinkang for the award of Doctor of Social Science, *honoris causa*.

Conferment of the Degree of Doctor of Laws, *honoris causa* A Citation

Professor Sir Steve Murray Smith

Professor Sir Steve Murray Smith was born in 1952 in Norwich, England. His parents were from working class backgrounds, and he attended the City of Norwich School. It was a grammar school – a member of the most academically focused stream of England’s selective state schooling system. In principle that system was intended to find talented children, whatever their origins, through a country-wide exam known as the 11-plus and offer them an education reflecting their potential. Winning a place at a grammar school was an achievement. But at a parents’ evening, his form master told his parents that ‘people like you don’t go to university’. They should find a suitably low-skilled job for their son – perhaps sweeping the floor in a nearby shoe factory.

Schools can of course be wrong – and famously so. But their career guidance can seldom have been much more wrong than Steve Smith’s form master’s conclusions were that evening. Fortunately, another teacher had a different opinion: he told Smith that if he stopped mucking around in class he could really go somewhere. ‘...That made all the difference,’ Smith reports. ‘Someone, somewhere, has to put faith in you to go forward.’

Many factors affect potential students’ decisions about choosing to go to a university, but their schools’ advice and assessments carry a lot of weight. Faced with deeply negative judgements from a school teacher, even if another is encouraging, what might a pupil do? Steve Smith took the high road. Not only did he go on to show that his form teacher’s judgement was entirely off the mark, but in showing it he became one of the primary architects developing both the policy and

operations of an entire system that he had been assured would have no interest in him.

He started by winning an undergraduate place to study Politics and International Relations at the University of Southampton. A Bachelor’s degree there was followed by a Master’s and then a PhD. Before his doctorate had been awarded he was already a Lecturer in Politics at Huddersfield, whence he moved back to Norwich to join the University of East Anglia (UEA). UEA was one of Britain’s new universities, set up in the 1960s. Its star was in the ascendant. It was centred around a splendid, 17th century house, Earlham Hall (as so often, reserved for the administration) but was famous for its contemporary architecture: the brutalist ‘teaching wall’ and ‘ziggurats’ that were its primary structures made an instant impression.

He was there throughout the 80s. By then, UEA was widely celebrated not only for its iconic, original buildings, but also for its extraordinarily influential creative writing programme and for its Sainsbury Centre for Visual Arts – one of Norman Foster’s first major public buildings, housing a spectacular collection. This was something of a purple patch for Steve Smith, too – his name adorns the spine of nine books that came out during his time there. His academic career was flourishing just as clearly as his university was – but his time at UEA was coming to an end.

In the early 1990s, he moved to the University of Wales, Aberystwyth – another celebrated campus, famous for its landscape design and its 1960s plantings by Brenda Colvin, of which much is now

lost and the remainder controversially threatened. Aberystwyth is also home to what is claimed to be the oldest department of International Politics in the world, established shortly after World War I in the hope that by increasing our understanding of international politics we might prevent such conflicts occurring in the future. We should all have a dream...

In Steve Smith's ten years there another four books appeared – the last of them being *The Globalization of World Politics* – a veritable blockbuster, edited jointly with John Baylis and Patricia Owens, currently in its 8th edition with over 600,000 copies sold. At the same time Smith transformed Aberystwyth's department of international politics, taking it from a grade three in the research assessment exercise to a five, and then a five-star in 2001. His activities in Aberystwyth also signalled a shift in emphasis from a subject or departmentally specific focus to a wider, university perspective, as Senior Pro-Vice-Chancellor for Academic Affairs and, in due course, to what became a national and international portfolio whose significance rapidly expanded when, in 2002, he moved to the University of Exeter as its 6th Vice-Chancellor.

Exeter is an ancient city by British standards – a Roman legionary fort that became a town. It is the County Town of Devonshire and a cathedral city, whose cathedral library contains one of the great literary treasures of the kingdom, Codex Exoniensis, the Exeter Book, donated to the cathedral in 1072. It is the largest collection of Old English literature that still exists, but it remained an essentially unnoticed hidden treasure for three quarters of a millennium.

The Bishops of Exeter were undoubted grandees, and some took an active interest in education, but they distributed their largesse elsewhere: Bishop Stapledon founded Exeter College, Oxford and Bishop Grandisson endowed a Collegiate Foundation at nearby Ottery St Mary. Exeter's own university evolved largely from Exeter's Schools of Art and Science, founded in the mid 19th century. It became a full-fledged university in 1955 – not long before CUHK.

Shortly before Steve Smith arrived, Exeter had been criticised along with several other UK universities for its exclusivity – primarily, for its low proportion of state school pupils. At his interview for the Vice-Chancellor's post, Smith presented a 'forensic' analysis of the current state of the university, and a clear view of where it needed to get to. Eighteen years later, Exeter is very different. It has close to doubled its student numbers, and greatly increased its number of international students; it has pushed into the STEM subjects; and it has steadily moved up the ranking tables. To this end it has radically extended its campuses, and the accommodation that it is able to offer its students: full disclosure, my own younger son was an Exeter student at one of these – their Penryn campus in Cornwall, which opened in 2004.

Exeter has not simply worked to attract overseas students; it has also gone out of its way to forge international partnerships at the institutional level. Its partnership with CUHK, setting up a Joint Centre for Environmental Sustainability and Resilience here in Hong Kong, is an illustration of this outlook. Collaboration is key for the

management of climate change, and Exeter has made itself into one of the places with which to collaborate.

At the same time as changing his own university, Steve Smith has also been deeply engaged in the operations of the university system within which it is embedded. These activities might appear to compete for time or attention, but in truth they are interlinked. What happens within a university is of course substantially determined by the context within which it operates, from the schools whose pupils need to be encouraged and inspired, to the admissions system through which those pupils apply, to the structures, resources, attitudes and policies of the university sector itself. In highlighting just a few of the organisations to which he has contributed, I would like to pick out the Prime Minister's National Council of Excellence in Education, which advised the UK Government on how to achieve world-class education performance for all children and young people; his spell as President of Universities UK, representing the collective universities of the whole kingdom; and his Chairing of the Board of Trustees for the Universities and Colleges Admissions Service, which oversees admissions for the entire UK public university system – and at the same time plays a key role in advising and encouraging potential applicants. These are contributions which, over the years, have changed the entire system.

Steve Smith's contributions have been recognised with honorary degrees and awards both nationally and internationally, too numerous to list. But I cannot let pass unremarked the Susan Strange

Award of the International Studies Association for the person who has most challenged the received wisdom in the profession: truly a prize to cherish! He is a Fellow of the Royal Society of Arts, and of the Academy of Social Sciences, and he became Sir Steve Smith in the Queen's Birthday Honours List in 2011.

He stood down from his Vice-Chancellorship in September 2020. His successor has already been announced. At this most difficult and challenging time for universities everywhere he should surely be both proud and content to have passed on an institution in the best possible condition to weather the storm: the new Vice-Chancellor is a lucky woman!

You might reasonably suppose that, after all this, a quiet retirement beckons. But you would misjudge the man – and, as I am sure he will wisely have concluded, retirement is in any case a dangerous lifestyle to adopt. He will move to a new role as the UK's new International Education Champion. Education really is something that should be available for everybody. He has come a very long way from parents' evening at the City of Norwich School, and an awful lot of people have reason to be grateful.

Mr Chairman, it is my privilege to present to you Professor Sir Steve Murray Smith for the award of Doctor of Laws, *honoris causa*.

This citation is written by Professor Nicholas Rawlins