2018 David Hume Lecture "Oysters, death and taxes"
Professor Peter Mathieson, Principal of the University of Edinburgh

Good evening ladies and gentlemen.

It is my pleasure and honour to be invited to give the David Hume lecture this evening and I would like to thank Sir John and Jane-Frances for the invitation. Jane-Frances and I were introduced to one another by someone for whom we both have a great deal of respect, Professor Glyn Davis who until recently was President of the University of Melbourne: he predicted that we would get along well and I am pleased to say that he was correct.

As a relative newcomer to Edinburgh, I am somewhat daunted by the history of the place, the city, the University and some of the city's great men, of which tonight's lecture is named for one of the very greatest, David Hume. In thinking about my topic for this evening, of course I consulted Dr Google and there are some very rich sources of information about David Hume.

I walk past David Hume at least twice each day, in that my walk to work takes me past Old Calton Cemetery and then half way up the staircase to my office in Old College there is a splendid portrait of him. As many of you will know, his relationship with the University of Edinburgh was a complicated one. He studied Law at the University at the tender age of 12; one report even suggests that he was only 10. He gave up his law studies in favour of philosophy and literature but he did not think much of his Professors and he never graduated. Later he worked at the University as a librarian and then in 1741 he applied for a Chair in Moral Philosophy, but the University did not appoint him after ministers petitioned the town council not to do so because he was an atheist. I am pleased that the University's employment practices are now a bit more broad-minded, otherwise I would not have even made it onto the short-list! Some ten years later, Hume applied for a chair of philosophy at another ancient university to the west of here but again he was unsuccessful, Glasgow taking a similar attitude to his religious beliefs, or lack of them, as Edinburgh had done before them. Even Adam Smith, his personal friend who had vacated the chair at Glasgow, was against his appointment because he was concerned about going against public opinion.

I like the following description of Hume, by J.H. Burton: "There is no instance of a man of genius who has wasted less in idleness or in unavailing pursuits. Money was not his object, nor was temporary fame; though, of the means of independent livelihood, and a good repute among men, he never lost sight: but his ruling ambition, pursued in poverty and riches, in health and sickness, in laborious obscurity and amidst the blaze of fame, was to establish a permanent name, resting on the foundation of literary achievements, likely to live as long as human thought endured, and mental philosophy was studied." I think we can all agree that this aim has been achieved, so far at least.

My favourite David Hume quote, and the one that I propose to take as part of my theme for my presentation is his comment that "The life of man is of no greater importance to the universe than that of an oyster". His own life was clearly more significant than that of an average oyster and I venture to suggest that this should be the aim for all of us: that we try to contribute more to the universe than the average oyster. I hope to convince you that the

average kidney doctor contributes more than the average oyster. Another man that can make that claim is Benjamin Franklin, one of the founding fathers of the United States. He famously stated that the only things in life that are certain are death and taxes: that assertion will also feature in my presentation, hence the slightly odd title that I offered to Jane-Frances. I will talk about death and how to delay it, about taxes and how to best use them, both in the pursuit of health and also in the provision of education, and in the process I will draw some contrasts between England, Uganda, Hong Kong and Scotland, all places in which I have had the pleasure of working.

There is a David Hume connection with Benjamin Franklin: Hume introduced Franklin to French society and later also to Scottish society. Ironically, Hume held his last dinner party on 4th July 1776, just as America was celebrating its first day of independence, with Franklin one of its signatories. Hume died soon afterwards from probable bowel cancer, now an eminently preventable death as I will return to later.

So, what about me and any comments that I have to offer you that may be of interest this evening?

A bit about myself. My father, William Archibald Mathieson, was born in Edinburgh in 1917 and I like to think he would be proud that his younger son is now the Principal of the oldest University in his birthplace. He died when I was very young but I have two strong relevant memories of him. One is at Eilean Donan, the castle on Loch Duich where he told my brother and I that 'this is where it all started for the Mathiesons' because we were once constable of the castle for the Macraes; and the second is standing with him in the castle in Edinburgh and him surveying the city saying 'this is where I am from'. Every time I look up at the castle, I think of my father and that gives me a sentimental feeling about Edinburgh.

My father was with Trinity House, the merchant naval organisation which used to put people on and off lighthouses and lightships in the days when they were manned. We moved around with his work and moved to Cornwall when I was four years old. He died when I was seven, and we therefore stayed in Cornwall and I grew up there.

I later became the first in my family to go to university, despite the fact that when I told the careers master at the state grammar school which I attended that I wanted to study medicine, his reaction was to shake his head and said "Oh, Peter: it's very competitive and you might end up disappointed. Don't you think you should set your sights a little lower?" That was a red rag to a bull to me (in fact I have often wondered if that is why he said what he said: was it to stimulate me to try even harder?) Anyway, I made an appointment to see my family doctor, who seemed relieved when I didn't want to ask him about any medical problem, instead to talk to him about careers in medicine. He gave me some excellent advice.

Everything good that has happened to me in my entire life has been the result of education. I could even say that if my wife was sitting here listening, which she is not tonight, because I met her in our first term at university. The final personal detail that I will give you is that we recently celebrated the arrival of our first grandchild. When it was a boy and my daughter-in-law announced her choice of name as William Mathieson, I was thrilled: I told you that

my father William Mathieson was born in 1917. The new William Mathieson was born in 2017, exactly 100 years after the first.

This gives me an excuse to make a slight diversion to discuss genetics. You all share 50% of your genes with each parent, 25% with your grandparents, 12.5% with your great grandparents. So the new William Mathieson shares 12.5% of his DNA, one eighth, with the older William Mathieson. It's easy to remember: you have two parents, so the share of genes is 50:50 ie 50%; 4 grandparents, so 25% shared; eight great grandparents, so 12.5% shared etc. With your siblings, ie brothers or sisters, you can share 100%, 50% or 0% of your DNA. Even those siblings that apparently share 100% of their DNA will have very minor differences: the only siblings that are truly identical are identical twins. Non-identical twins may share 100%, 50% or 0%. All this will become relevant later when I talk about kidney transplantation.

Organ transplantation also generally requires blood group compatibility (not blood group identity, but compatibility, for which there are some simple rules). Intriguingly my wife and I are the same blood group, the relatively unusual B positive. This accounts for 9% of the UK population, so the statistical likelihood of me marrying someone else who is B positive is 9% of 9% ie a less than 1% chance. This was an inspired choice of partner for us both: if either of us ever need a kidney transplant we could give one, and if we ever need a blood transfusion when we are traveling together in some remote part of the world, we know we are blood group compatible. Maybe everyone should ask for blood groups before identifying their life partner!

I specialised in kidney medicine and I want to tell you something about it. Kidneys do a number of important jobs connected with regulating the chemistry of the body, and so when they fail, it makes people very unwell because it causes chemical mayhem. I enjoyed looking after very sick patients, not least because in my specialty we had a good chance of making them better because dialysis and kidney transplantation are very effective. The other thing that attracted me to kidney medicine is that it is very much a team approach: we had nurses, technicians, dietitians, pharmacists, psychologists etc that all worked together with the doctors to help our patients. That team ethos has served me well in all my subsequent jobs. Kidney units also have a reputation for solving other doctors' problems: lots of critical illness follows, for example, major surgery or other major medical intervention. When things go wrong, call in the kidney doctors. This sometimes causes resentment: there was once a joke in the doctor's magazine "Hospital Doctor" saying that having a kidney unit was good for the morale of a hospital, because it united all the other staff in their hatred of the kidney doctors!

Kidney doctors need to know a lot about other medical conditions, especially diabetes, which is the most important cause of kidney failure in the developed world. Actually, to be strictly correct, the most important risk factor for kidney disease is ageing, but since we don't usually consider ageing to be a disease, we label diabetes as being the most important disease that underlies kidney impairment. The proper name for diabetes is diabetes mellitus, which means sweet-tasting urine, because sugar spills out into the urine through the kidneys when the blood sugar level is high and that used to be the way of diagnosing diabetes: to taste the urine. Nowadays we have more sophisticated tests.

Ageing matters because kidney function deteriorates from the age of about 25 onwards. Generally this causes no problems in itself but it does mean that elderly people are much more at risk of kidney failure because they have less reserve to cope with any additional problems. I heard a presentation at a kidney meeting recently that said that everyone will get kidney failure if they live long enough, with the limit of kidney lifespan on average being about 120 years. Therefore in theory if you all live to 120, you will all need dialysis. That brings a problem: no country on the planet can afford dialysis for everyone that is affected by kidney failure as the population ages. Therefore prevention is very important, as I will describe in a minute.

The other treatment for kidney failure is a kidney transplant. The ideal transplant comes from an identical twin: as I told you earlier, they are genetically identical. This means that the kidney transplant will not be seen as foreign and the immune system will not try to reject it. The only transplant that can be done without anti-rejection drugs is one between identical twins. Even siblings that apparently share 100% of their DNA will have enough tiny differences for the immune system, which is very clever, to detect them, treat the new kidney as foreign and try to reject it. Since not everyone is fortunate enough to have an identical twin, the original kidney transplants were done between siblings in the hope that there would be a good tissue match. Then transplants were done between parents and their offspring, usually with the parent giving the kidney to the offspring but on rare occasions the other way around, although this raises ethical issues because it is a younger person giving a kidney to an older one. I told you that the degree of genetic match between parents and offspring is 50%. The reason these transplants can succeed is that anti-rejection drugs have become more and more powerful. In fact, now many transplants are done between unrelated donors, including so-called “spousal transplants” (which sounds like an alternative term for divorce but actually means a transplant between partners). Marriage partners are not typically related so will usually not share any genes, but the anti-rejection drugs are so good now that these transplants can be very successful. When we do a kidney transplant we don’t put it where the original kidneys are, here in the back, we put it here in the front, because it is technically easier there to join it to the bladder and to give it a good blood supply. People can have more than one transplant: I had one patient in Cambridge who had had three transplants and so he had five kidneys.

People sometimes ask why we have two kidneys. Well, it’s not so that you can give one to someone else. In fact, the more interesting question is why we don’t have two of everything: we have two eyes, two ears, two nostrils, two arms, two legs, two lungs etc. Those organs like the brain, the heart, the liver and the pancreas of which we have only one develop in the midline of the body; other organs are paired, with one on each side.

Other organ transplants are also technically very successful now: hearts, livers, lungs, pancreas etc. As you will know, there are not enough donor organs available for everyone that needs a transplant. Much has been written in the past about animals, especially pigs, as sources of transplant organs. I have never been very optimistic about that because of the major differences in physiology and the difficulties of overcoming rejection, but the advent of the very powerful new techniques of gene editing make this seem possible. I also believe that we will be able to grow organs in the laboratory: it is already possible to grow small

kidneys in a dish from stem cells, this now needs to be scaled up. We need to understand more about the growth signals to kidneys to be able to optimise this: for example if you take a kidney out of a small child, the other kidney will grow rapidly to make up for the lost one: it knows that the other one has gone. Similarly, if you transplant a child's kidney into an adult, it grows rapidly to adult size, so it knows it is in an adult. We know nothing about the signals for this rapid kidney growth: if we understood it, this would certainly help us to grow new ones.

I had to look up whether oysters have kidneys: they do!

So, how can you protect your kidneys? I told you about diabetes: well, type I diabetes is not preventable but the much more common type II diabetes is definitely preventable. By trying to avoid obesity, eating a healthy diet and avoiding cigarette smoking, the risk of kidney disease can be reduced. Screening for early detection of kidney disease is also important: simple urine tests can show the likely presence of early kidney damage and treatment with drugs including those for the treatment of high blood pressure can be very effective in slowing down or preventing kidney damage.

Preventive medicine needs to learn from the past, and the experience of other countries. There is a quote that is sometimes wrongly attributed to Winston Churchill, but was actually said by George Santayana: "those who fail to learn from the mistakes of history are doomed to repeat them". If we look at the United States of America, the growing prevalence of obesity across the country was followed a few years later by a growing prevalence of diabetes and a few years later again by a growing prevalence of kidney failure. We need to heed that lesson and avoid obesity by public health education about diet, sugary drinks, exercise etc.

An observation accurately attributed to Churchill concerns the fact that America is often considered to be ahead of us but it is a matter of fact that they are actually 5 hours behind. Coming back to oysters for a moment, the US is the home of Rocky Mountain Oysters: you might not have heard of these. My wife and I have a hobby of horse riding, and have had three holidays in the US riding on cattle ranches. Yes, we paid someone to allow us to herd their cattle for them! On one such holiday, in Colorado, we were given Rocky Mountain Oysters: they were delicious. They are in fact bull's testicles, nothing to do with oysters! Those ranch holidays were the best distraction I have ever had: getting those cows through that next gate was all that mattered, making sure that none escape. That reminds me of a leadership lesson from Nelson Mandela, who in his book "Long Walk to Freedom", recounts herding goats as a child and learning that if you walk ahead of the goats, when you turn around, all the goats may have wandered off, so instead he learned to herd from behind, where he could see all the goats, encourage them along, and if one tried to break away he could realise quickly and get it back in line. Wise words indeed.

Back to preventive medicine: I mentioned that David Hume died from bowel cancer. This is now an eminently preventable disease in many cases. Screening is possible, if a little indelicate, and can be targeted at those at most risk: the over 50s and those with a family history of relatives affected by bowel cancer.

There are also now some very exciting treatments for cancer, aimed at harnessing the immune system by effectively vaccinating against the tumour and allowing the immune system to detect and eradicate any recurrence. Secondary melanoma, previously considered untreatable, can now be cured in many cases with this approach.

Cancer is predominantly a disease of the elderly, so as the population ages, we will need new strategies for prevention and treatment. We will also need more palliative care. There is a common misperception, of which I have recent experience because my own mother, who died from cancer last year, held it with great conviction. This is that hospices are places to die and even that they "finish off" the terminally ill. In fact there is good evidence that hospice care prolongs both the quality and the length of life. Many patients are now discharged from hospices back to their homes, where they prefer to be.

Elderly people will often have one or more chronic diseases, so health care needs can only grow. It has long been my opinion that this problem cannot be solved by medicine, at least not in isolation. We will also need social science, robotics, engineering, remote sensing etc to help elderly people who are often isolated and might have cognitive impairment. Who will do the caring for such people? Robots can sometimes help. If driverless cars become successful, there will be large numbers of taxi drivers out of work, so maybe you and I face seeing out our twilight years being cared for by an unemployed Uber driver!

So that is probably enough about life and health, and certainly enough about death. What about taxes?

There is a link: optimal use of public funding through taxation includes healthcare, and also education of which I spoke earlier. Sadly, I believe that the NHS, of which I am a huge fan after spending 30 years of my life working in it, is unsustainable in its present form. We either need increased investment or a reduction in the expectations of comprehensive coverage. We need a focus on prevention and on maintenance of public health.

A word about Uganda: one of the countries with lowest life expectancy. When I first started going there as a visiting teacher in the late 1990s, HIV was out of control. Mercifully that has improved now but malaria continues to be a major killer, especially of young children, and the country has widespread poverty, poor sanitation and inadequate infrastructure. Despite all this, Ugandans are very optimistic and usually very cheerful. I find them inspiring. Unfortunately there is inadequate public funding to pay for universal education or healthcare. We should always remember that there are many in the world worse off than ourselves.

In Hong Kong by contrast, there is the longest life expectancy in the world. Some attribute this to their faith in traditional Chinese medicines, but myself I prefer the explanations that there are very low rates of cigarette smoking, low rates of obesity, genetic effects in a survivor population and also city living so that when comparing statistics for Hong Kong with whole nations, one is not really comparing like with like. Hong Kong does have inequalities, with some of the population living in poverty, variable access to high quality healthcare, and no real system of social support for the elderly, many of whom rely on dependence on their family. This probably contributes to the 24/7 work ethic because people want to work all

the hours that they can in order to save money for their old age. Sadly there is a high rate of suicide in the elderly.

The Hong Kong government is wealthy: recently they have substantially increased expenditure on research and development and this is very welcome. I have said that whilst running a university in Hong Kong, shortage of money was not my biggest problem. Politics was my biggest problem: everything in Hong Kong is politicised. Hong Kong is divided between those that want to integrate with China and those that want to resist integration at all costs. This was what underlay the "umbrella revolution" of 2014.

Hong Kong has many links to Scotland: major Scottish businesses helped to build Hong Kong: Swire, Jardine-Matheson etc.

So now to Scotland itself. Clearly taxation and many of the ways in which it is spent are now devolved matters. Should higher education be funded by the taxpayer? I was working in England when university tuition fees were introduced. This led to a customer focus which should perhaps have existed anyway, and to allegations of commoditisation of higher education. In Scotland, we have three groups of students: those domiciled in Scotland or the EU, whose tuition fees are paid by the Scottish government, those from the rest of the UK who pay just over £9000 per year, and those from international origins, outside the EU, who pay much higher fees. Frankly I can live with whichever funding mechanisms governments and the public decide to support, as long as it is accepted that if you want high quality university education, it is expensive and someone has to pay for it: there is no such thing as free education. Tuition fees show signs of politicisation, and I would prefer us not to have a politicised university sector like that in Hong Kong.

Optimal spending of public money is a matter of prioritisation. Personally I would prioritise healthcare and education, including universities, over missiles but everyone has their view.

In conclusion, ladies and gentlemen: some men (and possibly even more women) can have more influence than the average oyster. I hope that posterity will judge me amongst them, and I wish the same for all of you. Thank you for your attention.