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Book reviews, reminiscences, obituaries or appreciations of prominent current or past members should be up to 800 words in length.

Articles will be refereed and a report sent to the author(s).

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Dr Diana Leitch, BSc, PhD, FRSC, MBE

President 2016–2018

President's Report

In my last Annual Report for July 2016 to June 2017 I said that I hoped in the year July 2017 to June 2018 that we would have a more stable environment within the administration and management of the Society than we had had in the two previous years when it was fair to say 'the past season had been an eventful one'. I am pleased to say that the Honorary Officers, all of whom in September 2016 when they took office, including myself, were new to their roles, have coalesced well in their second year in office and brought considerable stability to our administration while also pushing on with new developments in our management and provision. So thanks are recorded to the Honorary Secretary, Peter Hilton, Honorary Treasurers, Trevor Rees and Greg Mauchline, and the two Vice-Presidents, Chris Baker and Professor Tony Jackson, for their services. Other members of Council, both elected and heads of section representatives, have assisted in these positive developments. Amongst that group of people only one change of personnel occurred during this session when Professor Desmond Winterbone replaced Professor Michael Sinnott as Chair of the Science and Technology Section. The extensive work which had been carried out on the Society's governance documents during previous years came to fruition, was presented to the AGM in November 2017 and accepted by the members.

At the beginning of the session it was necessary to conduct an extensive and lengthy search of members to find a President-Elect for the period September 2017 to September 2018. The decision was taken by Council that a nominee did not have to have served on Council before having their name put forward so that the range of people eligible for nomination could be extended and new blood brought in. As a result of this search Dr Susan Hilton's name was taken forward to the AGM on 7th November 2017 and agreed by the members. She joined Council after its first meeting after the AGM. Her involvement since then has been much valued and she will take over as President in September 2018, only the sixth woman since 1781. I would like to illustrate one of the ways she has been involved. As a charity we have to deal with all aspects of charity legislation including any new regulations which may appear and that we have done this year. General Data Protection Regulations (GDPR) issues were handled in time for the 25th May 2018 deadline by the office staff working with the President-Elect, Sue Hilton, who wrote our new Data Protection Policy and Privacy Notice, which has been in use since then.

Work has continued by our technical team to improve our booking system for lectures and to iron out glitches. During the year there has a been a major review of the statistical data that we collect regarding attendances at all of our lectures and the average cost per member of our lecture provision, which has been led by Vice-President Chris Baker. The presentation of this data to Council and the review of it has enabled us to take a more business-like approach to this provision and the effects of any deficits that were found. A worrying feature that was revealed was that there was a constant 20% of no-shows amongst those who

had booked, whatever the subject matter of the lecture, and this is being investigated. The costs of hiring various venues and the cost of pre-lecture drinks and of suppers were also reviewed to ensure the best use of the Society's and its members monies. All aspects of potential alternative lecture venues were considered but a decision has been made after this review that for 2018/2019 we should continue to use the RNCM and Manchester Conference Centre (MCC) as our major venues. However, these venues and their facilities will be kept under constant review as to suitability.

A survey of members was carried out under the leadership of Council member, Joanna Lavelle, which looked at members' preferences for lecture locations, start timings, suppers, ways in which the Society could be more inclusive, new lecture topics etc. As surveys go the response was reasonable and some suggestions have been implemented where feasible. Responses were considered when looking at our review of venues mentioned in the previous paragraph.

The Treasurers have continued to review the Society's finances and regularly report on these at each meeting of Council. They, assisted by Council members, David Brailsford and Dr David Shreeve, have reviewed our investment portfolio with our investment advisers, Brewin Dolphin, and reported their positive findings of this review to Council.

Before Christmas members were invited to two 'at homes' with Council members and office staff in the newly-refurbished room at our Church House offices. Only a few members attended but those who did enjoyed the events and it is proposed to repeat these events and to offer other opportunities for members, old and new, to meet Council Officers and the Society's staff. The new room has offered new possibilities to the Society. It now has the paintings of two of our famous former Presidents, John Dalton and James Joule, on one of the walls. These were retrieved from Manchester Museum of Science and Industry (MOSI) where they had been on loan for several years and it is good to see them back home as they used to hang on the walls of previous Lit and Phil premises in the past. At the opposite end of the room a wall-mounted screen has been installed allowing more multiple use of this room for small lectures and other activities. A new venture by the Arts Section to create a 'Theatre Group' has been a success and it has been good to see the new room being used before attendances at local theatres by this group.

Regrettably Dr David Shreeve completes his period of service on Council in September 2018 and I and fellow Council members thank him for his wisdom and calm and sensible contribution to the Society's affairs. Given the decision at the last AGM to slightly reduce the number of members of Council to sixteen by natural attrition, as their period of elected office ceases, he will not be replaced this year at the AGM.

Through the work throughout the year of each of the sections – Arts, Science and Technology, Social Philosophy, Young Persons and Council, we are yet again able to put together an excellent programme of lectures for 2018/2019 and the printed brochure will be submitted to the printers shortly and be ready for distribution at the end of the summer. Not all our forthcoming events are in the brochure

so members will be asked to look regularly at the Society's website (www.manlitphil.ac.uk) for updated information. None of this work could have been achieved without the dedicated commitment of the office staff, Julie Brockenshaw and Kathryn Slater, and I thank them on behalf of Council for everything they do. Similarly the Editor of the Memoirs, Professor Graham Booth, who unfailingly manages to produce a record of the lectures given in a particular year which can be published, and our Honorary Librarian, Mrs Christine Chappelle, who has been sorting and cataloguing our archives on a weekly basis throughout the year, have to be thanked for their work.

Last year I indicated that I hoped ease of travel to our evening lectures would improve as disruptive road and building works in central Manchester and beyond ceased. There have been some improvements but they could be better and it is to be hoped that 2018/2019 brings a real sea-change in transport disruption and its effects near our two venues.

Finally the Society is always looking at its processes and procedures and prior to my ceasing to be President in September 2018 l shall be undertaking a review with one or two colleagues of the criteria used for offering Honorary Membership of the Society, the criteria for the award of the Dalton Medal by the Society and the future nature of the Society's Percival Lecture.

Dr Diana M. Leitch MBE, FRSC
President 2016-2018

The Future isn't what it used to be

JAMES BURKE

1 September 2018

A Knowledge Economy

Thanks to the unintended consequences of innovation the future may no longer be what we thought it was going to be. This may turn out to be a serious matter, since accurate prediction is essential to survival. But all is not lost, since most of us have a brain that, much of the time, gets us half-way there. Every healthy brain on the planet has about eighty-two billion neurons, each neuron sprouting up to fifty thousand connective dendrites, each of which is potentially in contact with up to another quarter-million connective dendrites. So the total combinatorial number of ways a signal could go through the brain appears to be greater than the number of atoms in the known universe. And everybody has one.

A good example of this marvellous mechanism in predictive action takes place in any speak-listen event, when we understand what a speaker says as fast as they say it. We use our linguistic database (the 600,000-odd words in the core English language), plus the behaviour of the speaker's three thousand facial muscles, plus what we thought they were going to talk about anyway, so as to perform dynamic, real-time analytics on the syntax, grammar and content of what the speaker has said so far. Then we use this data to run scenarios of all the possible words they might generate next. Then, as the next word emerges, we shut down the scenarios and build new ones in anticipation of the next word. And we go on doing that for as long as the speaker speaks.

Predicting language is relatively easy, because it's using a database that we all more or less share. The same, however, can't be said about technological and scientific data. This may be why more and more people know less and less about what's happening around them. The problem with innovation is (a) stuff going on you don't know about, or understand and (b) the way we predict the future from within our contemporary paradigm of how things are supposed to be. A paradigm that changes when what we know changes.

So the evident difficulty that people appear to have with predicting the future today would seem to be because of the present high rates of technological change, and especially the social effects of that change, which are rendering the paradigm obsolete faster than most individuals (and, more especially, institutions) can keep up.

What complicates things further is the fact that, during the innovative process, the rules of maths seem to change, and '1+1' can make '3'. Ideas come together that never did so before, and the result of the process is unpredictably more than

the sum of the parts. As an example, the nineteenth-century German engineer Wilhelm Maybach combined an antiseptic spray as used in hospital operating theatres (so surgeons knew about it) with kerosene, as used in oil lamps (so lighting engineers knew about it), and produced his carburettor for the new car manufacturers (who knew nothing about either antiseptics or illumination).

Ripple Effects

What makes accurate prediction even more of a challenge are the potential secondary, 'ripple effects' of innovation. The ripple effect happens all the time. You can only rarely do one thing and expect just one result. The typewriter brought women out of the kitchen and into the office, but also boosted the divorce rate. The first refrigerators kept food fresh, but also punched a hole in the ozone layer. The biggest ripple effect of all time (and the one that bears most closely on my topic) was the one that shaped modern thinking itself. It was triggered in 1492, at a time when the authority for all knowledge was Aristotle. Whose definitive, last-word stuff included a map of the world. On which America did not appear. Until Columbus.

Intellectual panic ensued, until in 1619 a French military engineer, René Descartes, came up with two rules that ensured data could be more predictable and trustworthy. These rules locked down how we innovate, how we manage innovation, and how we predict innovation. First, Descartes said: "Apply methodical doubt. If something is said to be definite, think of it as probable. If they say it's probable, consider it possible. And if it's described as: 'possible' - forget it." Second: " Be reductionist, i.e. reduce the view of anything down to its simplest component elements. That way, you'll see how it works and, if need be, how to fix it."

We Europeans took to Descartes' method with all the enthusiasm of an alcoholic in a brewery. Methodical doubt and reductionism laid the grounds for modern scientific method, and the reductionist mission-statement ('learn more and more about less and less') has driven innovation and expertise of any kind, from then on.

Along the way, as reductionism has taken hold, the effect has been to slice and dice the disciplines into hundreds of scientific and technological 'niche studies.' Over time, these have become disciplines in their own right, with their own arcane vocabulary. Arcane disciplines then interact unexpectedly with each other, and render things even less accessible to the nonspecialist. For instance, the seven hundred modern specialist fields of study include such gems as: cryptozoology, the study of organisms that might not exist: ichnology, the study of fossilised footprints: osmics, the study of smells: and (my favourite) acarology, the study of mites (of which there are over 43,000 kinds).

The more the information moves around, the more such arcana occur. As Claude Shannon, the inventor of information theory once said: " Information causes change. If it doesn't, it's not information." Over the last fifty years, information technology has radically accelerated innovation, and modified the innovation process itself. Before IT there were the science and technology silos that Descartes created, and which became more and more specialized and incomprehensible. As

part of his work on thin-films, for instance, the nineteenth-century Scots physicist James Dewar kept a bubble inflated for three years. People thought he was nuts. The end result was cling-film, and the development of the packaging industry.

Now, thanks to internet access, the innovation process has changed again. As the American mathematician Norbert Wiener, once said : ' Major innovations come, most of all, from the unexplored no-man's-land between the disciplines.' So as the internet makes it easier to cross the line between those disciplines, the rate of innovation burgeons. The names of the newer sciences are all cross-discipline. In such a world, if we want to predict and prepare better for the future, maybe we should be looking at ways for higher education to add to their specialist curricula a few programs which would train people to think more interdisciplinarily, even within the same field, thus creating experts whose area of expertise would be no-man'sland i.e. broad-view generalists, rather than narrow-view specialists.

The Knowledge Web

With that in mind, and on a very simple level, I've been working, spare-time, on a small, online 'Knowledge Web' (www.k-web.org) designed to get young learners to think in a more "inter-disciplinary and contextual" fashion about the stuff they're learning. An approach which may to turn out to be critically-important for all of us, when the future stops being what it used to be, in about fifty years' time.

The K-web database is, at its present early stage, made up of about 2,800 people, events, and artifacts from history, split about equally between the humanities and the sciences, and interconnected among themselves about 25,000 ways. So the number of ways the user can travel through the K-web is fairly large. The name of the game is to learn new things, find new connections, reveal new relationships, by taking journeys of relational discovery across the K-web to see how everything is, ultimately, connected to everything else, across all disciplines.

Each K-web page displays a central node (in most cases a name) with lines linking that individual to others who played a primary role in their life and work. These in turn can be seen linked to some of their own primary connections. Clicking on any name causes the page to morph to that individual's page. Hovering over any name on the page produces a drop-down showing that person's area of activity. Each central character's biography (including details on their connections) lies to the side of the k-web page.

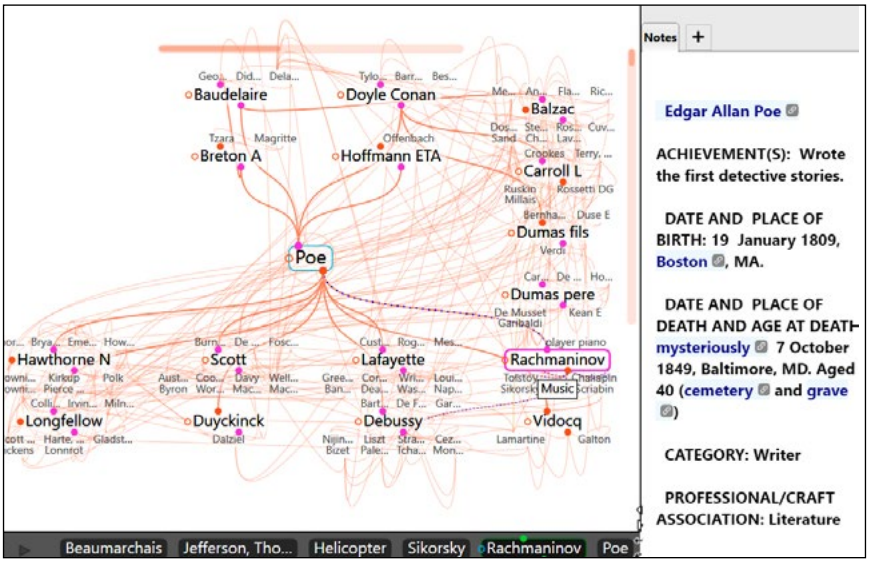

Figure 1: The basic k-web page. Central node, with primary and some secondary connections. A glance reveals outliers (unexpected links). Here, between Edgar Allan Poe (writer) and Rachmaninoff (composer)

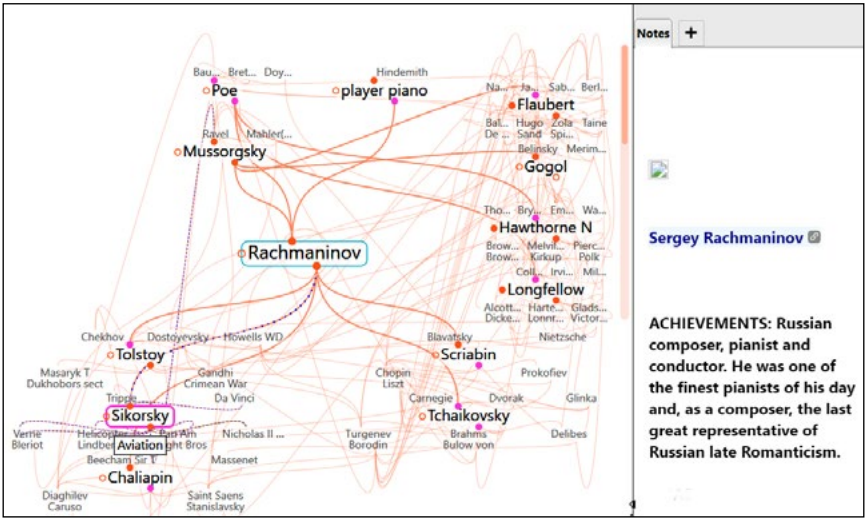

Figure 2: Rachmaninoff's connections, including one to Sikorsky (aviation) .

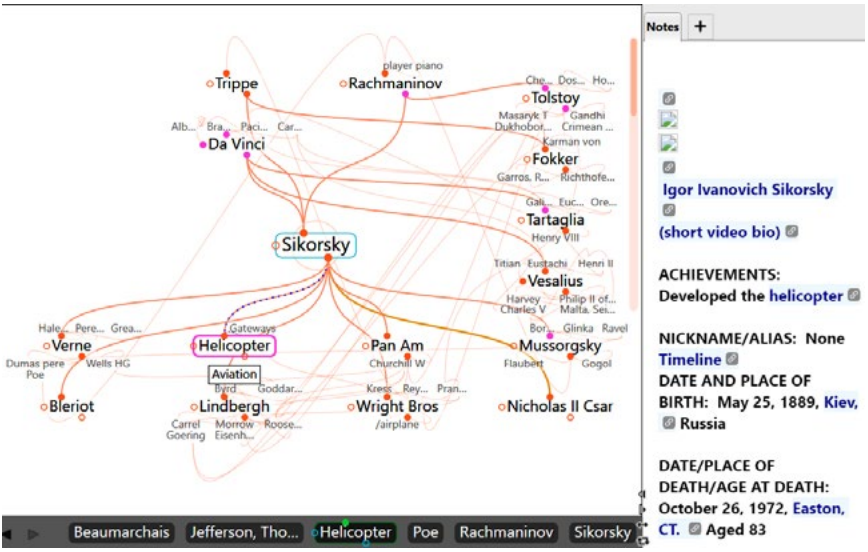

Figure 3: Screenshot: Sikorsky's connections. Including helicopter.

A brief sequence illustrates the interdisciplinary possibilities of this approach to data.Edgar Allan Poe, the American crime writer, wrote a story which inspired the (2) Russian composer Rachmaninoff to compose a symphony of the same name ("The Bells"). Rachmaninoff was at a Party on Long Island in 1923 and met a young Russian émigré whose work so impressed him he gave him (3 Sikorsky) enough money to help develop his helicopter. Three links: from literature through music to aviation.

The hope is that students will use this approach to build their own connective webs, either based on their own research, or on their own lives. In the world at large, the purpose of building a K-web (of an organization, or industry, or of the global, social, political or commercial environment) is to make people aware that something they know may be meaningfully-related to something that somebody else knows, in some other silo, or discipline, or business.

The K-web also shows one possible way of predicting change, because while individuals' connections are most often to others in their personal lives, or their field of expertise, in many cases there are also unexpected and surprising 'outliers.' These are individuals who at first glance would seem to have little to do with the central character. Outliers are the connections that lead to the most surprising results. In other words, outliers can often facilitate prediction of the unexpected.

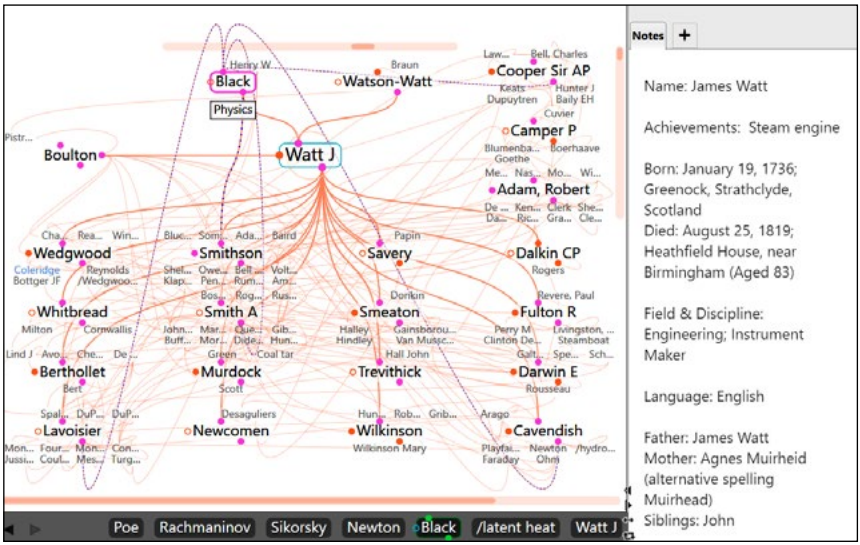

Figure 4: James Watt and his 'outlier' Joseph Black (chemistry professor)

In James Watt's case, Black was researching (for the Scots whisky distillers) how to get more whisky for less fuel (used in the boiling process), and discovered latent heat in steam. As a result of which he was able to tell Watt how to develop the separate condenser, which made Watt's steam engine efficient.

Is it worth attempting to predict innovation?

However, if innovation is so hard to second-guess and so difficult to adapt to, thanks to the unexpected nature of its emergence and its social effects (and especially since it was made more impenetrable by Cartesian reductionism), then why do we attempt it? The answer, I think, has been our constant requirement to find ways to solve the problem of scarcity.

Throughout history, there has never been a time when there was enough food, clothing, knowledge, money, tools, land, literacy, or raw materials for everyone. For example, as early as ten thousand years ago, bad weather caused food scarcity that drove hunter-gatherers to develop farming. The ensuing farming food-surplus triggered the need for social innovations that set the infrastructure of the modern world: the concept of ownership, police, education, organization, government, trade, taxation, bureaucracy, mathematics and the law. And to ensure continuity of the entire process, religion emerged to sanction those who did not conform. And to provide a value system we retain to this day. That entire, scarcity-driven historical dynamic was, in a way, just ready and waiting for Descartes to improve.

After which, two specialist (and scarcity-driven) innovations combined to bring us to the constantly-changing environment of the modern world. The first was James Watt's steam engine and the industrial life it spawned: mass-production,

shift work, division of labour, slums, smog and the crowded industrial cities in which we live. Above all, an economy now driven by advertising which generates 'perceived' scarcities. All this, facilitated by the second major historical innovation. This occurred during World War II, when the American military machine was producing hundreds of kinds of weapons. To make sure of hitting their target, users had first to consult the firing tables formulated for every kind of weapon in every possible circumstance. Working out such firing tables demanded millions of calculations, carried out at the Aberdeen, Maryland labs, where eighty women mathematicians worked night and day, unable to keep up with demand. Then physicist John Mauchly saw colleagues registering cosmic ray impacts which caused reactions in vacuum tubes a zillion times a second, and realised that this technique could become the basis for very fast calculation. The machine he designed is now known by the name previously given to all those overworked computational women: 'a computer' .

One major ripple effect of computers and the astonishing growth in their computational abilities has been the emergence of Big Data, which makes possible entirely new ways to drive the scarcity economy, because of what Big Data can find out about individuals, thanks to the digital exhaust each of us leaves behind.

Online, every time you click to activate something, or agree to cookies, or make any kind of online purchase, provide any kind of information, download software, use your bank, or your passport, get sick, take a holiday, go to the shops, make a phone call … almost anything you do can be recorded and analysed to find out about you and your likes and dislikes. The computer doing the analysing doesn't necessarily care about you as an individual, just you as a potential buyer. And the reason Big Data can be extraordinarily accurate is because the data it collects is immense:- from five billion people on mobile phones, half the global population online, sending three hundred billion emails a day, and doing a hundred billion Google searches a month. Three times every second, we generate as much data as there is in the Library of Congress. So Big Data no longer handles statistical samples, or representative numbers. It deals with everything.

There's now a whole new industry dedicated to using all this data. In what's called 'predictive analytics.' An algorithm (a search programme) is injected into the sea of data about a person, and the algorithm looks for patterns in their behaviour. For example, because the computer in your smart-phone always knows where you are, Big Data can determine that you're in a particular shop, looking for a particular article, and can suggest to you, via a message on your phone, where to look for the item. And then identify what else you might also be interested in buying. Or it might predict where you'll go next and offer advice on that, too. In some stores you can also point your smart-phone at the goods on the shelf, the phone reads the barcode, instructs your bank to pay, and you just take the goods and leave. No check-out. It's called 'grab and go.'

And one last twist - with the ' Internet of Things ' now totalling over twenty-seven billion objects capable of talking to each other (like an empty milk bottle telling the dairy to send another one, or the refrigerator ordering the weekly shopping for you) you won't even have to 'go and grab.'

So, thanks to our ability to innovate our way out of scarcity (perceived or real), we in the industrialized nations are now the healthiest, wealthiest people in history. But the effect of all the resultant consumerism, population growth, and raw materials use on a major scale now appears to have potentially lethal consequences for the future of the planet: oceans clogged with plastic, pollution everywhere, destruction of habitat, deforestation, over-population and urban sprawl. As for fresh water, 90% of it gets used for irrigation and by industry. Most of what's left after that is available to drink, but is often too dirty. And then there's climate change. So our latest form of scarcity is a clean, stable environment.

The international political reaction to these noxious matters has been to talk about reducing fossil-fuel use, cutting back on the use of raw materials, limiting urban expansion, and slowing the spread of industrialization. So the Third World can no longer expect a brighter future, and the industrialized world faces possible major damage to its economies. ' Apocalypse Now,' you might think.

However, coming to the rescue could be something Descartes would have been really proud of. Because more reductionist you cannot get than being able to work at the scale of the nanometer. A billionth of a meter. Three atoms' width. Where noodlers have been working since 1959, when Nobel prize-winning physicist, Richard Feynman, gave a talk[1] about a new discipline now known as ' nanotechnology.'

There are already over two thousand nanotechnology products on the market. Nanoparticles are used in cosmetics, solar cells, batteries, light-bulbs, sports equipment, wrinkle-free clothing. There are also major nano-prototypes already working in the labs -- tiny delivery systems carrying drug molecules to an individual target cell, one end of a straw can be placed in dirty water and pure water drunk out of the other end; spray-on solar cells make whatever you spray into its own solar-power source; materials a hundred times stronger than steel, and light as a feather; molecular filters which can take all the pollutant molecules out of exhausts and smokestacks; systems for trapping and rendering harmless all greenhouse gases.

So if these and many more similar products are going to be on the market in the next twenty years, there may be no need for the old-technology, economy-busting clean-up measures we are now planning. There's little doubt that the marvels of nanotechnology could eventually allow us to consumerize all eight billion people on Earth and not destroy the environment in doing so. Once again, thanks this time to nanotechnology, we've responded to scarcity by innovating our way towards a better future. Since Darwin, this is known as: 'progress.'

A new future

Except for something else nanotechnology promises to do, which could mean that the future is no longer what it used to be, i.e. " the same as before only better ." In 1981 IBM invented a scanning tunnelling microscope, which enables us to move atoms around. If you can pick up an atom and place it with other atoms, you can encourage the atoms to self-organize and clump together into a molecule. For instance, if you put two atoms of hydrogen together with one atom of oxygen you get a molecule of water.

And this is where the future stops being what it used to be, because the ability to move atoms and molecules will change absolutely everything, everywhere, for everybody. This device used to move the atoms and molecules will be called something like a: " nano-fabricator" and it will make anything.

To give a sense of the scale involved in building and operating a nano-fabricator, there are fifty trillion atoms in one grain of salt. Putting together a nano-fabricator would require us to be able to build trillions of atomic-scale robots, to work on an atomic-scale production line, taking atoms and putting them together, so as to make molecules, and then doing the same to the molecules so as to make a material, and then shaping the material into things like food, clothing, construction materials, electronics, the bits and pieces of daily life. Or a molecularlyperfect copy of the Mona Lisa, the crown jewels, a million pounds, or a gold block. All fabricated rapidly, since down at the nano-level, things happen a million times faster than at the human scale.

The feedstock for the nano-fabricator would principally be dirt, air and water. And the energy to drive the fabricator would be spray-on solar cells. This may be sounding a bit like science fiction, so let me add that the first atomic-scale nano-fabricator production-line robot was recently produced at Manchester University.

I don't think it an exaggeration to say that the social effects of the nano-fabricator will be greater than anything we have previously experienced. It makes no waste, so there would be no carbon-footprint pollution to worry about. People could live cleanly, anywhere, because they 'd be totally autonomous with all the resources, including energy, they might ever need. On a previously worthless, but perhaps wild and beautiful land, up a mountain, in a desert or in Antarctica. Anywhere.

In each of these places you'd be looked after by the other major item which nano-technology will have produced by then:- nano-computers. Each one nearly-intelligent, and at least a hundred thousand times more powerful than today's supercomputer. And each the size of a mote of dust (we may call them 'motes') embedded in, or sprayed on anything from house walls to skin, and networked with the trillions of other motes, anywhere on the planet. Your motes (you'd talk to them of course, as we are already able to do with computers) could be told to programme the physical world to your specifications. So your house interior could look like Versailles today, or a country cottage tomorrow.

Given that the motes would be programming your nano-fabricator to make whatever you want, you could live a life of what used to be called unbelievable luxury. Any guest you invited to visit could come as a 3-D hologram, so realistic you'd forget they weren't real. And after dinner you could all watch a Shakespeare play in the original Globe Theatre (which the motes, embedded in the walls, had turned your house into). So you'd never be lonely or bored. or lack for anything.

Does it all sound like winning the lottery? Well, yes and no. Consider that the first thing a nano-fabricator could make would be another nano-fabricator. So it would rapidly become two, four, eight, sixteen, thirty-two. One for everybody on the planet in, say, two years. The motes programme everything the

nano -fabricator makes, because encoding the instructions for doing or making anything, from clothing to cake, would be a piece of cake. So from then on, whatever you want you can have. Free.

So what will happen to the retailers you used to buy everything from, the manufacturers or service industries who supply them, the jobs all they all provide and the wages they all pay? If you don't need to buy anything anymore, what need would there be for money or a job? What about the taxes collected on all those wages? Well, all governments ever did, was decide how to spend our tax money on the entire social and physical infrastructure, and now there's no money, or need for any infrastructure anyway. In terms of a health service, the nano-fabricator makes all the medications and treatment devices for nano-medicine to take care of you. For second opinions and expert medical advice, the motes talk to each other. In education, nanotechnology will, twenty or thirty years from now, already have generated new educational systems where each student will have their own personal hologram avatar, teaching them, one-to-one, what they need or want to know, in a manner tailored exactly to their own individual. idiosyncratic personality. The question is: in a nano-fabricator world why would you want to learn anything? What would the purpose of education be, in a world without jobs and careers? And on that score, how will people define themselves without work? Most of all, what do we do… if we've nothing to do?

Perhaps, freed from the need to work, we might discover imaginative abilities we never knew we had. There might be a flowering of talent unprecedented in human history. But what kind of talent, creating what? And to what end?

Nobody knows what eight billion individually autonomous human brains might do, if they were free to act without having to think about scarcity. If everybody lives either by themselves, or in very small communities, what will happen to the culture we used to share? Or was that just a stage in our evolution? Was culture only ever there because we had to hang together as a group, with an agreed, common view of life, so as to more efficiently survive scarcity? Such a survival-oriented arrangement might no longer be necessary. What will hologram-socializing do to human contact? Indeed, human reproduction? If nothing is scarce, will anything have value? Will there be no more crime of property (since what you want, you can have). This would leave perhaps unavoidable crimes of passion. and crimes committed by lunatics who made their own nano-weapons unless we programmed the motes never to create such things? And if so, what else would the motes prevent us from doing. And who would programme the motes?

Conclusion

In the final analysis, our entire scarcity-driven society, constantly renovated so as to keep providing as many people as possible with what they need, living by values born of scarcity, will be called into to question by the advent of abundance. We have no experience in living without scarcity. And we may have no more than fifty years until the first nano-fabricators force us into the chaotic and profoundly disruptive transition from thousands of years of one way of living, to a new and entirely unknown way: to living with abundance. The transition to what might be

called ' the next stage of social evolution' . Without the old scarcity-driven social constraints on individual and community behaviour.

Given the enormity of this potentially-catastrophic or potentially-utopian change, we might consider setting up some kind of international project to prepare and plan. On the other hand, some may feel that everything I've said has been a figment of my fevered imagination, and that you can forget it, because it's not going to happen. But even if only some of it happens, we ought at least to engage in public discussion on the subject. If only to avoid finding ourselves in the position of the man in the joke, who falls off a skyscraper, and as he's dropping past the fiftieth floor, is asked how he's doing.

He shrugs and answers - "So far, so good".

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1 'There's Plenty of Room at the Bottom: An Invitation to Enter a New Field of Physics' was a lecture given by physicist Richard Feynman at the annual American Physical Society meeting at Caltech on December 29, 1959.

James Burke was educated at Jesus College, Oxford and is the author of twelve books. He was a columnist for Scientific American, and a contributor to New Scientist, Vogue, Time and Encyclopaedia Britannica Online (contributing the entry on 'Innovation'). He has created and presented many BBC programmes, including the major television series "Connections" and 'The Day the Universe Changed'. He has lectured to audiences at many prestigious institutions including the Smithsonian, MIT, NASA, IBM, Microsoft, the European Parliament and the US National Security Agency.
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Climate change – the past, the present, the future

Based on a talk given by Kevin Anderson*

9 October 2018

The latest report from the Intergovernmental Panel on Climate Change [1] (IPCC) describes a world at a critical junction. There is a path leading to a future with a global average temperature rise limited to no more than 2˚C, perhaps even 1.5˚C or, continuing with our present lifestyle, growth and emissions, there will be a rise of 4 to 6˚C. This paper considers how this point was reached and what is required to take the safer road.

The global average temperature is determined by a balance of the incoming radiation from the sun and the outgoing radiation, of longer wavelength, lost to space. The present global average temperature is around 15˚C. An essential factor in reaching equilibrium is the effect of atmospheric gases in absorbing and re-emitting outward radiation. Without this - commonly called the greenhouse effect - the average temperature would be around -18˚C and life as we know it would not have evolved. An important greenhouse gas is carbon dioxide, CO_2, which, until 1850, had not exceeded 280 ppm for over 100,000 years. The role and importance of CO_2 was first suggested, then demonstrated, early in the 19th century by scientists including Fourier and Tyndall: in 1896 Arrhenius estimated that doubling the level of CO_2 would result in a rise of 5˚C. Since then, through our use of fossil fuels, there has been a relentless rise to the present (2019) value of 410 ppm. As shown by the Keeling curve in Fig 1, there is no sign of abatement

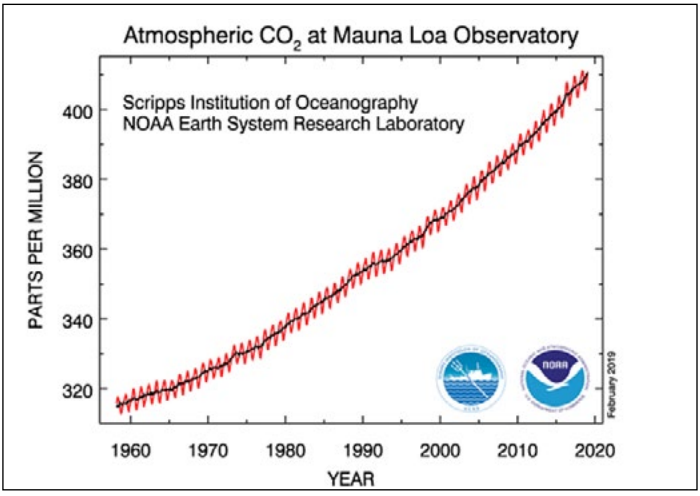


Figure 1: Growth of atmospheric CO_2 levels since 1960.
US NOAA Earth System Research Laboratory

The first world wide response to this global problem was the establishment in 1988, through the United Nations and the World Meteorological Organisation, of the IPCC. The IPCC includes representatives from over 150 countries, involves thousands of scientists using peer reviewed scientific literature to assess the risk of human-induced climate change, its potential impacts, and the possible options for prevention. The first report in 1990 set out the seriousness and scale of the problem. The 5th report[1] in 2014, supplemented by a special report[2] in October 2018, set out in unequivocal terms the worsened state of the planet; the impending consequences if there is no change; the need for urgent action and the scale required. Despite the early warning, little has changed in the 28 years since the first report – our planet continues on cruise control (Fig 2)

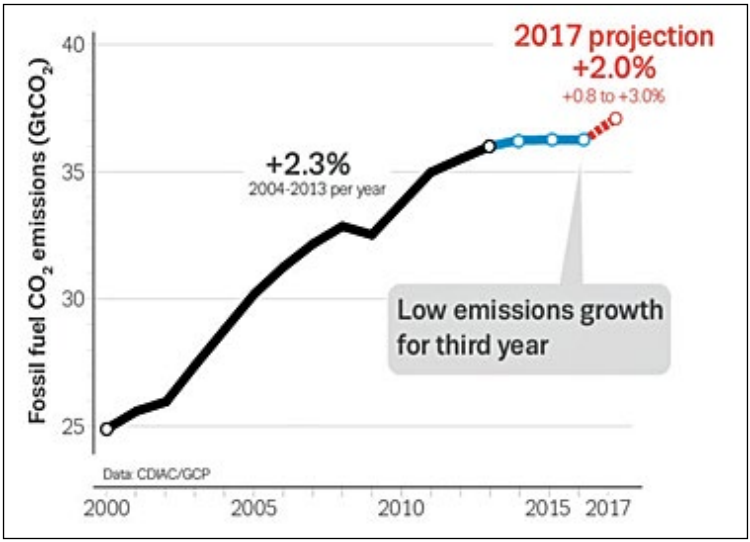


Figure 2: Fossil fuel emissions in the 21st century.
The final revised data for 2017 is a 1.6% rise with the value for 2018 being 2%.
Presentation to the University of Manchester Alumni Association (see note 5)

The 2015 Paris Agreement on climate change committed the participating nations to take action to:

> ...hold the increase in global average temperature to **well below 2°C** and pursue **efforts** to limit it to **1.5°C**
> …undertake rapid reductions in accordance with **best science**
> …proceed on the **basis of equity**

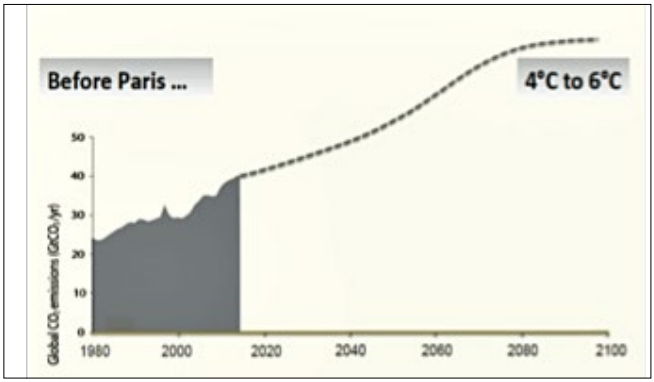
To do so requires an understanding of the science and of society. Richard Feynman pointed out that "For a successful technology, reality must take precedence over public relations, for Nature cannot be fooled" [3] whilst Pope Francis in his 2015 encyclical [4] stated"… the alliance of technology and economics ends up sidelining anything unrelated to its immediate interests."

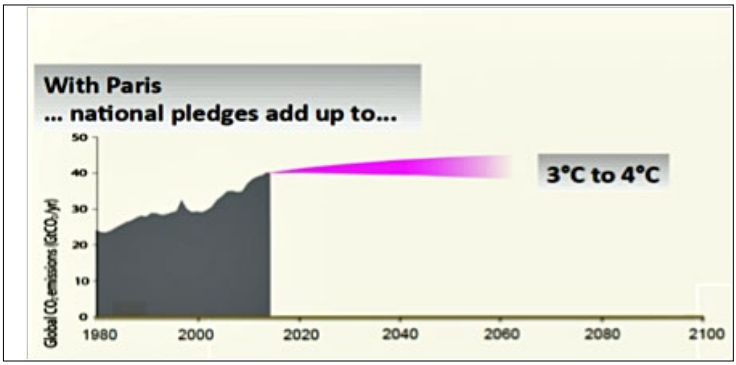
The methods listed below, either now in use to limit CO_2 emissions and global warming or in the Promised Land, have been critically described [5] as weak, insufficient and ineffective.

- **Offsetting** ... equivalent to paying a poor person to diet for us
- **Clean development mechanism (CDM)** … basically state sanctioned offsetting
- **Emissions trading (EUETS)** ... so many permits the $GtCO_2$ stays too low to be effective
- **Afforestation** ... plant a tree, expand an airport
- **Speculative 'negative emission technologies' (NETs)** ... requiring a huge planetary scale
- **Geo-engineering** ... which would be like a sticking plaster on gangrene

In the UK, and several other European countries that also consider themselves to be leaders in tackling climate change, there has been almost no change in CO_2 emissions since 1990 once an honest assessment is made with aviation, shipping, imports and exports included [5]. Globally since the start of the industrial revolution there has been a rise in the global average temperature of almost 1°C, a rise in sea level of 20 cm, many more extreme weather events of all kinds and changes of habitat for plants and species, including some extinctions. Some of these changes are the result of population growth, others come from climate change and many from a combination of both pressures.

Extrapolating the IPCC's 2013-14 carbon budgets (Assessment Report 5) to today suggests the remaining global carbon budget that would be compatible with the Paris "well below 2°C" and "pursue 1.5°C" commitments is a mere 750 $GtCO_2$ to 2100 and beyond. As the 2017 global CO_2 emissions were ca. 42 $GtCO_2$ there could be only a further 18 years at the current rate before the commitment is broken. The temperature predictions and emission targets for doing nothing, going with the Paris pledges or aiming for the commitment are shown in Fig 3, overleaf.





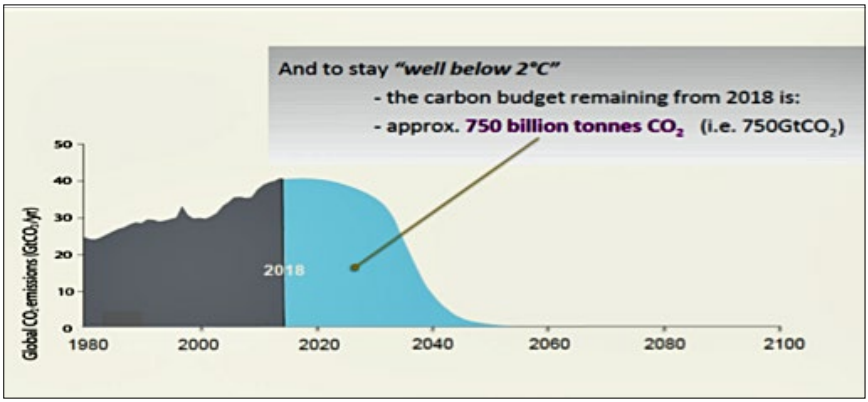


Figure 3: Predicted change in the global average temperature for different emission scenarios. Presentation to the University of Manchester Alumni Association (see note 5)

The realistic interpretation is that to stay "well below 2°C" then emissions must peak immediately then rapidly reduce to reach zero CO_2 by about 2050. There is an alternative picture but it relies on the assumption that negative emission technologies (NETs) – presently non-existent or unproven at scale – can be used to suck 100s billions of tonnes of CO_2 directly from the atmosphere and remove them from circulation. This highly speculative prospect is already embedded in most emission scenarios and even government policies, deferring action and passing responsibility to future generations (e.g. the UK following advice by the Committee on Climate Change). However, the scale of negative emissions assumed to work is beyond anything previously endeavoured. Clearly there is a strong argument for researching various NETs, but the ubiquitous reliance on their success represents a serous 'moral hazard', transferring the climate risks posed by our relative inaction onto future generations and low emitting climate vulnerable communities elsewhere.

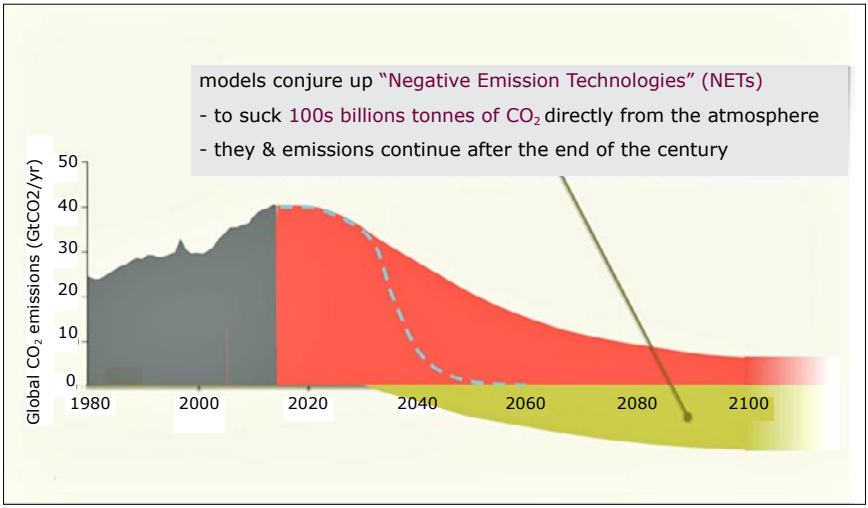


Figure 4: An alternative emission scenario relying on NETs
Presentation to the University of Manchester Alumni Association (see note 5)

The consequence of failure to limit global temperature rise is well illustrated by the experience and plans [6] of one of the most vulnerable countries – Bangladesh. Two-thirds of the country is less than 5 m above sea level, it is small in area but densely populated, lies on a fertile delta of the Ganges and Brahmaputra rivers, experiences annual floods and frequent cyclones. Yet in recent years there have been improvements in education especially for women, there is a falling birth-rate, new varieties of rice will allow it to become self-sufficient and perhaps an exporter. In addition, a system of cyclone warnings and shelters has dramatically reduced the death toll from recent cyclones. Scientists, engineers, political leaders and community groups are already making the changes needed to cope

with climate change. Detailed studies for this region combined with the present experience of this country suggest it can probably cope, albeit at considerable cost, if the global temperature rise is limited to 1.5˚C and global warming peaks in 2050. If global warming peaks at 2˚C in 2100 it may still cope but the costs will be extremely large. But with 2.7˚C as promised in Paris rising to 3˚Cin the next century then major parts of Bangladesh will drown and this nation, which is not responsible for climate change, will pay the price.

If plans are to be made to keep within the emissions budget of around 750 $GtCO_2$ it is necessary to allocate shares to each major group, such as the EU, and then to individual member states. These should be more generous for developing nations than for the industrialised countries which have been the main contributors of greenhouse gases in the past. It is argued [5] that to limit warming to no more than 2˚C the UK's fair share is between 2.9 and 4 $GtCO_2$, i.e. 7 to 9 years of current emissions when including aviation and shipping but excluding imports and exports. This would require for the UK:

- reduction of CO_2 at 10-13% p.a. starting now
- a total reduction of around 75% by 2025

A starting point might be recognition that CO_2 emissions are highly skewed towards a small fraction of the population with 50% of the CO_2 associated with 10% of the population. There would be a 1/3 cut in global CO_2 emissions if this top 10% reduced their CO_2 footprint to the EU mean level whilst the other 90% made no change.

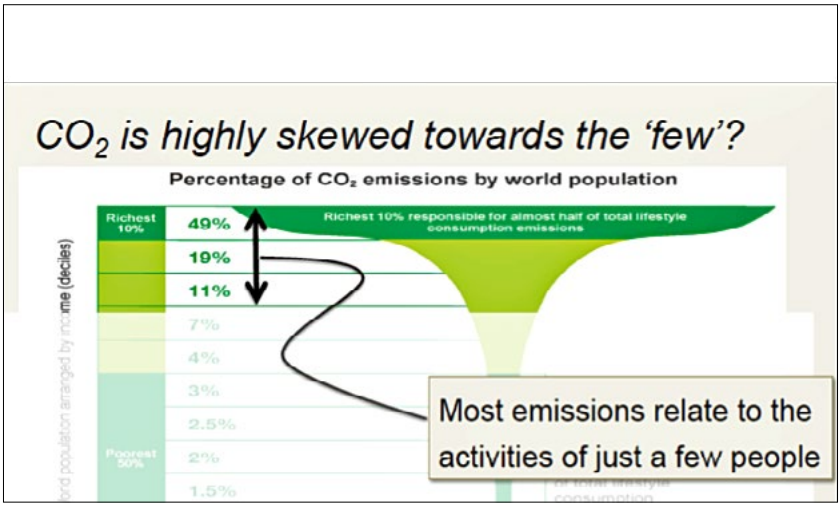


Figure 5: Distribution of CO_2 emissions per decile of the world population. Oxfam report "Extreme Carbon Inequality", Dec 2015

Beyond this "seemingly simple" change a 3 phase strategy is needed to address CO_2 budgets and the present inequality.

Immediate and near term

- Profound changes in the energy behaviours and practices of high-energy users

Near to medium term

- Very stringent energy efficiency standards on all major end-use equipment

Medium to longer term

- Marshall-style construction of near zero CO_2 energy supply and electrification

There would also have to major changes of lifestyle, especially for the top 10% emitters. The implementation of a Marshall-style programme to move to zero-carbon infrastructure and energy with the productive capacity of society shifted would be akin to that of the production changes during WW2 and the post-war reconstruction. The benefits, not just in limiting climate change, would be immense including:

- Major, secure and high-quality jobs for several generations
- Elimination of fuel poverty
- Improvements in air quality, especially benefitting the young
- Stronger indigenous tourist industry with less flying abroad
- A prosperous and healthy future for our own children and grandchildren
- Clear progressive international leadership

Is there hope of moving onto this path towards a future with a limited global average temperature rise of no more than 2°C, perhaps even 1.5°C? To access it will require more than simple evolution in our society; the changes need be nearer to revolutionary. The past decade suggests this is not impossible. In this period there have been major disruptions including a banking crisis, the spreading influence and power of social media, many unexpected political upheavals including Brexit, plummeting prices for renewable energy and greater awareness and concern for environmental problems, especially amongst the young. The logical interpretation of the IPCC predictions and the associated carbon budgets is that climate change demands system change. The policy of relying on slow, incremental improvements was condemned by Alex Steffan: "Winning slowly is basically the same thing as losing outright. In the face of both triumphant denialism and predatory delay, trying to achieve climate action by doing the same things, the same old ways means defeat. It guarantees defeat." But in a message of hope, Robert Unger says

"at every level the greatest obstacle to transforming the world is that we lack the clarity and imagination to conceive it could be different".

The ultimate choice is between a short term realpolitik and a sustainable long-term real-climate. The challenge for us is to have the cogency, tenacity and courage to escape the black hole of today's socio-economic norms with its incremental changes to 'business-as-usual', and instead develop policies appropriate to the scale of the climate challenge.

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Kevin Anderson is Professor of Energy and Climate Change in the School of Mechanical, Aerospace and Civil Engineering at the University of Manchester and is a former Director of the Tyndall Centre for Climate Change Research. He is research active with recent publications in Climate Policy, Royal Society journals, Nature and Science. He engages widely across all tiers of government; from reporting on aviation-related emissions to the EU Parliament, advising the Prime Minister's office on Carbon Trading and having contributed to the development of the UK's Climate Change Act.

With his colleague Alice Larkin, Kevin's work on carbon budgets has been pivotal in revealing the widening gulf between political rhetoric on climate change and the reality of rapidly escalating emissions. His work makes clear that there is now little chance of maintaining the rise in global temperature at below 2°C, despite repeated high-level statements to the contrary. Moreover, Kevin's research demonstrates how avoiding even a 4°C rise demands a radical reframing of both the climate change agenda and the economic characterisation of contemporary society.

Kevin has a decade of industrial experience, principally in the petrochemical industry. He is a chartered engineer and fellow of the Institution of Mechanical Engineers and is a Director of Greenstone Carbon Management.

**This article was drafted by Brian Tyler, Secretary to the Science and Technology Section committee of the Lit&Phil.*

THE MARGARET PILKINGTON MEMORIAL LECTURE

The Alderley Edge Landscape Project: 'Living with the Edge – Alderley's Story'

JOHN PRAG

15 October 2018

Alderley Edge is a sandstone ridge 179m high a dozen miles south of Manchester overlooking the Cheshire plain to the south and the foothills of the Pennines on the east. True – but this bald statement conceals the fact that it is also a place with a many-faceted history going back 10,000 years to the Mesolithic period, a place where according to legend a king and his knights lie sleeping ready to save England in the last battle of the world, a place which all who come to know it well agree is a special place.

The Edge is now familiar to many people through the works of its most famous son Alan Garner – *The Weirdstone of Brisingamen* (first published in 1960 and continuously in print ever since), its sequel *The Moon of Gomrath* (1963) and then the concluding story *Boneland* (2012). Garner has written numerous other books set in his native Cheshire, of which the most important for the story of Alderley, and for our project, is *The Stone Book Quartet* (1976), a set of four narratives describing a day of passage based on four generations of his own family.

Figure 1: Alan Garner in Miss Bratt's class at Alderley Edge Council School, aged 6. (AELP archive)

This account of our project could run with the subtitle 'Three children and the story of the Edge', Alan Garner and his shovel, Rachel Bailey with a pot of Roman coins, and Edna Younger and her porcelain dog. The tale of Alan Garner's shovel began in 1875 when some miners clearing round an old shaft at Brynlow found 'an oak shovel that had been very roughly used' together with a collection of stone hammers. The findspot was investigated by William Boyd Dawkins, Professor of Geology at Owens College (later the University of Manchester) who suggested, albeit tentatively, that the whole group were of Bronze Age date, although his arguments had to be based simply on the crudeness of the tools. A drawing of the shovel and a description of its discovery were published in Dr J.D. Sainter's splendidly titled *The Jottings of Some Geological, Archaeological, Botanical, Ornithological and Zoological Rambles around Macclesfield*, and the fact that mining at Alderley started in the Bronze Age became a given. There the matter rested until 1953, when a Manchester Grammar School boy sitting in the Central Reference Library became bored with Aeschylus' *Agamemnon* and pulled Sainter's book off a shelf nearby as an interesting diversion. The shovel looked familiar, and a few days later he remembered seeing it hanging on the wall of his classroom in Alderley Edge Council School when he was six.

Figure 2: The Alderley Edge shovel (Manchester Museum acc. no. 1991.85) (AELP archive)

He rushed back to the school and found Miss Fletcher, the headmistress, who led him to his old classroom – but the shovel was gone. Not to the tip, as the caretaker suggested, but hidden under the stage in the hall, still with the label identifying it adhering to it (just). Miss Fletcher decided it was a case of finders, keepers. Alan then took it to the Manchester Museum where there was no-one available to see him (shame on my predecessor!). Nobody appeared interested in the evidence for its origin: the British Museum decided it was probably a Tudor winnowing fan, the Ashmolean that it was a child's spade, probably Victorian (all this after a spell of safekeeping in Alan's National Serviceman's kitbag). Yet in the end his

perseverance paid off: thirty-eight years later I had a phone message at my desk in the Manchester Museum that a Mr Alan Garner would like to talk to me about some items he wanted to place in the museum, and I was invited to his house out in Cheshire, across the tracks from the Jodrell Bank telescope.

I could not believe my curatorial eyes when among several other objects of great local interest he produced the shovel. The other items could mostly wait, he said, but this I should take now. I felt we should have it radiocarbon dated before accepting it formally, to which he bravely agreed. The Oxford Research Laboratory for Archaeology dated the timber to around 1750 BC, which placed it securely in the British Early Bronze Age.

None of this should have happened. The handle of the shovel is broken and the blade has a slice missing, so logically the miners should have thrown it away, or at least used it for firewood; a piece of timber like that should have decayed long ago; the school should have thrown it out. The schoolboy re-discoverer should not have had the persistence (and passion for history) of Alan Garner. Maybe he should not have met as gullible an archaeologist as me. But that is what happened, and it was the first of two events that led to the notion of a research project at Alderley.

Now comes Rachel Bailey with the pot of coins: in 1995 Rachel's father Malcolm was working with the Derbyshire Caving Club (DCC) who maintain the mines for the National Trust to make safe an old mineshaft for the Trust, and uncovered a coarseware pot containing a hoard of 564 coins most of which proved to date from the reigns of the Roman emperors Constantine I and II (AD 317-340). They very properly reported it to the National Trust's Regional Archaeologist Jeremy Milln and the coins were duly placed in the Manchester Museum.

Figure 3: Rachel Bailey with the pot containing the hoard of Roman coins immediately after its discovery by her father in April 1995 (AELP archive).

These two discoveries provoked a re-assessment by the Trust of its strategy for managing Alderley Edge. Bronze Age and Roman occupation had long been assumed, but here was the first hard evidence. The Edge has always been a honeypot for local city folk seeking a walk in the country: they said that when a train came in from Manchester at holiday time you could walk up to the Edge on the heads of the people. The fragile topsoil was becoming eroded by all those feet, and consequently not just the history and archaeology but also the natural life were suffering badly. Discussions between the Trust and the Manchester Museum – Manchester University's only multidisciplinary department – led to the creation of the Alderley Edge Landscape Project (AELP) in 1996, based in the Museum but calling on disciplines around the university and elsewhere. Its steering group included representatives of the Museum and University and the National Trust (who now own most of the Edge) but also groups such as the Derbyshire Caving Club and the parish councils and – importantly – individuals with an interest in the Edge, notably Alan Garner himself. As the Project growed so did the Steering Group: local involvement was always a fundamental element in the Project's make-up. I was given the role of 'project co-ordinator'. 'Shall we say 25% of your time for two years?' said Tristram Besterman, then Director of the Museum, who became chairman of the steering group. In the end it took more like 200% of my time for twenty years, well into official retirement. Herding chickens would have been an easier task, but much less exciting.

AELP's aims sounded straightforward:

1. To make the first complete survey of the story of the Edge.
2. The suite of minerals at the site is unique and complex: from this geological starting point the project intended to record both the flora and fauna and the traces of man's activity above and below ground.
3. The further aims of the project included:
   (a) a management plan for the site;
   (b) an exhibition at the Museum, followed by a display at the site;
   (c) opportunities for teaching linked to the National Curriculum;
   (d) an illustrated guidebook to the Edge as well as a multidisciplinary monograph or series of articles;
   (e) avenues for possible further research.

The project was to run for two years, and secured funding from the Leverhulme Trust, supplemented later by numerous smaller grants from other bodies, too numerous to list here, and from several individuals.

We established a core survey area which corresponded roughly with the National Trust's property, in which we were going to record 'everything', and a larger hinterland that included Alderley Edge village, Nether and Over Alderley and Mottram St Andrew, extending southwards as far as Monksheath and the A537 and east to include Hare Hill (see figure 4). Here we planned to look at items of particular interest. Many of the techniques which we employed such as GPS and GIS are now commonplace but were then still in their infancy: using them was 'interesting' and often relied on the goodwill of colleagues around the university, in Cheshire County Council and elsewhere. In some instances their application to AELP provided a platform for further development.

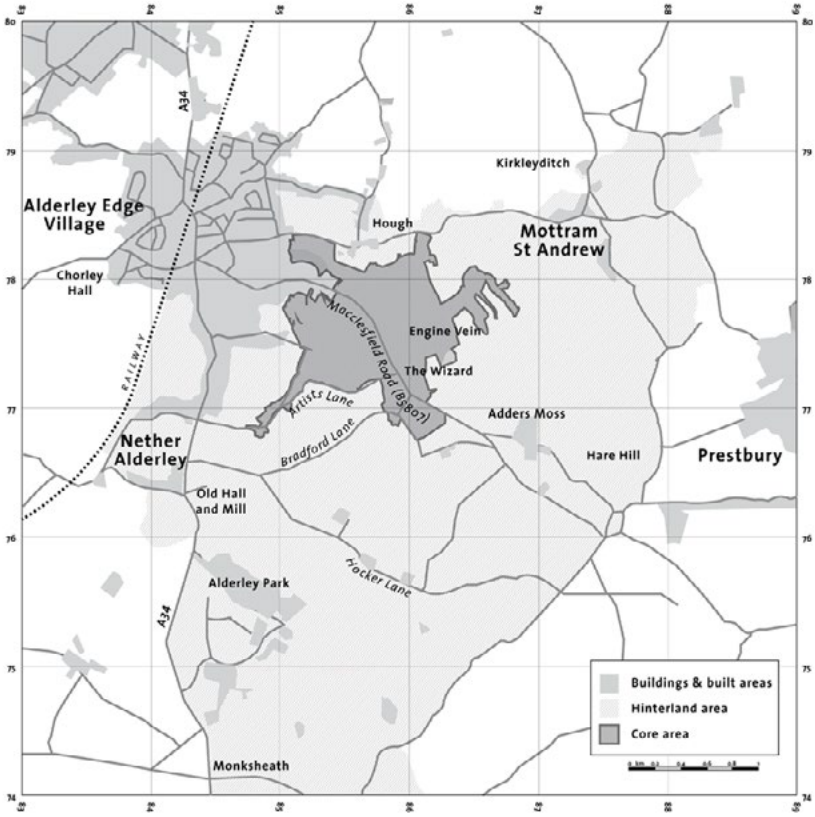

Figure 4: Map of Alderley Edge showing the Project's Core and Hinterland research areas (Based on the 1992 Ordnance Survey 1:25,000 Pathfinder map sheet 759 with the permission of the Controller of Her Majesty's Stationery Office, Crown Copyright October 2013). (AELP archive)

Part of the Edge had been classified as a Regionally Important Geological and geomorphological Site (RIGS), and in 1993 much of our core area had been identified as a Site of Special Scientific Interest (SSSI) on the basis of the geology and its impact on the natural life. Indeed, the geology is fundamental in every sense to understanding Alderley (see figure 5). Its earliest known inhabitants are two archosaurs from the Permian age (c. 240 Ma), the large carnivore Ticonosuchus (cheirotherium) and the smaller herbivore Rhyncosaurus articeps (rhyncosauroides) whose presence is touched on in Alan Garner's The Stone Book. However, central to our story are the 30 million years during the ensuing Triassic (205-175 Ma) when copper, lead, zinc, vanadium, cobalt were precipitated between sand grains and along faults in the limestone, and then the glaciations during

the Ice Age (400,000-12,000 B.P.) when glaciers exposed the mineral veins but also deposited tills containing the flint and cobbles that were later important for the early exploitation of the minerals. Some of the minerals and ore deposits are indeed beautiful, reflected in names given to the mines by the DCC others such as 'Blue Shaft'. A dark blue solution from the process works was recognised by Henry Enfield Roscoe, Professor of Chemistry at Owens College, as containing vanadium, becoming fundamental to his work on the production of vanadium metal.

c. 245 Ma (million years ago)	Alderley Edge created as a ridge of sandstone between Alderley Fault on west, Kirkleyditch fault on east Hard coarse Helsby sandstone above, softer fine Wilmslow sandstone beneath
245-205 Ma	Incursion of sea, deposited silt and rock salt, became impermeable layer of mudstone and halite = classic hydrocarbon trap for oil & gas rising from below. Fossil magnetism in red rocks and trace fossils (*cheirotherium* and *rhyncosauroides*) indicate semi-arid tropical environment, c. 20°N
205-175 Ma (Triassic)	Copper, lead, zinc, vanadium, cobalt precipitated between sand grains & along faults
65 Ma	Another uplift following another reopening of N Atlantic: overlying rocks stripped, gas & oil leak away from Cheshire Basin
By 3-4 Ma	Continents had drifted N, present shapes recognisable
2 Ma - present	Current form of Edge created by differential erosion before/during/after Ice Age
c. 2.6 Ma (Pleistocene)	Fluctuating but increasing temperature drop caused partly by change in ocean currents
400,000-12,000 BP	Ice Age - 6 glaciations. Glacial tills & gravels cover Cheshire but Alderley Edge remains upstanding. Present form of landscape created: hummocky sand/gravel with ridges, kettle-holes & mosses. Glaciers exposed mineral veins, glacial till etc, deposited flint and cobbles for tools.

Figure 5: The geological history of Alderley Edge

As well as mapping all the Edge's humps and bumps and thus clarifying their relationship which is often obscured by the trees and other ground cover, the project's topographic survey plotted the mineral deposits and thus the mines. While it is very likely that people were already exploiting some of the ores for their bright colours in the Neolithic, the first actual mining came in the Early Bronze Age, perhaps as early as 1900 BC, making Alderley the earliest metal mine in England. These mines are found along the eastern lip of the Edge, notably at Engine Vein with an outlier below at Mottram St Andrew, and on the dip slope at Brynlow, the findspot of the shovel. The miners extracted the ore with stone hammers, having first fractured the surface by fire-setting. One of AELP's most important aims was always to involve the local people and schools as much as possible, and on National Archaeology Days in 1997 and 1998 we carried out a programme of Bronze Age mining all the way through from making and using hammerstones to smelting the copper: while this was very instructive for the specialists involved as well as for the 'amateur' participants, it also became clear that in antiquity too this was probably carried out as a communal activity.

Just as with Alderley's Bronze Age story, it was often assumed that the Romans came here for the copper, but apart from a few chance finds there was no firm evidence until Rachel Bailey's father and the Caving Club discovered the coin

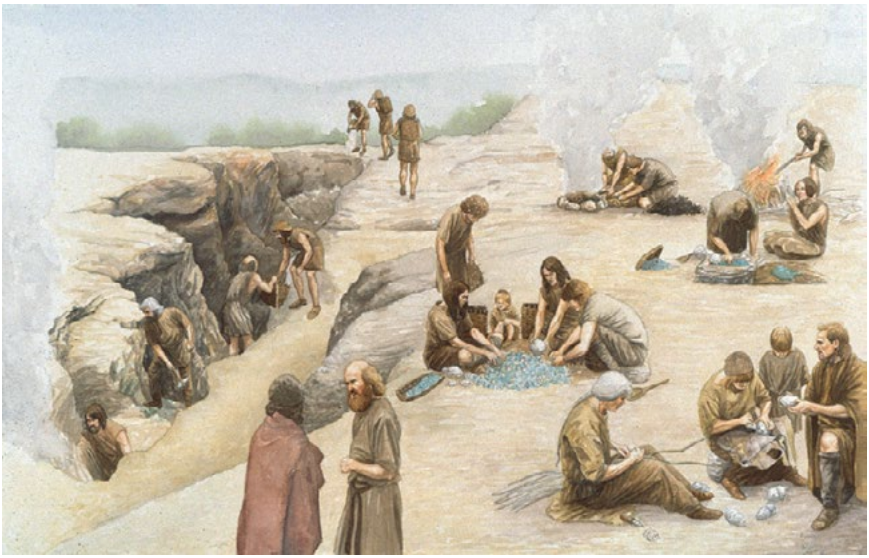

Figure 6: Reconstruction of mining and ore-processing at Engine Vein during the Early Bronze Age (Drawing by Seán Ó'Brógáin). (AELP archive)

hoard. This in itself did not prove Roman mining, only that when the Roman army was withdrawing from Britain in the fourth century somebody thought of the old and now disused mine-shaft as a good place to hide his small hoard (for it is a poor man's hoard). Pot Shaft, as it came to be called, was situated close to Engine Vein, and was fully excavated by the DCC as part of the Project in 1997. It was unlike any other shaft on the Edge, 11 m deep and almost perfectly square with a sump at the bottom across which lay three planks. The passage that ran from its foot towards the ore-bearing stratum was shaped like a rounded trapezium rather than the 'coffin levels' of the later mines. This shape and the tool-marks are typical of Roman mines at Dolaucothi in Wales and in Spain and Greece. However, radiocarbon dating of the planks yielded a date of 360-280 BC or 250 BC-AD 15: the two ranges at 95% probability reflect the squiggle on the carbon-14 calibration curve for this period, but either way this is much earlier than the Roman occupation of northern England in the later first century AD. It is of course the date for the felling of the trees, and it is likely that the timber was being re-used as a platform at the bottom of the shaft, but there is growing evidence from Britain and especially from Gaul that miners in the Late Iron Age were using Roman technology or even working under the supervision of Roman engineers.

However, there is no other indication of Iron Age occupation at Alderley, nor has any trace been found of Roman dwellings – one would expect at least an army camp of some kind. The next evidence for mining does not come until the perambulation of the parish boundaries in 1598 which refers to 'myne holes' on

the top of the Edge near Saddlebole: it does not say that the mines were active at the time, but excavation at Saddlebole and elsewhere has shown evidence of probable small-scale Medieval work. The court report of a violent dispute between men from two local companies in 1696 shows that mining was being carried out, probably from the early 1690s. By the middle of the eighteenth century Charles Roe of Macclesfield worked Alderley Edge fairly intensively from 1758 to 1768, building a wind-powered ore-crusher in what is still known as Windmill Wood, recognisable by the fact that even now little vegetation grows on the site although all the buildings are long gone. Part of the workings of Brynlow Mine are dated to this period on the basis of the passage shape and the engraving on the wall of initials (IW) in eighteenth century style ('I' crossed through and double 'V') and the date 1764.

Roe moved on to the much richer Parys Mountain mines in Anglesey, and in the early nineteenth century the mines were worked intermittently for lead, copper and cobalt. The latter is still found in at least two locations (in mines now known as Wood Mine and the Cobalt Mine) and was worked as a source of cobalt smalt, principally cobalt oxide, which was used to provide blue colouring to glass, pottery and paper. The most extensive mining took place between 1857 and 1877 by the Alderley Edge Mining Company Limited (AEMCL). In 1857, James Michell investigated the area and, in April 1858, took a lease from Lord Stanley to work the mines. The first stage of development was in the opencast workings at the entrance to West Mine, which was followed soon afterwards by underground workings. By 1861, when the British Association was meeting in Manchester, the workings were large enough and of sufficient interest to justify the organisation of a visit below ground by the British Association for the Advancement of Science, who were meeting in Manchester. The AEMCL was the most successful of Alderley's mining ventures, largely because of its development of the acid-leaching process which enabled it to extract copper metal from low-grade ores, but this also produced vast quantities of waste sand heavily contaminated with hydrochloric acid: the resulting dumps on the south-east side of the Edge became known the Sandhills – more about these later. However, by 1870 the venture was becoming more difficult to keep in profit and in 1877 the mines closed. In the early twentieth century a final attempt was made to work West and Wood Mines, but by 1919 work had ceased and in 1926 all the equipment was sold.

In the long term people's lives were affected much more by the arrival of the Manchester and Birmingham Railway in 1842 whose story is closely linked to Alderley's two principal families, the Stanleys and the de Traffords.

Alderley is mentioned twice in the Domesday Book, and it is clear that the area suffered badly from the 'Harrying of the North' when the Normans took vengeance for the northern risings of 1069. It is hard now to visualise the tree-covered Edge as an area of moorland cultivated by small peasant farmers or industrial mines (in fact the mines never employed more than perhaps 50 people at any one time), but Louisa Stanley described it as a 'dreary common till the year 1779 when it was enclosed with all the other waste lands of Alderley. Some hundreds

of Scotch firs were planted on the highest points by Sir James and Sir Edward Stanley'. Historically the Edge has always formed a significant local divide between Wilmslow and the modern village of Alderley Edge on the north and west, the lands of the de Traffords, and the original parish of Alderley to the south and east held by the Stanleys since the fifteenth century and by their kin before them, on which the Project concentrated its work. The history and the development of the de Trafford side is relatively straightforward, the family maintaining their main residence at Trafford Park. The Stanley side is much more complicated, and reflects many of the changes and upheavals taking place in the north, the Stanleys themselves generally steering a careful course through the political turmoil of the sixteenth and seventeenth centuries. They played an important role in the story of the Edge, planting trees following the enclosures, encouraging the exploitation of the mineral resources, and generally caring for the welfare of their tenants. They have been described as a 'wordy family' and despite the loss of nearly all the estate documents in the fire that destroyed the Old Hall in 1779 they have left us valuable records in the form of notebooks, books and correspondence, particularly between the ladies and their extended families.

One of the most striking differences between the de Traffords and the Stanleys as it affects the Edge today was their response to the coming of the London and Birmingham Railway in 1842, who planned to construct a line past the Edge towards Stoke-on-Trent with a junction at Nether Alderley for a line west to the Grand Junction Railway at Crewe. In the end the junction was created at Cheadle Hulme but the direct line went ahead with plans for a station at 'Alderley Edge', along with a hotel and housing for the 'Cottentots', as the Stanleys called them, with the lure of twenty-one years' free first-class travel to Manchester for those who built a house with a rateable value of £50 or more within a mile of their new station. Although they supported the mining companies, the Stanleys resisted the 'Rail Roadians', above all the suggestion of a promotion which would allow railway travellers privileged access to their estate, and they fought against the naming of the new station as 'Alderley Edge', demanding that it be called 'Chorley' despite the potential confusion with Chorley in Lancashire. When Edward, second Lord Stanley, became postmaster-general he directed that all mail addressed to Alderley Edge be returned to sender or put in the dead-letter office, until public outcry compelled the Post Office to give in.

The villas came in three waves. The first began soon after 1842 and was complete by about 1870, extending from the station up to Woodbrook and Macclesfield Roads. These nouveax riches often commissioned the leading architects of the day such as J.S. Crowther, Alfred Waterhouse, and later the Worthington brothers: among these families came the Pilkingtons, fleeing the smoke of their colliery and tileworks in North Manchester. In 1906 they moved into Firwood (now renamed The Cedars), an ornate Italianate villa designed originally by John Gregan for the Scottish merchant John Heugh with a tower from which he was said to spy on his shipping in the Mersey.

Figure 7: The Pilkington family in the window of Firwood: Dorothy is standing behind her mother and Margaret is seated by her father (from Matthew Hyde, The Villas of Alderley Edge *(Macclesfield, 1999), p.82)*

The second wave of building followed in the early twentieth century when the progressive Edward Lyulph succeeded as fourth Baron Stanley in 1903, and comprised ribbon development along the Congleton Road and its feeder lanes. The third phase began in the 1990s and effectively continues to this day, although because of planning restrictions much of the building has been confined to reconstruction within and now even beneath the existing shell of a house to provide not just garage space but saunas, private cinemas and gyms: the exterior may be preserved, but all interior detail is generally lost.

While many of these big houses had accommodation for live-in servants, mostly recruited from all over Cheshire, the 'outside' staff like the gardeners and the coachmen (and later the chauffeurs) along with many of the maids, often local people, lived in the back streets of the growing village or in purpose-built

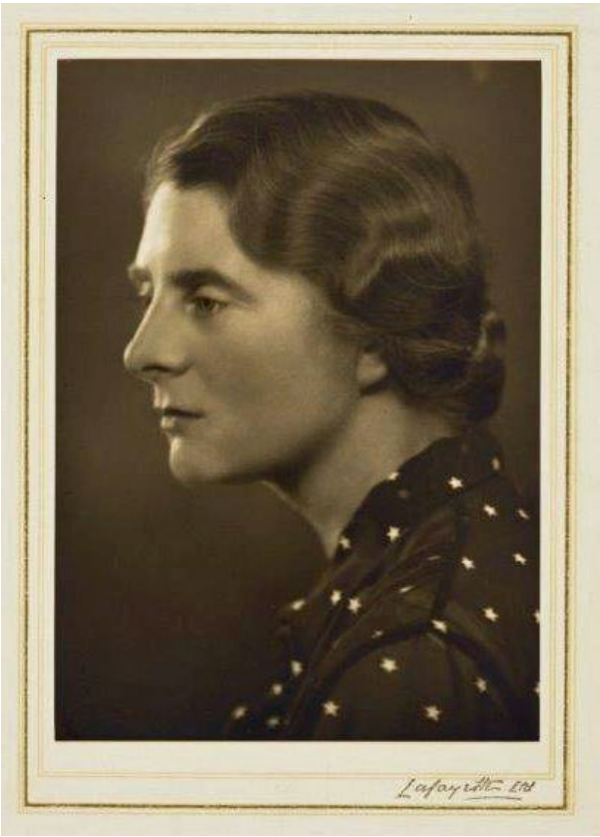

Figure 8:Margaret Pilkington (from Matthew Hyde, The Villas of Alderley Edge *(Macclesfield, 1999))*

developments such as Orchard Green, designed by Hubert Worthington in 1920. There was a big divide between the Edge and the village, 'them and us'. AELP recorded or collected around 300 hours of conversations with people who remembered this life, including the lecture given by Margaret Pilkington to the Edge Association in 1972 for an oral archive of which copies are now housed with the National Trust and the British Library, and also carried out a regular survey of the shops from 1928 to 2018 and beyond which together gave a clear picture of how the social life of Alderley Edge changed not just with the coming of the Cottentots but also as shopping habits and wealth distribution changed. The enclosures of 1300 and earlier down into the nineteenth century naturally left their mark, but so does the evidence of the tracks and paths along with the roads over and around the Edge. Place, street and house names can reflect the shape of the landscape,

the function of a road or inhabitants of a house but even changing patterns of holiday travel, sometimes rather unexpectedly. To take a few examples from a whole chapter on names in The Story of Alderley, 'Adders Moss' has nothing to do with snakes but contains the word 'adsheads' where the ploughman turned his ox-team, and 'butts' which has the same meaning occurs twice as a field name in 'burnt butts' as well as in 'Butts Farm', and possibly in 'The Butts' at Alderley Cross, though this may have been the site of the archery butts. On the other hand 'Quarry Road', 'Tanyard Farm' and 'The Miners' Cottages' need no explanation; but 'Redclyffe Grange', 'Ivanhoe' and in more recent developments 'Quinta' and 'Kamiros' no doubt reflect literary pretensions or Mediterranean holidays.

However, agriculture remained the predominant occupation in Nether and Over Alderley, and the contrast between this settled traditional life and the newer suburban community of Alderley Edge Village remained distinct. The sense of interdependence between the Stanleys and their tenants persisted into the 1930s: Edna Younger recalled the splendid Christmas parties given for the tenants' children at Alderley Park during the time of the fifth Lord Stanley – 'the children belonged; we were sort of belonging to them'. All this changed in 1938: when the sixth Lord Stanley succeeded to the title in 1931, he faced two lots of death duties, for his grandfather had died only six years before in 1925. Edward Stanley had lots of charm, but did not have the character to see this straitened time through, and he had expensive habits. In the words of his cousin, the eighth Lord Stanley, 'he drank, he gambled and he womanised and he was no good at any of it'. However, his decision to sell the Alderley estate in 1938 came as a great shock, especially to his tenants and dependents, who had no warning of what was about to happen. The map in the sale catalogue gives a frightening picture of the Edge carved up into building plots.

Fortunately for posterity, the sale was a fiasco, partly because in October 1938 minds were focussed on the Munich crisis rather than speculative development. A second sale in January 1939 was slightly more successful and many of the tenant farmers were able to buy their own land at more reasonable agricultural prices. This left the field clear for Margaret and Dorothy Pilkington and others to raise funds to purchase the wooded areas of the Edge in 1948 and present them to the National Trust. However, although the Edge and the physical landscape have survived, the farming and mining community that created and supported it has now largely gone, and their houses are occupied by professionals and business executives. 'The suburban takeover of Alderley, which started with the railway arriving in 1842, is now almost complete'.

The National Trust has since acquired further properties on the Edge, which it manages on sound ecological lines where conservation plays a very large part: its mission to preserve its properties 'for ever, for everyone' entails a full understanding of the natural as well as the human history. For AELP this provided an opportunity, indeed a requirement, to conduct surveys of vegetation in general and the trees in particular, as well as the birds and the mammal, amphibian and insect life.

Insects and other invertebrates represent the most numerous and most diverse group of organisms in Britain, something which is reflected on Alderley Edge. The total number of 'bugs' recorded by AELP was 1,732 species but this figure is by no means exhaustive because for many reasons – including the availability and enthusiasm of the volunteers involved – only selected groups were surveyed and identified: we were strong on butterflies and spiders, but the soil fauna remain unstudied. The true total is probably at least three times that number: the fact that the chapter on the invertebrates occupies 80 pages of the final publication along with another fifty-plus of close-printed appendices speaks for itself. While much of the plant life appeared fairly ordinary there were some surprises – for example two hitherto unknown species of bramble, the Alderley Edge Bramble (Rubus alderleyensis) and Bailey's Bramble (Rubus baileyi), named after the great Victorian Manchester botanist Charles Bailey whose collection of 300,000 specimens is kept in the Manchester Museum.

The role of the Stanleys in transforming the Edge by planting trees has already been mentioned, and AELP's surveys of species, age and condition enabled the Trust to continue this practice in an informed way. They also provided clear evidence of the effect of other human activity, from graffiti (also found on the rock faces and inside the mines) to the mining itself. The large bare patch in Windmill Wood mentioned above has really only begun to recover from the effects of pollution in the years since the Project was completed. At first sight the area where the Sandhills had stood on the south-west side of the Edge still appeared largely barren when AELP began its work in 1996, supporting only algae and other cryptogamic plants such as mosses, liverworts and threadworts typical of mining spoil, even though the Sandhills themselves had been largely removed and the sand reused by an engineering contractor in the 1950s. However, among these tiny plants were some interesting rarities, most notably the delicate Greater Copperwort (Cephaloziella nicholsonii) – it measures a few millimetres across, and is only 'Greater' in comparison with the even smaller Lesser Copper+wort: it was previously only known in the West Country, and is not found outside Britain; we assume that it arrived at Alderley on the boot of one of the Cornish miners who came to work here in the 1860s. Encouragingly, by the time AELP's work was published twenty years later the area had largely recovered, and today (2019) it is hardly different from the rest of the Edge.

The archaeology and social history of the Sandhills became the focus of a subsidiary project where our child star is Edna Younger with the porcelain dog, found during the excavation of one of the cottages (figure 9): Edna was in her eighties by the time the Alderley Sandhills Project (ASP) began its work in 2003 and clearly sceptical that she had ever seen the little model before, but she was much too good a sport to spoil the story about it coming from her doll's house that a young journalist was putting together. ASP's aim was to survey the two pairs of cottages originally built in the seventeenth century in the area known locally as the Hagg on the edge of the Sandhills site and to excavate one of them, and to relate this to the social and community life of the village, using a multi-disciplinary approach developed in the New World. Three of the children who grew

Figure 9: Edna Younger with the porcelain dog supposedly from her childhood doll's house. (AELP archive)

up in the cottages, Roy Barber, Molly Pitcher (née Barber) and Edna Younger (née Barrow), were still alive and their memories of growing up in the Hagg were recorded for the AELP oral archive, forming an important factor in understanding the site, as well as being a very moving experience not just for the three participants but for all involved. The possibility of combining such personal memories and facts on or under the ground was innovative for British archaeology, and it became interesting and sometimes challenging for the archaeologists when the two disagreed. For example, the two girls said there had been no cellars, but the boy insisted that there were: archaeology proved him right. One has to assume that he was brave enough to go down into the dark but the girls found it spooky and stayed clear, putting it out of their minds.

The story of Alderley begins and ends with the legend of the Wizard. Most people know the story through the books of Alan Garner, and the Landscape Project provided him with an opportunity to reconsider its significance, and indeed to trace it back to the Bronze Age. Here is how he set it out in The Story of Alderley:

> My grandfather told me this tale. He told it in the dark of his forge, and by the side of his hearth, and in his garden as we pulled rhubarb. He told it with simplicity, respect, authority; and he would not have brooked doubt. It was his truth, a part of him, which he passed on.

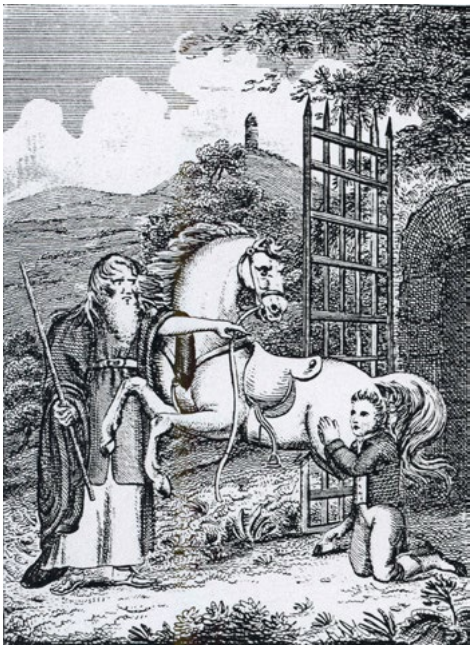

Figure 10: The Wizard and the Farmer (from Stanley, 1843).

Here is how he told it. And it is the manner of the telling that is important.

'There's a farmer living down Mobberley. And he has a white mare. And he must take the mare to sell her at Macclesfield market.
'So he sets off one day at the back end of October; and just as it's coming light he's crossing the Edge, but when he gets to Thieves' Hole, the mare stops and won't budge, choose what he does. Against the side of the road he sees a tall old chap, thin as a rasher of wind; and he's got a proper sort of a stick in his hand.
'"Oh," he says, this chap, "that's just the mare I'm after. How much do you want for her?"
'"I'm not selling to the likes of you," says the farmer. "I'll get more at market."
'"You go your ways," says the old chap. "You'll not sell her. And I'll be waiting for you tonight."
'So off the farmer rides to market. And he sits there all day; but though everybody says she's a grand beast, no one offers to buy that mare. And at the finish, he has to get him back to Mobberley with her.
'When he comes to Thieves' Hole it's fetching night. And there's the

old chap waiting for him.
"'Now will you sell?" he says.
"'How much will you give?" says the farmer.
"'Enough," he says. "You come with me."
'And off he tramps, with the farmer behind him.
'They go from Thieves' Hole, by Seven Firs, and Goldenstone, to Stormy Point and Saddlebole. And on Saddlebole they come to a rock, big as our house nearly.
'The old chap touches the rock with his stick, and the rock splits open, clatter. And behind the rock there's some iron gates. He touches them with his stick, and they open; and there's a rum sort of a hole going into the hill.
'By this time the farmer, he's asking the old chap to let him go, and keep the mare. He wants no money for her.
'But the old chap tells him he'll not come to no harm, he says. So the farmer takes the mare down into the hill, after him.
'They come to a cave; and there, all around, are knights in armour and a big man with them, all asleep with their heads each against a white horse, except one, and he has nobbut a ruck of stones for rest on.
"'This here," says the old chap, "is a sleeping army, with their Top Man and their horses, waiting on the last battle of the world, and whenever that day is I must wake them. But I'm one horse short, and yours will do nicely. Now you come with me."
'And he takes the farmer to another cave; and this one is full of gold and silver and all sorts. "Have as much as you can carry," he says, "and we'll call that payment."
'Well, the farmer, he sets to and he crams his boots and his pockets, his britches and his shirt with the treasure; and his hat; and when he can hold no more, the old chap takes him back to the iron gates and shoves him through. Another clatter and a bang, and when the farmer turns him round, there's just the rock and it's dark as a bag outside.
'Well, the farmer, he gets home as best he may and tells his tale; and the next morning him and his neighbours they go back to the Edge to fetch more treasure; but neither they nor any since have seen the iron gates again.'

That is the tale my grandfather told; and it is, of course, the Legend of Alderley. What my grandfather did not know, and would not have cared if he had, is that the Legend, in various forms, occurs across at least the northern hemisphere, at all times and in many places. It is the myth of the Sleeping Hero. Aspects of it are in the earliest written record of any myth, The Epic of Gilgamesh, baked on clay tablets, some dating from the second millennium BC. Incidents differ, but, at their most simple and comprehensive, the stories involve the encounter of a mortal, through an intermediary, with an immortal, asleep under the ground in a special or sacred place.

Garner tracked the route taken from Thieves' hole to Saddlebole and the Iron Gates, and found signs of human intervention at each of the places named – just one of the many aspects of the story which AELP was able to follow up. He cites the definition of a legend as 'a fanciful story associated with a place and believed to be true by the people that live there', in contrast to a folk tale which is folk fiction, 'told for the edification, delight or amusement'. Legends become folk tales (or myths) when they are handed on and embellished by people who no longer believe them. At Alderley, as elsewhere in Britain, the 'old chap' becomes Merlin and the 'Top Man' becomes Arthur. Garner recalls that during the Second World War people in Alderley remarked that now if ever was the time for the knights to wake – but that they would need white tanks, not white horses. At the launch of the first report on AELP's work in 2005 I was asked by a member of the audience if I knew about the Americans billeted in the village during the war. I did. Did I know that they included members of the USAF? I knew that too. Did I know that the planes they flew were Mustangs? I did not, and the hairs on the back of my neck began to stand up. There is more: later I remembered that their P-51 Mustang fighters, originally designed by the North American Aviation company for low-level reconnaissance and as fighter-bombers, were underpowered for the high-level flying which they were required to do in the European theatre, so they were fitted with a more powerful engine: the Rolls-Royce Merlin.

Although this coda does not form part of the story as handed down in what one might call the Garner tradition, for me it illustrates as clearly as any study of the oral tradition in Homer that if the legend is alive there are need not be a single 'correct' version. Equally there is much more to our project than can be summarised in the summary of a short lecture: we like to think that we fulfilled all those objectives that we set ourselves in 1996, indeed some further plans are quietly bubbling away until funds and time become available – but for the full story you will have to read *The Story of Alderley: Living with the Edge*. The archaeology that is fundamental to our research had been published a decade earlier as *The Archaeology of Alderley Edge*, while the villas and the Sandhills project also had separate publications and there have been several specialist articles and a spin-off educational project. Inspired by some of the stories about growing up in Alderley collected for the oral archive, many of them told by his childhood friends, Alan Garner has written his own further memoir, *Where Shall We Run To?*. Further research by chemists and ancient historians demonstrated that far from having been thrown away as rubbish, the shovel had been deliberately broken – sacrificed – by the Bronze Age miners as a thank offering for the copper they had found under the Edge, or perhaps in the hope of finding more. However it is *The Story of Alderley*, with thirty-five contributors and a thousand pages long, which brings together all the different aspects of the project and of course sets out in much greater detail aspects that I have only been able to touch on here. It goes without saying that I owe an enormous debt of thanks to all my colleagues and fellow-contributors. It was both satisfying and frustrating that the original printing sold out within twelve months of publication, but in 2019 it was re-issued both as an e-book and in a print-on-demand version. We like to think

that this rendering of Alderley's story has grown out of that 'fanciful story associated with a place' and will be believed to be true by people that are intrigued and excited by it as we have been.

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List of abbreviations

AELP Alderley Edge Landscape Project
BA Bronze Age
Ma Million years ago
DCC Derbyshire Caving Club

John Prag was appointed Keeper of Archaeology at Manchester Museum in 1969 and was given a personal chair of Archaeological Studies at the museum in 2004. Now Professor Emeritus of Classics in The University of Manchester his interests include Greek iconography, facial reconstruction, ancient portraiture, chemical analysis of pottery and the application of ancient DNA research to kinship studies. He is the author or co-editor of over 60 articles and six books and is currently working on a new edition of The Oresteia: Iconographic and Narrative Tradition, originally published in 1986. Correspondence to: john.prag@manchester.ac.uk

Death Row Art

MARY M VAUGHAN

8 November 2018

Introduction

The words "death row" emit a chilling message of horrors, of unspeakable crimes, prisoners chained and incarcerated for countless years, unfair convictions, poor judicial representation, inadequate medical care and food, and inhumane treatment, - all resulting in painful and often botched executions. However, there is some light in the gloom of the endless days of solitary imprisonment. Some prisoners find that they have a previously unknown talent for art and, often within limited capabilities, produce drawings and paintings of great imagination and beauty.

Death Row in the United States

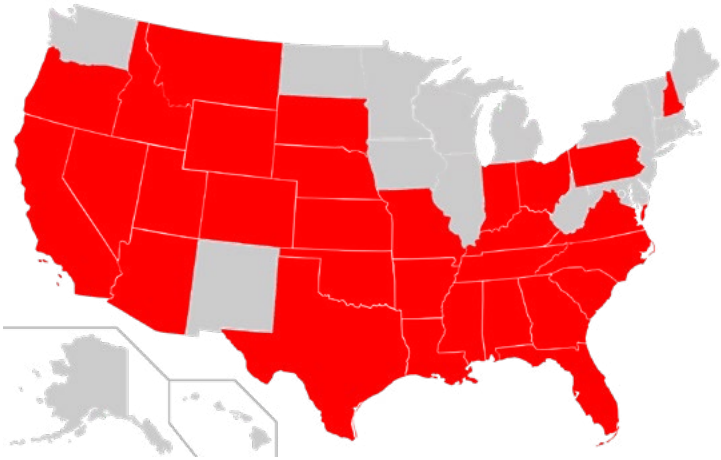


Figure 1. The 50 states in the USA, 30 of whih currently retain the death penalty. Source: States and Capital Punishment - National Conference of State Legislatures (Wikipedia, author JayCoop)

The US is ranked 5th in the world for the number of executions carried out per year, after China, Iran, Iraq and Saudi Arabia. There are currently 2,664 prisoners on death row in the US, 53 of them being female. The primary method of execution is by lethal injection, though with the source of drugs required gradually drying up, some states have resorted to electrocution and firing squad, with talk of nitrogen gas and hanging also being brought back into practice.

Figure 2. The Human Writes Logo

Human Writes is a non-profit-making, humanitarian, non-judgemental organisation formed in 2000 and based in the UK, for the purpose of befriending prisoners on death row in the US through letter writing. Each state that has the death penalty has a co-ordinator who supports the friendship on both sides. The organisation currently has approximately 1200 members.

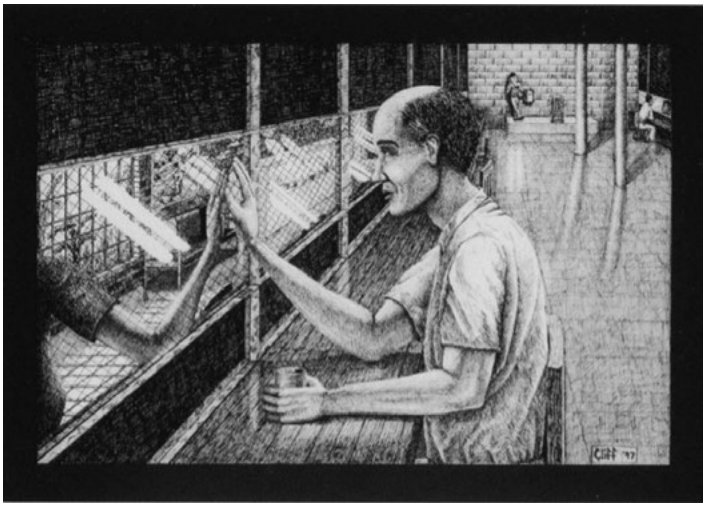


Figure 3. Drawing of the Visiting Area by a Death Row inmate

The death penalty is normally imposed for first-degree murder but can sometimes be an arbitrary decision based for example on racial bias. On average it takes 15 years from sentencing to execution though some inmates, currently on death row, have been there for over 30 years. Life is hard for these prisoners who are normally kept in solitary confinement for 22 – 23 hours each day in cells measuring approximately 8'x6'. Any time out of their cells is spent in the exercise yard, showers or visits. Letters and cards from the "free world", as they call it, are very welcome.

The rules vary state by state and in some states televisions and radios are permitted but transmissions are controlled. There is a limited number of books and, in most states, the prisoners are only permitted to have three at any one time – a religious book, dictionary or thesaurus and a third, which may be fiction. They have a great deal of free time and, in some cases, this is where the art comes in.

Paintings and drawings

In most cases the prisoners are self-taught and started to do the artwork once they were incarcerated, to give their lives some purpose but also, sometimes, to earn a little money which can be used to purchase food items to supplement their meagre diet, toiletries and stamps from the prison commissary.

Art work is not straightforward in the practical sense as materials are hard for them to come by, expensive to purchase or not fit for purpose. Many of the inmates have come from dysfunctional families, are poorly educated and certainly did not live in a world where art could be appreciated and enjoyed. What is most interesting, despite all of this, is how they are inspired to create lovely pictures in their grey world where often their only view of the outside consists of prison walls.

Death Row Artists

Stephen, Tennessee

Stephen has been incarcerated in prison in Tennessee since 1996. When first in prison, he was given some instruction on art from a prison visitor. He initially used the cardboard backing on a writing pad to paint on and his own hair to make a paintbrush by tying it to a sharpened pencil point with a rubber band. To make a thicker brush he would tie his hair to the other end of the pencil. He used his own blood to make the colour red but found that it turned to brown on drying so he resorted to fruit juice when available. As with many of the inmate artists, Stephen finds that painting takes him out of his situation.

He is scheduled for execution in August 2019.

Daniel, Pennsylvania

Daniel is in prison in Pennsylvania. His artwork is very colourful, amazingly as he is colour blind. He works mainly with acrylic paints on card to make greetings cards or canvas for larger pictures. In his words "I'm devoid of life's stimulus. It is difficult to paint in here because of the many challenges I face. I try to translate what I feel about what I see and hear that moves me. I want other people to see what I feel when I look at the world. Life has a beauty in movement that I want to capture, and tell its story. Throughout my incarceration my painting has sustained and healed me. I had no means to support myself during the costly litigation until I learned to paint. Selling my art works enables me to purchase commissary and 'phone time. I've also helped prisoners send loved ones their sentiments". Apart from painting on canvas, Daniel has used men's plain white handkerchiefs and depicted a death row prisoner in the exercise yard surrounded by all the reasons that he may be on death row such as corruption, injustice, drugs, violence, poverty, abuse, depression, homelessness and unemployment. Leaning over the wall and reaching down to him is his Human Writes penfriend.

Daniel has had his artwork accepted by the Dukes of Cambridge and Sussex and also Pope Francis.

Martin, California

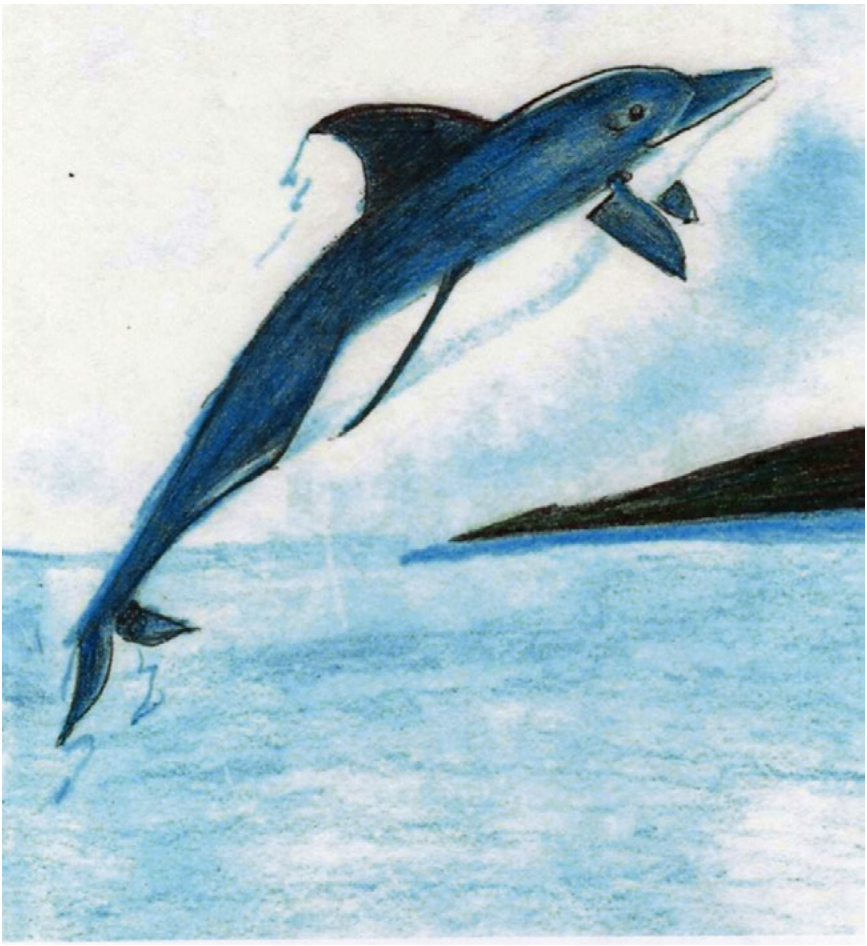
California has the largest death row population with over 700 inmates. Amongst them is Martin who is Hispanic. He paints cards with messages such as "Thinking Of You" which he donates to Human Writes and others.

Martin refuses to accept payment as any money he earns is taken by the state to repay outstanding court fees. When he was admitted to prison he could neither read nor draw. There is a childlike innocence in his work, which consists mainly of lines, circles, squares and geometric patterns. Martin finds the work very rewarding as it helps him mentally and physically, and to see life in a positive way. Although he is right-handed he has to use his left hand due to damaged nerves in his right hand resulting in crooked fingers. "My inspiration comes from the support of family and friends."

Carl, Ohio

Carl is a self-taught inmate artist in Ohio who learned to paint in prison from studying books. He writes "I get my inspiration from my faith, which gives me the courage to try to nurture happiness, not only for my sake, but for everyone. I enjoy seeing someone else benefit from my paintings, I feel a big sense of accomplishment when I finish a piece of artwork". In Ohio the prisoners are allowed to order art supplies from an approved source but it is expensive so not always feasible.

John, Texas



John is in prison in Texas. He looks at comic books to capture the "light aspect of art". He says, "Inspiration is not letting my mind stay in this prison unit, locked down with my body, otherwise I would be drawing skulls and demons. I'm about positivity and growth, not nightmares and chaos". Although he was sentenced to death in 1999, he has only recently started to draw and is very critical of his art. He may not be a Picasso but there is always a fun element to his work.

James, California

James is another California inmate who gets his inspiration from his sheer love and joy of colour.

He likes to paint pictures for people on the outside who have done something for him by way of a thank you. He says, "After all, I cannot take them out to dinner!" In addition, he tries to sell his art to generate some income.

Roberto, Texas

Roberto has submitted many of his paintings to Human Writes for use in their newsletters and card projects. His talents lay in picturing insects, flowers and animals, which were remembered from his time in the free world so he felt that they were what he painted best. His artwork helped him to "do his time" but he found it increasingly difficult with the threat of execution looming ever closer.

(Sadly, Roberto was executed in November 2018 after spending over 20 years on death row in Texas).

Richard, Florida

Richard comes from Jamaica and started drawing when he was 4 or 5 years old. He says that he is self-taught and that it is all "trial and error". Due to lack of decent materials available on death row in Florida, he will use anything he can get his hands on, mixing pen and pencil for example to obtain the right shade of green for a bird's wing or red for a rose. He says that he can draw more or less anything but loves to paint humming birds as he finds them fascinating. He is able to purchase art materials from the prison commissary but says that they are "kindergarten standard" and cost three times their value.

According to prison rules he is not allowed to sell his artwork. However, he has a Human Writes pen friend who sends him money for the materials, which enable him to paint and to whom he sends his artwork for her to sell on his behalf. Unfortunately Richard suffers from seizures resulting from a fall from some scaffolding when he was 15 years old. He tries not to allow that problem to deter him from drawing. A pen friend told him once, "Richard, you are not so good with words but you speak volumes to me through your drawings".

Death Row Art

John, Florida

John is also on Florida's death row but his artwork is totally different from Richard's, not the usual colourful birds and flowers but geometric, abstract designs such as shown here. He started drawing when he was first imprisoned, by doodling, and is inspired by the designs of the ancient Celts and Germanic tribes. He also of course has difficulty in obtaining quality materials but is fortunate in having friends who will give him money from time to time to support him in that way.

Many years ago he started to teach himself calligraphy, which he enjoyed, but unfortunately the prison confiscated his pens and inks resulting in him losing his desire to do any more artwork.

Sitting for any length of time is very difficult and painful due to an untreated herniated disc in his spine. He has a small desk in his cell, which he can use for short periods, but it is 6" higher than it should be, coming up to mid chest, making drawing for any length of time very hard, and he feels drained and empty when a picture is finished.

The little amount of artwork that he now does is for friends as gifts or for Human Writes for the newsletter, web site or postcard scheme.

George, Pennsylvania

Before George was imprisoned in Pennsylvania, he worked as a painter for Walt Disney World. He enjoys depicting comic strip characters. He does try to continue with his art work when possible but says that the restrictions on death row are so great than many of the prisoners have given up trying to draw and paint. George likes to "layer" his work with a cut out sheet on top of a backing sheet. One of his passions is papier-mâché but that is not permitted in case contraband items such as drugs are hidden inside. Apparently he once made a chess set from papier-mâché but it was confiscated.

Johnny, Arizona

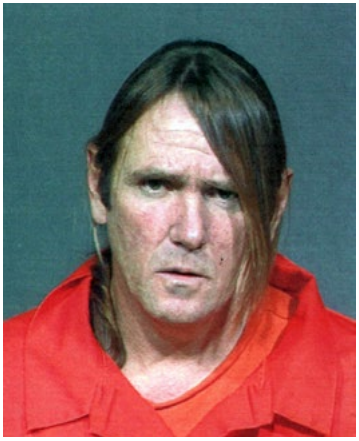
Johnny was arrested in 1998 and imprisoned in Florence on Arizona's death row. He started to watch another prisoner drawing patterns on envelopes and was inspired to try himself as he thought that it would be a good way to pass the time and give him a little income by "selling" those envelopes to other inmates. As in other states, selling is not permitted in Arizona prisons but that rule does not seem to deter the prisoners who become very ingenious and Johnny was able to "exchange" his decorated envelopes for foodstuffs etc.

In 1999 he was sentenced to death and moved to death row where he started to make greetings cards, which again he would "sell" for various items. For example for one drawing he can receive a bag of coffee or three international stamps. The design above is currently in the Human Writes postcard scheme and when the stocks have been sold, the money will be transferred to Johnny's prison account enabling him to buy toiletries and dried food.

He finds that drawing these very clever designs enables him to escape the emotional rollercoaster ride in his mind. When he focuses on his drawing he can temporarily forget the problems facing him in prison and the events in his life, which led him to be in his current situation.

His attorneys can sometimes provide him with paper, pencils and paints. These items are available for purchase in the prison but are very expensive. Sometimes he makes his own where he can, and he folds up a piece of card to a fine point and uses that as a pen or pencil. Unlike most of the other states, the cells have bright fluorescent lights, which do make life easier. His chair and table are both made of cement, which means that sitting for any length of time is extremely uncomfortable especially as he has chronic back pain. Johnny says that, despite all of this, he gets great satisfaction in completing an item and sending it to a friend or family member for them to enjoy.

Young Blood, Arizona



Another Arizona death row inmate is a half Native Indian whose name is Frank but he likes to be known as Young Blood. He is an extremely prolific and talented artist and has submitted over 600 paintings to Human Writes, many of them Native American related.

Young Blood was born prematurely and the area of his brain that controls speech, was damaged. Unable to talk, he was given paper and pencils so that he could express himself in that way. That was the beginning of his artwork.

He says that his inspiration comes from his imagination and he loves to paint people and animals making it up as he goes along. He wishes that he had lived in days of old when men and women were filled with respect and honour.

Maybe due to his talent, which perhaps does not quite fit with normal death row behaviour, prison officers pick on him. His cell is regularly trashed with his artwork being ruined and materials confiscated. He feels that people are always cruel and mean to him, but somehow he finds the strength to pick himself up and start over, as the Americans say.

Until recently, inmates on death row in Arizona were not permitted to buy art materials so Young Blood learnt to make his own. Rather as with Stephen in Tennessee, he uses his hair to make paintbrushes, and foodstuffs such as coffee and pencil leads for his paint. He gives his artwork to his lawyers and organisations such as Human Writes. He would really like a proper chair and table in his cell as for decades he has sat Buddha style on his bunk with his legs crossed underneath him and his materials spread out on the bed.

He says that without his art he is nothing and would not exist. He also says he hopes that one day his art will prove his innocence and set him free.

One of his magnificent paintings is of a Cherokee woman entitled "Memory of Yesterday". Young Blood requested that it was framed and presented to the Society.

Figure 4. Mary Vaughan presenting Young Blood's painting to Jim Howells at the Lit & Phil.

Conclusion

There is a ray of hope in the gloom of capital punishment in that the popularity of the death penalty is slowly diminishing in the US. The number of executions is gradually reducing year by year (25 in 2018 as opposed to 43 in 2012) and hopefully this trend will continue with courts in several states turning away from death sentences and instead favouring a sentence of life without parole. In the meantime, the inmate artists continue in their solitary confinement relying on their artwork and the support of friends and family and, most of all – HOPE.

Mary Vaughan is a retired ballet dancer and teacher now living in London. She joined Human Writes in 2001 and is the co-ordinator for North and South Carolina, and Washington State. She has visited prisoners on death row in Pennsylvania (2008) and in Tennessee (2009, 2010 and 2013) and is planning a further visit to Tennessee for 2019.
(Information regarding Human Writes can be found at humanwrites. org)

Predictability Beyond the Weather Forecast?

ADAM SCAIFE

11 December 2018

Weather forecasting is one of the great unsung triumphs of modern science. Forecasts save lives and help us to plan for everything from the nation's energy needs to putting our washing out. The same science is now used to predict future climate warming as we continue to emit greenhouse gases into the atmosphere. These long term projections show clear signals for future climate change that match dramatic changes already seen in our climate and present a great challenge to humanity. But what about the timescale in between? Can we make predictions months ahead? Can we say whether the coming winter will be stormy and mild or dry and freezing? Scientists have wanted to make long range weather predictions for centuries but ideas around complexity and the chaotic sensitivity to initial conditions (the so called butterfly effect) would seem to prohibit this. I briefly show some of the recent evidence that many of the notable year to year differences in our seasonal weather, even in the variable mid-latitudes of the UK, can actually be predicted months ahead.

A problem you can write on a postcard but need a supercomputer to solve

It is sometimes said that the weather and climate are so extremely complex, with so many degrees of freedom, multiple interactions and a multitude of variables, that long range prediction is a lost cause. However, rather than revelling in complexity, we can quickly dismiss this argument by a quick look at the compact physical equations which govern the atmosphere and oceans. These stem from well-known classical physics, much of which was known over a century ago and is encapsulated in the Navier-Stokes equations for fluid flow. Allowing for the spherical Earth, neglecting viscosity which is small in the atmosphere and working in a frame of reference that co-rotates with the Earth, a set of so-called 'primitive equations' are formed (Figure 1, overleaf) which can be concisely written, but when solved, produce solutions that contain jet streams, hurricanes, monsoons and even the most intense of heatwaves.

The equations are a little daunting at first, but the first three simply correspond to Newton's 2nd Law (Force = mass x acceleration) applied in the east-west, north-south and vertical directions. The fourth is just the law of conservation of mass and the fifth is the 2nd law of thermodynamics which accounts for the heating of the atmosphere, for example from the Sun. We also need the equation of state for the gases in the atmosphere. These equations are set out in Figure 1 and they are actually compact enough to be written on a postcard.

Newton's second law

$$\frac{D_r u}{Dt} - \frac{uv\tan\phi}{r} - 2\Omega\sin\phi v + \frac{c_{pd}\theta}{r\cos\phi}\frac{\partial\Pi}{\partial\lambda} = -\left(\frac{uw}{r} + 2\Omega\cos\phi w\right) + S^u$$

$$\frac{D_r v}{Dt} + \frac{u^2\tan\phi}{r} + 2\Omega\sin\phi u + \frac{c_{pd}\theta}{r}\frac{\partial\Pi}{\partial\phi} = -\left(\frac{vw}{r}\right) + S^v$$

$$\frac{D_r w}{Dt} + c_{pd}\theta\frac{\partial\Pi}{\partial r} + \frac{\partial\Pi}{\partial r} = \left(\frac{u^2 + v^2}{r}\right) + 2\Omega\cos\phi u + S^w$$

mass continuity

$$\frac{D_r}{Dt}\left(\rho_d r^2\cos\phi\right) + \rho_d r^2\cos\phi\left[\frac{\partial}{\partial\lambda}\left(\frac{u}{r\cos\phi}\right) + \frac{\partial}{\partial\phi}\left(\frac{v}{r}\right) + \frac{\partial w}{\partial r}\right] = 0$$

thermodynamics

$$\frac{D_r\theta}{Dt} = S^\theta$$

Figure 1: The equations at the heart of weather and climate forecasting. The first three equations represent Newton's 2nd Law and give the acceleration of the air in terms of forces in the rotating reference frame of the Earth. The fourth equation represents conservation of mass as the air flows around the atmosphere and the fifth equation represents the 2nd law of thermodynamics. Along with the equation of state for the gases in the atmosphere and the small scale processes that are represented as sources (S) of momentum and heat, these equations govern the behaviour of the atmosphere and can be easily adapted to the oceans.

So the problem of weather and climate forecasting is at least well defined. The atmosphere behaves as a fluid and it obeys the equations of classical physics. However, there are other major problems to overcome if we are going to make a successful long range weather forecast. First, it has been known for many years that some mathematical problems, including problems similar to the equations set out in Figure 1, cannot be solved analytically. In other words, unlike the problems we are used to solving in school mathematics and physics lessons, these problems have no 'pencil and paper' answer. To overcome this first hurdle we have had to wait for the advent of powerful computers that can break the problem down into small spatial chunks and small steps in time. These give approximate solutions and hence weather forecasts, that improve incrementally, slowly coming

into better focus as each generation of computers becomes more powerful and the resolution of each generation of our computer models increases the accuracy of the solutions to the mathematically framed weather forecast problem in Figure 1. These days we run long range forecasts at a resolution of 50km or so over the globe and daily weather forecasts at resolutions of around 10km over the whole Earth and at every level from the surface to the upper atmosphere at 85km altitude. The second hurdle is a deeper problem with even the idea of accurately solving the equations themselves. This has been hinted at for centuries, for example with the intractable 'three body problem' of classical mechanics, but it really only came to the fore in the 1960s with the development of 'chaos theory'. Seminal work by the American meteorologist Ed Lorenz[1,2] using simple early computer models of the atmosphere showed that even the tiniest change to the starting conditions could radically alter the weather forecast just weeks into the future. So does this exquisite sensitivity to the smallest change – the 'butterfly effect'- mean that all is lost? Is this the end of the road and is long range forecasting a fundamentally unsolvable problem? In order to take account of the butterfly effect we now run dozens of individual forecasts, each one slightly different to the other but all aimed at predicting the weather in the same period, say the coming winter a few months ahead. If chaos rules, then all we will see in the individual members of this ensemble of forecasts is a range of different outcomes with no more similarity between individual forecasts than we would find if we looked back over a series of winters in the historical record of our weather. However, it turns out that this is not the case and that there are important elements of the weather that can be predicted months ahead.

A simplifying factor: the North Atlantic Oscillation

Although we run the computer based forecasts described above to find the forecast at millions of individual points in the Earth's atmosphere, these points are not independent. In fact the temperatures, winds and pressures throughout the atmosphere are all linked together by the equations in Figure 1 and the number of degrees of freedom of the system is a much smaller number. Just as the computer models spontaneously produce storms and jet streams, they can also spontaneously reproduce the large scale patterns of weather that dominate the difference between one year and the next.

For the Atlantic region the dominant pattern that appears in the difference between cold dry UK winters like 2010 and mild wet winters like 2016 is called the North Atlantic Oscillation (NAO). The NAO has been noted in weather observations for a century[3] and its very large scale pattern was spotted in the 19th century in very early weather analyses[4]. The NAO is far larger than the scale of the UK and its influence extends across the whole Atlantic. Depending on its phase, it leads to coherent mild and stormy winters or cold and dry winters not only in the UK but across the whole of Northern Europe and across the Atlantic into the eastern part of North America (figure 2, overleaf).

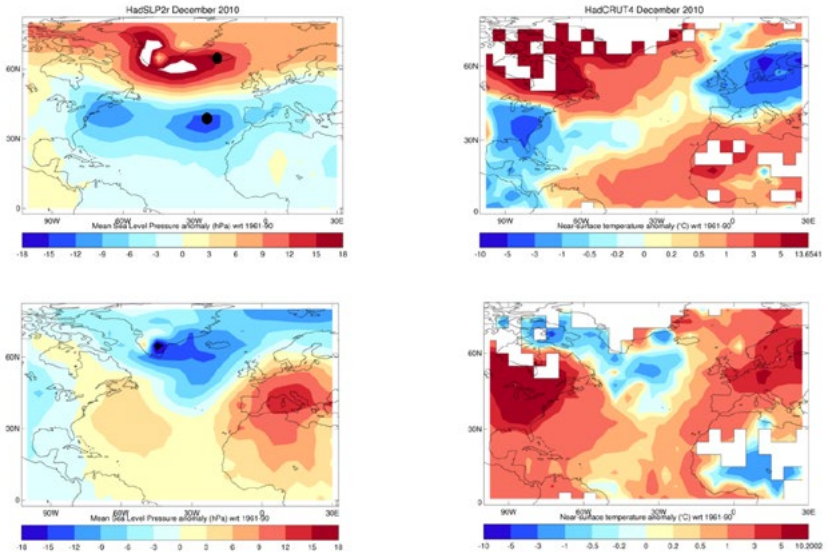


Figure 2: The large scale pattern known as the North Atlantic Oscillation controls the difference between many extreme winters. Pressure (left) and temperature (right) for December 2010 (upper) and December 2015 (lower). Differences from normal are shown in hectopascals for pressure and degrees Kelvin for temperature.

Such a large scale controlling pattern in winter weather greatly reduces the complexity of the seasonal forecast problem. Instead of making and evaluating forecasts at each location, to first order, we simply need to predict the large scale pressure patterns on the left of Figure 2 to gain a good estimate of the seasonal winter weather around the whole North Atlantic basin. From here on we discuss predictions of the pressure difference between Iceland and Azores (black dots in upper left of Figure 2) as the simplest measure of the Atlantic pressure gradient and the NAO.

Long range predictability

The NAO varies from one year to the next in concert with changes in the Atlantic jet stream and this is the main reason for year to year changes in our seasonal weather, but are these variations of Atlantic climate predictable? A clue comes from statistical analysis of the observed climate. It turns out that large amounts of year to year variability in winter (and to some degree in summer) cannot be explained as residual weather noise[5]. This suggests that other, more systematic factors could be driving year to year differences in seasonal weather and if this is the case, their long timescales might well lead to predictability. The scientific literature is now littered with studies of a number of factors that affect the NAO. These occur on monthly timescales, where fluctuations in the stratospheric polar vortex and the Madden Julian Oscillation in the tropics precede fluctuations in the

surface NAO. On longer timescales of years, tropical rainfall variability, Atlantic Ocean temperature variations, the Quasi Biennial Oscillation, subtle signals from solar variability and even Arctic Sea Ice variations are all thought to provide a predictable influence on the NAO.

Many of these factors have a tropical origin. Even the earliest observations of weather in the deep tropics suggested that equatorial weather was more predictable than the variable conditions of the mid-latitudes and Europe[6]. Variations in seasonal rainfall in the deep tropics have been known to be predictable on long timescales for some time due to the much stronger coupling between the oceans and the atmosphere in the tropics. Some of this predictability has also been shown to leak into the extratropics by the propagation of planetary scale atmospheric disturbances called Rossby waves[7], and so the role of the tropics in providing long range weather forecast skill for the extratropics has now become well established[8]; at least in winter when the connections are strong. In summary, although they are remote, distant variations of rainfall in the tropical belt are far from irrelevant to our winter weather and the correlations between the two have a causal mechanism.

To test whether these mechanisms can add up to a significant degree of predictability for the NAO and hence winter weather, we return to the comprehensive computer models introduced at the start of this paper[9]. Just as in weather forecasting, we begin with the latest and best estimate of the state of the climate system, obtained through analysis of global observations. We use this as the starting condition for our long range forecasts, beginning every autumn, to run retrospective forecasts for a whole series of past winters to answer the question; "If we had today's knowledge and computer models, how well could we have predicted recent winters well in advance from early November?".

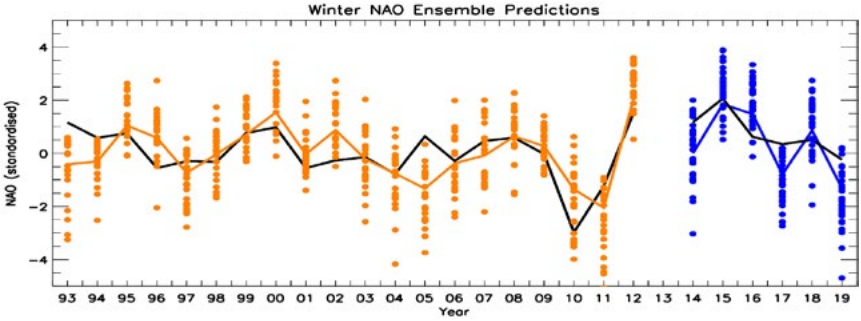


Figure 3: Figure 3: Skilful long range forecasts of the winter (Dec-Feb average) North Atlantic Oscillation[10]. Retrospective predictions for winter based only on observations collected up to November in each winter are shown in orange. Real time predictions of recent winters are shown in blue. Individual forecast members are shown by dots and mean forecasts are shown by solid lines in standardised units. The black line shows the observed values. The correlation score is 0.62 and many of the extreme cases such as 2000, 2010, 2011, 2012 and 2015 are well predicted.

The answer is shown in Figure 3 below which illustrates retrospective predictions of the North Atlantic Oscillation for past winters in orange and actual forecasts that were issued in later years in blue. Although far from perfect, the observed variations in black are closely followed by the ensemble average predictions shown by the solid lines. The correlation between the predicted and observed predictions is 0.62 (random forecasts would have an expected score of zero and perfect predictability would give 1.0). This result is statistically significant beyond the 95% confidence level and demonstrates that skillful seasonal forecasts for winter are now possible[10].

It is interesting to note from Figure 3 that many of the extreme winters in recent decades are predictable. The very cold winters of 2010 and 2011 which caused so much disruption to transport systems[10] and energy supplies[11] in the UK both show strong negative predictions. Similarly, the mild, wet and stormy winters of 2015 and 2016 were well predicted in advance. This gave warning of the severe UK flooding that occurred in December 2015 and has been shown to be another clear example of tropical influences affecting UK winter weather[12,13]. Of course, our latest forecast systems are not perfect, neither are all winters necessarily predictable, and so some cases such as 2014 showed only small forecast signals, despite the occurrence of intense winter weather patterns[14].

An Unresolved Paradox

We discussed earlier how an ensemble of many individual forecasts is used to make long range predictions. This is done to take account of uncertainties due to atmospheric chaos. It is important to understand that the fluid dynamical equations for the atmosphere shown in Figure 1 and used in our computer models are deterministic (i.e. they have no random elements) and therefore give exactly the same forecast if started from exactly the same starting conditions. However, inevitable small errors in the starting conditions or the model itself will grow due to the butterfly effect to eventually create large differences between forecasts and the real world. We therefore use an ensemble of forecasts, each with a small perturbation (a different flap of the butterfly's wing if you like) to take account of this chaotic uncertainty. As you can see from Figure 3 above, this gives a spread between individual long range forecasts in any particular winter (the dots in each winter), but it does not entirely destroy the forecast signal and the average of the ensemble of forecasts (the solid grey lines) still fluctuates up and down from one year to the next. This suggests that each individual forecast contains an unpredictable part (visible in the difference between individual forecasts) and a predictable part (visible in the ensemble average). The same goes for the real world; some of the variation from one winter to the next will be inherently unpredictable 'noise' and some of the variation will be predictable 'signal'.

Our correlation score of 0.62 suggests that the predictable signals may actually be quite sizable, but of course the amount of predictability depends on the relative proportion of predictable signals to unpredictable noise. For example, if all of the variation from winter to winter is due to predictable signals, then it would in principle be possible to achieve a correlation of 1.0 between forecasts

and observations. Similarly, if all of the variation from winter to winter is unpredictable noise then correlations between forecasts and observations will be zero on average. In fact the proportion of variance that is predictable signal should be equal to the correlation squared. This simple fact, coupled with the results from our seasonal forecasts leads to a very counter-intuitive result described below.

The correlation between forecasts and observations of 0.62, when squared, suggests that around 40% of the variance between winters consists of predictable signals. Furthermore, estimates of the correlation score for larger ensemble averages[10,15] suggest this is likely to reach a limit of around 0.8, implying that as much as 60% of the winter to winter variability is predictable. Interestingly, this agrees with estimates of the variance between winter to winter in the real world that cannot easily be explained as residual weather noise[5]. However, when we interrogate the forecast ensemble, we find that this does not match the proportion of variance in the ensembles that is predictable. The predictable signal, as measured by the ensemble average (the solid grey lines in Figure 3) divided by the total variance between individual forecasts is actually much smaller than expected from the correlation score. This leads to the so called signal to noise paradox[16], and results in the paradoxical situation that computer models of the atmosphere being better at predicting the real world than they are at predicting themselves!

The fact that forecasts behave differently to the real world suggests that the individual ensemble forecasts, while giving excellent short range weather forecasts and spontaneously reproducing many of the observed features of our atmosphere, are still not valid alternate realizations of the real atmosphere. A number of hypotheses have now been suggested to explain this but none has yet convincingly explained away all the features of the paradox. Our latest work suggests that the finite resolution of our computer models is likely to be responsible because small transient features of the atmosphere which conspire to boost the strength of large predictable signals like the North Atlantic Oscillation are not fully represented at the current resolution of our computer models[17].

A look to the future of climate forecasts

Extreme weather, including winter cold snaps and weather related flooding scenarios appear high on the list of hazards in the UK government's National Risk Register[18]. Many recent examples of such events have occurred in the context of prolonged seasonal weather events, many of which have now been demonstrated to be predictable at long range. Some of these events are also expected to increase in frequency and intensity in the future due to climate change. Impacts on areas ranging from transport to energy, the skill of our predictions and the increasing risk of extreme events from climate change all suggest the growing importance of early warnings from long range forecasts.

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Building a Knowledge Economy

JANE DAVIES

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A Knowledge Economy

The Knowledge Economy holds the key to the future prosperity of the UK, an economy where knowledge has replaced capital, land and labour as the main resource. From the perspective of a practitioner with 18 years of experience in the science park sectors of Manchester and Belfast, this paper explores the challenges of building a knowledge economy at the city level. From two examples, one based in Manchester and the other in Northern Ireland, it is possible to draw conclusions about what was critical to their success and thus get nearer to understanding what it takes to build a vibrant knowledge economy.

The companies that make up a Knowledge Economy are knowledge-intensive, export-oriented and innovative. They tend to be those organisations with the greatest potential to sell high value goods and services globally. They are established and developed by individuals who deploy innovation to solve problems and satisfy needs. To maintain their competitive advantage they recruit highly-skilled individuals from all over the world, invest in R&D and encourage creativity at all levels. A survey of the companies based on Manchester Science Park, all of which satisfied the entry criteria of being innovative, technology based and having ambition to grow, showed that the average wage was 60% higher than the Greater Manchester average; in Northern Ireland, salaries in KE companies are 45% above the NI average. At a national level, the World Bank Institute developed a methodology for comparing a country's position with others in the global knowledge economy. Since 2013, a similar methodology has been used to measure the knowledge economy of Northern Ireland (the only region of the UK that does this) and the sectors that are included in the research are indicated below:

Pharmaceuticals & biotechnology	Medical Devices
Software	IT Services
Creative content	High-tech financial services
Technology consulting	Aerospace & transport equipment
Communications	Computing & advanced electronics

My first example of a KE company is a medical device company - Phagenesis.[1]

Phagenesis is based on Manchester Science Park's Central Campus with an office in Dusseldorf. It was founded in 2007 by Dr Conor Mulroony and Professor Shaheen Hamdy, then Professor of Gastroenterology at Salford Royal Hospital. Phagenesis is a University of Manchester spin-out company and it was formed to commercialise Professor Hamdy's research into the treatment of dysphagia. Dysphagia is the inability to swallow safely, a debilitating condition that affects about half of stroke patients and which can lead to the inhalation of solids or liquids followed by pneumonia. Current management of the condition includes tube-feeding patients, which can lead to a significant loss of quality of life.

Professor Hamdy discovered that both sides of the brain are involved in controlling swallowing with one side being dominant – and which side dominates is random across the population. If a stroke damages the dominant side of the brain for controlling swallowing, patients will have difficulties in swallowing. However, he also found that stimulating the throat to simulate swallowing would encourage the undamaged side of the brain to take over functional control.

The Phagenyx® treatment involves an electrical stimulus to the back of the throat (the oropharynx) for 10 minutes a day for three consecutive days. Peer-reviewed, randomised clinical trials have shown that this treatment is safe and effective in improving participants safe swallowing ability.

https://youtu.be/58REMe1fVvo

Looking at how it developed, Phagenesis is a classic example of a knowledge economy company.

- It was based on clinical academic research;
- It received significant investment (expertise and funds) from the UoM's IP and Technology Transfer organisation, UMIP[2] and TrusTech[3], the NHS innovation organisation for the North West;
- It took a long time to get to market because of regulation and the challenges of selling into the UK market;
- It moved into custom designed laboratory and office space on Manchester Science Park in 2010 following an initial investment of £2 million;
- It raised $17 million series B investment* from venture capital companies 2011-2013 for clinical trials, regulatory approval and continuing development of product;
- It had a staged acquisition by Nestlé Health Science announced in 2016;
- In 2018, it started testing the treatment in patients with Parkinson's and began the process of securing regulatory approval in the US;
- It benefits both the economy and public health.

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* Series B investment is sought when a startup has found their product market fit and is making sales but needs further investment to expand.

As can be seen, the commercialisation process "from bench to bed" requires specialised services, finance, knowledge and people, much of which comes from outside the company and is what is meant by the innovation ecosystem. The term innovation ecosystem describes the complex system of interdependent networks needed to create an innovative city or region with a vibrant knowledge economy. Because networks involve human interactions they are organic and chaotic; they can't be managed but they can be curated, by injecting energy into the system with novel events, inspiring people or by providing a reason for unlikely collaborators to meet (optimising serendipity).

Four characteristic flows are critical to support the interdependencies within an innovation ecosystem:

People - Recognising the mobility of global talent, it is crucial to produce the right skills and talents, retain the best graduates from our education system, and achieve a critical mass in labour markets for creative people.

Finance - This concerns the flow of money to satisfy the resource needs of innovators. It includes support from banks for growth companies, seed capital, venture funding and enabling investment in infrastructure (physical and intangible).

Services - A particular type of flow concerns the specialised support that innovators require to create capabilities, embodied as infrastructure and associated services for innovation including incubators, science parks, digital connectivity, specialised business support, access to equipment for testing etc.

Knowledge - This concerns the flow of ideas that create innovation opportunities that may be captured as Intellectual Property Rights or otherwise made use of. It emerges interactively from universities, hospitals, research and technology organisations, business R&D and the creative sector.

Manchester's Knowledge Economy

Phagenesis also benefitted from being located in Manchester, a city with the social capital or soft connectivity* that makes investments in hard infrastructure and new technology more productive. One independent indication that Manchester is a good location for knowledge economy companies is the 2018 Innovation Cities™ Index in which Manchester is 34th[4] globally and like London (London is second after Tokyo) is classified as a "Nexus" city, which is defined as "A critical nexus for multiple economic and social innovation pre-conditions across multiple industry segments." or in other words a city that has well-connected networks of people, with the knowledge, the finance and the services necessary to generate a globally significant amount of economic activity in multiple industry sectors – a mature innovation eco-system.

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* Soft connectivity is about supporting an open society in the city, which spurs ideas, entrepreneurship, innovation and growth.

Corridor Manchester - An Innovation District?[5]

There is a fortuitous concentration of Manchester's knowledge assets on both sides of the Oxford Road corridor from the Mancunian Way to the airport. Two universities, nine NHS hospitals on one campus, several private hospitals and clinics, MSP's Central Campus with nearly 200 innovative companies, Siemens, the Whitworth, Manchester Museum, theatres and concert venues.

Collectively it provides employment for over 60,000 people – mainly with first degree qualification or higher – and in term time the population is augmented by more than 70,000 students. The Corridor generates £3 billion per annum GVA which represents 20% of the city's output and the major institutions

Currently, the main institutions on the Corridor are almost half-way through a ten-year period of around £1.5 billion of public and private investment in their facilities. New hospitals, research and teaching facilities have replaced worn out buildings and green spaces have been created as part of a modern campus environment e.g. MMU on Birley Fields – the National Graphene Institute, the Engineering Campus, the Whitworth Art Gallery, HOME theatre, the pedestrianisation of Oxford Road and the refurbished Business School.

Less visible is the soft infrastructure between partner institutions that has grown up over the last 12 years and that is just as important as the shiny new buildings. In 2007, the Corridor Manchester partnership was formed, as a legal entity, bringing together as funding partners Manchester City Council, the University of Manchester, Manchester Metropolitan University, Central Manchester University Hospitals NHS Foundation Trust and Bruntwood, with Manchester Science Park (MSP), ARUP and the Cornerhouse. From the beginning, the Partnership recognised that the creativity in the cultural industries is as important to a vibrant KE as academic research and entrepreneurial spirit. 12 years later the Cornerhouse has become HOME, MSP has evolved into Manchester Science Partnerships and the Royal Northern College of Music (RNCM) has also joined as a partner. It has a board, a small executive team and a strategic development plan. The partnership is committed to bringing forward new public and private sector investment to generate further economic growth in the knowledge economy; and acting together as an Innovation District, is better able to achieve this than individual institutions.

This recognition of the need to collaborate may have begun in 2007 at board level, but it has gradually spread within the partner institutions and now there is a long list of interlinked organisations collaborating to facilitate and support the commercialisation of knowledge at all stages of development. Corridor Manchester has the right to call itself an Innovation District because it has a fully functioning innovation eco-system.

Gray's Clip

My second example, Gray's Clip[6] , is a very different knowledge economy start-up, less mature than Phagenesis and based in Bangor, Northern Ireland. Its founders are a married couple, Julie and David Gray; Davy is an electrician, Julie a data analyst and administrator.

Davy's invention was born out of his frustration with the slow and accident prone process of hammering electrical cables to wooden structures, one clip at a time. As we all know this really requires three hands; one to hold the cable in place, one to hold the clip in position and a third to wield a hammer. His idea was to design a clip made out of an insulating material so it could be used safely on 240v electric cables and was strong enough to be fired into the wooden structures like a staple.

In October last year, Gray's Clip was the winning entry in Northern Ireland's annual competition to find the innovation with the most commercial potential, INVENT. Run by Catalyst (the NI Science Park), INVENT offers an opportunity for the innovators of Northern Ireland to compete to be recognised as the next 'big thing'. Davy and Julie's product has revolutionised the process of clipping electrical cables. It works with a battery powered stapler to secure cables to wooden joists and structures. With this product no more hammering is needed, the user simply loads the strip of 20 clips into a stapler and presses the button. It's quick, easy and safe.

The core innovation of the product, the intellectual property, resides in the material which is used for the clip and the nails that fix it in place. It is a non-conducting polymer that is bendy enough to fit snugly round the cables, and the nails are made of a different glassreinforced polymer that is hard enough to penetrate wood. Originally, Queen's University researchers were involved in identifying a suitable material but the polymer they proposed was very expensive, and in the end, a representative of the Northern Ireland Polymers Association was able to come up with a cheaper alternative with similar properties.

The next challenge was to find a suitable device to shoot the clip into the substrate. Initially, David and Julie initially trialed a manual stapler, but the electricians who used it all said they really needed a battery operated staple gun and this is what they were testing before Christmas so they could demonstrate a working prototype to potential investors.

https://youtu.be/oHjh-GFBu6w

The journey from idea via proof of concept to a working prototype has been a frustratingly long one for the two founders. They have both worked on it full time for close to four years, living off the proceeds from the sale of their house and grants (Research Tax Credit) from Northern Ireland's regional business development agency, Invest NI. One week before the INVENT Final, Julie was checking out personal loan websites because she had worked out they needed £15,000 just to get the latest prototype to the stage where they could demonstrate it to potential investors. However, Christmas came early and as overall winners they received a £13,000 cash prize plus a free place on a trade mission to the US in 2019.

NI Knowledge Economy

The founders of Gray's Clip are not so fortunate in their location as Phagenesis. Northern Ireland's national politicians haven't met for almost two years, business operates despite them and they are in the process of reducing government funding

for PhD studies in any subject to zero. It's all too easy for NI's talent to leave the province for their education or career – and they do. There are insufficient university places to meet local demand and people with the skills required by the ever changing knowledge economy are difficult to source locally.

On the 2018 Innovation Cities™ Index, whereas Manchester is 34th, and classified as a Nexus city, Belfast is 167th and classified as a 'Hub', that is a 'Challenger city, innovating in key segments.' The Northern Ireland Knowledge Economy Report 2018[7] (commissioned by Catalyst from Ulster University's Economic Policy Centre since 2013) found that NI has the fourth fastest growing knowledge economy in the UK but it lies 10th amongst the 12 regions of the UK.

As far as soft infrastructure is concerned, real collaboration between academia and the private sector in NI is developing but the public sector is only just being brought into the fold and the NHS in NI is notable by its absence. However, following collaboration with the universities in the negotiation of a city deal for Belfast, local government officials are showing signs of recognising the need to develop the city's soft infrastructure.

Another positive sign is the recent appointment of Prof. Ian Greer as Vice-Chancellor of Queen's University; previously Vice-President and Dean at the University of Manchester where he was Director of Manchester Academic Health Science Centre, a partnership between the University and the six major NHS bodies in the city which has developed an integrated approach to translational research[8] in the Greater Manchester health economy. He has already expressed his view that more collaboration with stakeholders in NI is essential to achieve his vision for the University.

Catalyst, Northern Ireland

Most importantly, Northern Ireland does have a successful and financially sustainable science park, Catalyst [9], which started operations in 2000 in Belfast's Titanic Quarter. It's a not-for-profit foundation and its first buildings were funded by public money.

Successful science and technology parks (STPs) tend to embody in their governance structures the theory of 'triple helix' interaction[10] as a basis for business innovation (Academia:public sector:private sector collaboration). When one or more of the partners is not involved or has only a token presence at board level of an STP, the missing perspective tends to receive less consideration in development strategy than it should. In the case of Catalyst, Queen's University and Ulster University have been represented on the board of the organisation from its inception, and the NI government currently has the right to appoint two non-executive directors. The chairman and most of the other non-execs are from the private sector. The desirable characteristics of a Science Park are:

Vision

Catalyst's strategic development plan serves as the focus for developing a common vision and understanding amongst all stakeholders, particularly if they are meeting regularly as a board.

A Strategic Role

Globally, science parks have been seen since the 1950s as long-term instruments to deliver knowledge economy growth as well as financial sustainability. The most common business model is one where profit from a commercial property operation becomes the main source of funding for the park's innovation mechanisms. These include specialised physical facilities and infrastructure and also services that support commercialisation, business incubation and acceleration. Initially the park is seen as a service provider; subsequently it acts as the stimulator and curator of the local innovation ecosystem.

The role of 'trusted intermediary' is particularly important in NI given its history of division and the successful delivery of a science park facility in Derry in partnership with UU and Letterkenny Institute of Technology is a good example of how Catalyst has been able to build bridges. It may also be a useful precedent for further co-operation post Brexit.

Provision of support for inventors and entrepreneurs

As well as winning INVENT in 2018, the founders of Gray's Clip acknowledged the value of the support they received from Catalyst's suite of programmes and as a trusted intermediary. Catalyst's Connect programmes are designed to support inventors and entrepreneurs through each stage of commercialisation and development of their business. Based on the model developed in San Diego, they stimulate business start-ups; incubate start-ups with growth potential and scale more successful businesses to increase impact.

The NI Knowledge Economy Report has also helped to improve understanding amongst stakeholders of what a Knowledge Economy is, what it means to NI and what needs to be done to grow it.

Catalyst now also has facilities in Derry and Belfast city centre – a Fintech hub in partnership with Danske Bank – and planning consent for a further 100,000 sq. ft. on its main campus. It aims to become the core of an Innovation District, but the innovation eco-system and soft infrastructure of the city need to be strengthened before the ambition can be realised.

Conclusions

- Building a knowledge economy is a slow process – up to 10 years or more
- The social capital or soft connectivity of a place is a critical success factor – compare Manchester and Northern Ireland
- A Science and Technology Park is a useful tool in a developing knowledge economy, providing hard and soft infrastructure and specialised services. The package of services developed by a science park to meet the requirements of its target market is key part of the value proposition of the park and tailored to the local culture and innovation eco-system. In a location with a developing knowledge economy such as Northern Ireland the STP will have to supply many of the services themselves; As the local innovation activity increases, the shared vision develops into mutually beneficial

collaborations and it becomes no longer necessary for the STP to deliver all activities.

- Fully functioning innovation ecosystems are transparent, accessible and always evolving and must include contributions from all three elements of the 'triple helix'.
- Once the knowledge economy of an area has critical mass, the innovation ecosystem will be largely self-sustaining. In Manchester, the role that MSP played in the early part of this century was similar to that performed by Catalyst in NI today. In Manchester today, the Corridor partnership board fulfils this function for the whole Innovation District and aims to ensure that the development strategies of the key institutions are aligned for the benefit of all.
- A vibrant knowledge economy embraces diversity, welcomes creativity and encourages curiosity

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A Grand Gothic Magic Lantern Entertainment

JEREMY BROOKER

27 February 2019

The magic lantern is enjoying something of a Renaissance. Once relegated to the dusty cupboard of 'pre-cinema' devices, along with a range of forgotten optical curiosities with tongue-twisting Greek and Latin names, it now takes centre stage in the hands of a new generation of researchers, performers and visual artists. The pan-European 'Million Pictures' and 'B-Magic' projects have received substantial public funding to document and explore what has been described as 'the most important visual entertainment and means of instruction across nineteenth-century Europe'.[1] Major institutions have opened their doors to researchers and begun to look seriously at their holdings, often for the first time, and new discoveries are being made. Web-based resources like Lucerna make this material available to all through the digitisation of slides and other material.[2]

With this plethora of documentation and artefacts it is easy to think of the magic lantern as a passive thing, a set of material objects which sit comfortably within a museum setting. Such material is important and deserves to be preserved and studied, but we should never lose sight of the fact that the magic lantern is primarily a performance medium. Slides and projectors can appear very impressive in a display cabinet, but like musical instruments or theatrical playscripts, they are only brought to life by the inventiveness and skill of the showman. Despite its seeming simplicity, the magic lantern has shown an uncanny ability to adapt and engage with audiences and this is what has kept it alive for almost four centuries.

The Magic Lantern Showman

Although often thought of as a Victorian medium, the magic lantern had a long existence both before and after the nineteenth century and can with justification claim almost four hundred years of continuous use. Though it would achieve extraordinary levels of sophistication in the hands of skilled instrument makers, slide artists and performers, the essence of the lantern has remained unchanged throughout this long history. Indeed, a significant part of its appeal lies in its inherent simplicity - a bright light in a box, a transparent slide and an optical system which can focus an image on a distant screen. At its most basic it is a device which might be operated by a child, but it could also create mass spectacles to be enjoyed by thousands.

Figure 1: Jean-François Bosio La Lanterne Magique' *Hand coloured engraving 1804.*

A delightful engraving, *La Lanterne Magique* by Jean-François Bosio, illustrates something of the appeal of the magic lantern, and goes some way to explaining its longevity. Dating from around 1804, it depicts an itinerant showman in the home of a bourgeois family. The audience is a mixed one, and the show is clearly designed to appeal to all ages- and, indeed, classes. The family have graciously allowed the house servants to join in the fun, albeit from behind a screen at the back of the room!

There are many other telling details. We see that the windows have been temporarily covered to block out the light and that a sheet is suspended over an alcove to act as a projection screen. With these relatively simple adjustments the lanternist could set up his show, creating an impromptu performance space anywhere which could be made dark- whether in private homes, public theatres, provincial church halls, or in hands of missionaries like David Livingstone in isolated village communities in Africa. Endlessly adaptable, the magic lantern could be found in the upstairs rooms of pubs or in the Royal Albert Hall, in séances, in the naves of churches, in the ceremonials of secret societies and even in brothels.[3]

Darkness obscures the prosaic surroundings, creating an impromptu auditorium in which the projected image takes the place of the theatrical stage. It was also something of a novelty in respectable public entertainments. At a time when

theatrical performances were still routinely given with the houselights on, magic lantern entertainments carried a frisson of possible flirtations. The couple at the back of the engraving are heading off for an assignation in the shadows beyond our view.

Another striking thing about this representation is how much this simple show must have depended on the skill of the showman. In his book Ancient Mysteries Described (1823) the author and satirist William Hone describes a scene very like the one depicted by Bosio. On Twelfth Night 1818, a lantern showman was heard in the street 'making the usual cry, of "Galantee Show"' and was invited in 'to exhibit his performances for the amusement of my young folks and their companions.'[4] Hone was fascinated by its connection with ancient mystery plays, and engaged the showman in conversation. He discovered that the handful of slides he exhibited 'with astonishing gravity' were in fact all that he owned. He also noted that his companion 'played country-dances and other tunes on the street organ', which clearly had little connection with the images on screen.

In Bosio's engraving there is similarly no evidence of the showman having many slides, and the musician accompanying him is clearly carrying a mechanical organ which he probably used in the streets to make money during the day. With the screen image as the only visual focus it was the showman's voice which created the show, perhaps adapting his patter to suit the circumstances.

Magic Lantern as Visual Spectacle

At the other end of the scale from these itinerant shows were the spectacular entertainments given at the Royal Polytechnic Institution in London, which marked the beginning of the lantern as a medium for mass entertainment. Here, four and at times six magic lanterns were used to create entertainments on a vast screen.5 The slides themselves were of a very large size to allow extra levels of detail and were painted by the finest painters, with especially composed music and original scripts. In 1848, the Polytechnic added its own purpose-built theatre designed as an ideal space for showing lantern slides, and this remained a centre of excellence for optical projection until its eventual closure in 1882. The remnants of this theatre still exist to the present day, repurposed as a public cinema within the University of Westminster in Regent Street.

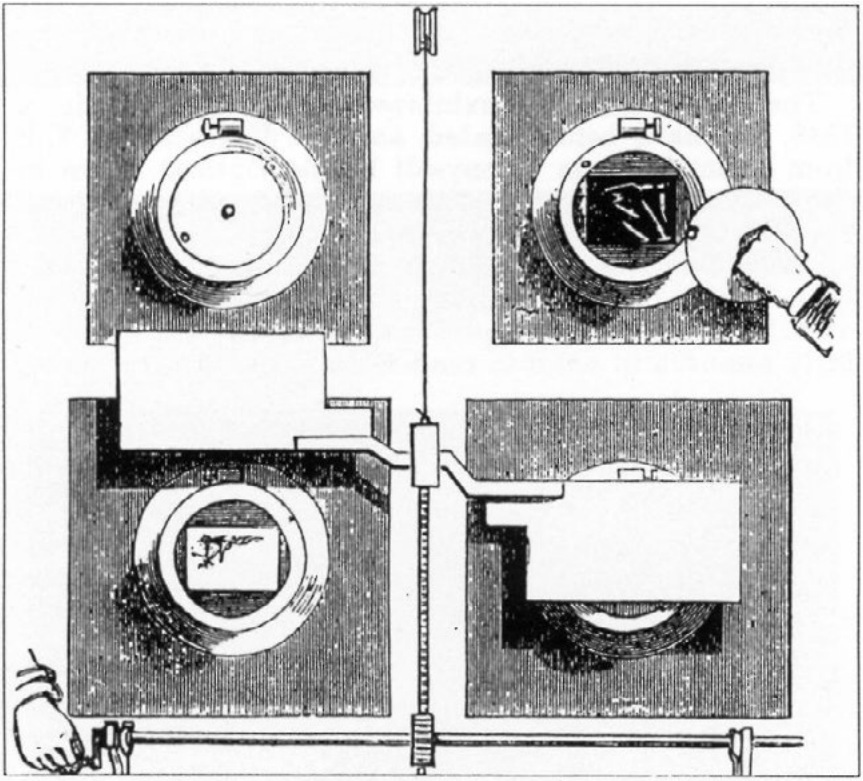

Figure 2: Fronts of four dissolving view lanterns at the Royal Polytechnic Institution.[6]

By using multiple projectors, the Polytechnic lanternists could create elaborate effects combining several different images and produce complex moving pictures on screen. The basis of these movements was often relatively straightforward, and had been used since the earliest days of the lantern. The earliest slide we know about was designed by Christiaan Huygens in around 1659 and preserved as a sketch in his notebooks. It shows a skeleton which lifts up its arm as if to scratch its head, and removes its entire skull!

A wide range of moving effects was available for the magic lantern. An illustration in Petrus van Musschenbroek's *Beginselen Der Natuurkunde* (1736) shows a number of slide types in which various parts of an image are painted on different pieces of glass to create the rotating arms of a windmill, a tightrope walker who slides stiffly across a tightrope, a woman who jigs up and down in a comical dance, and a man who lifts a glass of wine to his lips. These simple movements based on sliding and rotating pieces of glass could be endlessly adapted, sometimes reaching extraordinary levels of ingenuity.

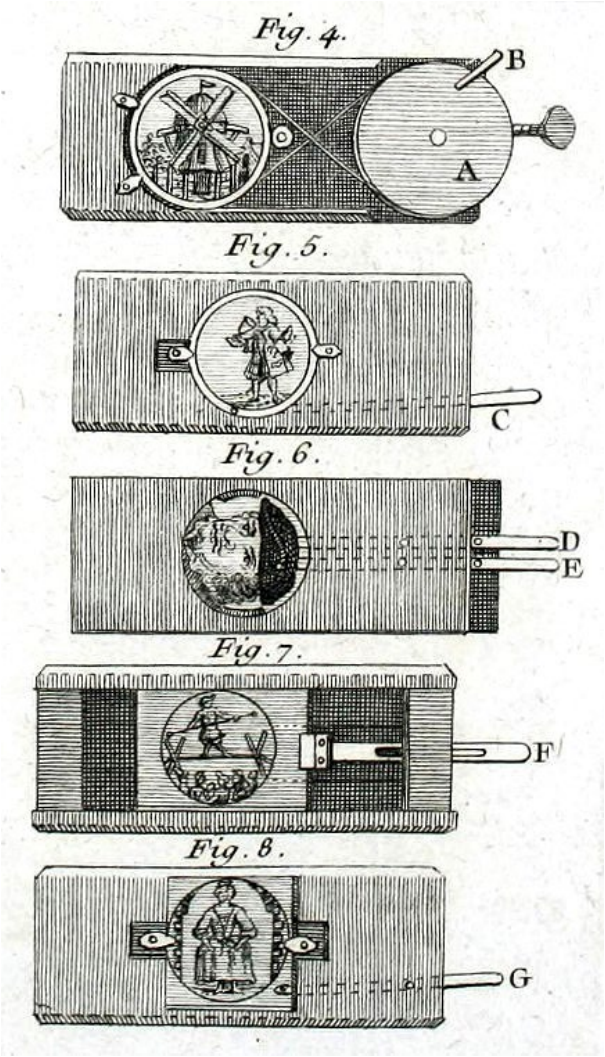

Figure 3: Petrus van Musschenbroek's Beginselen Der Natuurkunde (1736)

Science and Education

The magic lantern was often promoted as an educational aid, though in truth its inherent playfulness would often peek through. The great polymath Athanasius Kircher published the first printed account of the magic lantern in his magisterial *Ars Magna Lucis et Umbrae* (1671) (2nd edition). Though some technical details of the accompanying engraving are dubious, it seems the lantern was concealed in

an adjacent room and the presenter could simply walk in front of a small aperture in the wall to make the image appear or disappear at will. This playfulness was generally a feature of magic lantern performance, even when presented by apparently serious-minded men like Kircher.

Huygens, the purported inventor of the magic lantern, recognised the dangers of this seemingly frivolous device from the outset. In a letter to his brother Lodewijk in 1662 he begs him to sabotage the lantern so their father could not present it to the court of King Louis XIV at the Louvre.[7] He feared that his reputation might suffer through association with a device which served no real scientific purpose, except in the reflexive sense of demonstrating its own optical system. This is in marked contrast to the microscope or the telescope, which were primary tools of empirical research.[8]

The lantern couldn't be used to make new discoveries, but it could find ways to make knowledge available to a general audience. Whatever lofty ambitions were intended, however, contemporary accounts suggest that audiences did not always respond quite as promoters might have hoped. The oxy-hydrogen microscope could show minute specimens of pond life on screen in real time and may have played a role in helping the public conceptualise microorganisms, an important step in improving public health.

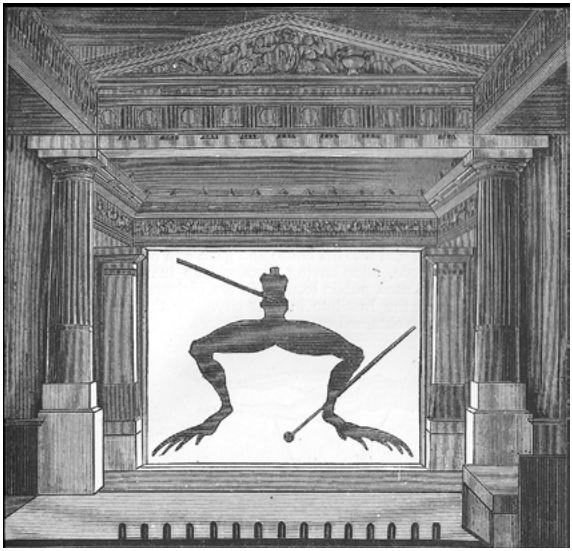

Figure 4: 'Galvani's experiment with the Nerves and Muscles of the dead Frog' at the Royal Polytechnic Institution[9]

At the same time, it was experienced as a novel form of entertainment. Successful presenters understood this underlying paradox and ensured that the imparting of knowledge was leavened by showmanship and visual spectacle.

This blurred distinction between amusement and education was always a feature of magic lantern performance. The Phantasmagoria was a form of ghost show popular in the late eighteenth and early nineteenth century and was generally presented within the context of quasi-scientific demonstrations of laughing gas or electricity.[10] The shows themselves were marked by great ingenuity. Magic lanterns were often moved backwards and forwards in relation to the screen to create the effect of approaching and retreating demons, or used to project onto concealed gauzes or smoke. The extent to which audiences found this genuinely frightening is perhaps questionable. It is possible that some people saw this as a genuine challenge scientific orthodoxy, but to most it was probably just a harmless thrill in the dark.

Figure 5: Robertson's Phantasmagoria in the Capuchine Convent

The creativity found in the Phantasmagoria was another common feature of magic lantern entertainments. In 1827 the lanternist Henry Langdon Childe created a phantom ship at the Adelphi Theatre which was used in a theatrical production of *The Flying Dutchman* and twenty years later devised a highly elaborate Phantasmagoria entertainment at the Royal Polytechnic to mark the opening of its new optical theatre.[12] The Polytechnic continued in this vein with a large number of 'optical pantomimes' in which every available form of projection was used, often in collaboration with spectacular stage illusions like Pepper's famous ghost illusion.

The inventiveness of lantern showmen certainly didn't die out with the advent of cinema and on the contrary the Edwardian period was one of great innovation. In the 1890s, the American actress and dancer Loie Fuller created a sensation with her 'Serpentine Dances', in which her voluminous costumes became a moving

projection screen. Fuller moved to France where she appeared frequently at the Folies Bergère and was seen as the living embodiment of the Art Nouveau movement. She also attracted a great number of imitators, and so initiated a number of music hall and variety acts which involved projection onto living people. One such act was toured for many years by Peg and Bill Sellers, the parents of the British comic actor Peter Sellers. Peg would stand on stage striking appropriate attitudes while Bill transformed her into a wide range characters including a nun, an arctic explorer, a Japanese geisha and a butterfly.

Figure 6: Butterfly pose slide (author's collection). Actress Miriam Gould

These kinds of acts were popular until at least the Second World War, and these years proved a boom time for lantern slide production. Improved photographic techniques brought slide making into the hands of skilled amateurs and many new markets opened up for the enterprising lanternist. One important use of the lantern was in promoting sales of sheet music, with professional singers presenting the newest songs to audiences in film theatres and other popular venues with specially created lantern slides illustrating the words. Huge fortunes could be made from sheet music sales so these slides were important marketing tools, and were produced to very exacting standards. The lantern also found a role in cinemas for making announcements or advertising local businesses, a practice which remained common even into the 1940s.

Figure 7: Song slide from 'ArrahWanna', A.L. Simpson, New York (1906) (author's collection)

By the 1950s new media had taken over many of the roles once taken by the magic lantern. Smaller and more convenient slide formats like the Kodak 'Carousel' took over the amateur market and in recent years digital projection has largely replaced 'analogue' projection for most purposes. In many ways PowerPoint and Giff animations are the true heirs of the magic lantern.

Yet despite this technological revolution, the magic lantern never went away entirely. Though interest in the lantern declined, the post-war period saw the emergence of young collectors and enthusiasts who built up huge collections of lantern slides for next to nothing, found in junk shops and even rescued from builders' skips. The Barnes Museum of Cinematography opened in St Ives, Cornwall, in 1963 and until it closed in 1986 became a Mecca for anyone interested in lantern and related matters. Books like Olive Cook's influential *Movement in Two Dimensions* (1963) and *Archaeology of the Cinema* by C.W. Ceram (1965) appeared, which began to take the subject more seriously than most previous publications.

By 1975 there was sufficient interest for the establishment of the Magic Lantern Society, which has continued to flourish for almost half a century to support the interests of collectors, researchers and showmen.[13] This was closely followed by a sister magic lantern society based in the USA and Canada.[14] This same period saw the opening of what was then the only professional magic lantern

theatre in the world. Operated by Doug and Anita Lear, this toured England in a specially adapted narrowboat before leaving the canals behind to tour all over Europe, eventually setting up as a museum and theatre in Wales.

Figure 8: Jeremy and Carolyn Brooker. Photo by Artemis Willis

Today there are many exciting performers whose shows range from the traditional to the highly experimental. The magician Sergi Buka and the circus clown Jordi Pujades each bring their own unique skills to the lantern, while artists like Nicolle Mollet and Melissa Ferrari create their own contemporary lantern images. My own work often combines historic material with slides of my own creation, either commissioned by theatre and film companies or for use in my magic lantern entertainments.[15] As Chairman of the Magic Lantern Society I have tried to encourage younger people to engage with the lantern and recently completed a series of workshops in Lisbon, where we were able to pass on our skills a new generation of lanternists from Spain, Portugal and France. The magic lantern is very much alive, and I hope it will continue long into the future.

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The Dig Greater Manchester Community Project, 2011 to 2017: archaeology for all?

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Introduction

This paper looks at the aim, scope, and outcomes of the Dig Greater Manchester community archaeology project. Dig Greater Manchester was a five-year community engagement project (2011-6), designed to widen participation in heritage within the Greater Manchester region. The project aimed to provide community archaeology education and training across the Manchester city region; to explore the impact of community archaeology on participating individuals, local groups, and communities; and to explore the impact of industrialisation in the region. This was done through excavating eleven sites in Greater Manchester and one in Blackburn and Darwen Council. All these sites were on local council land and ranged from textile mill workers' housing to factory owners' houses and a cavalry barracks. Adult participants feedback was recorded in detail, whilst 66 lectures and 116 training workshops across 11 local authorities in the region were undertaken. At the time Dig Greater Manchester was one of the largest community engagement projects in the UK, engaging 1588 adult volunteers, 2,409 open day visitors, and 3,406 school children, as well as producing two conferences, two major publications[1], an exhibition, and an archaeology festival which closed the project in 2017.

The project was funded by the Association of Greater Manchester Authorities (AGMA) and run by the University of Salford's Centre for Applied Archaeology (CfAA), in conjunction with the Greater Manchester Archaeological Advisory Service (GMAAS). A small professional team oversaw the delivery of the project, with additional support from the staff of the Centre for Applied Archaeology and the Greater Manchester Archaeological Advisory Service. The late Brian Grimsditch (died 2015) managed the day-to-day delivery of the project along with Vicky Nash (community archaeologist) and Sarah Cattell (education archaeologist). Kirsty Lloyd joined the team in 2015 and Adam Thompson provided overall management of the project.

Dig Greater Manchester had three primary research aims: to examine the significance and impact of community archaeology; to study the practice of community archaeology; and to explore the archaeology of industrialisation in the Manchester city region. This article focusses on the significance and impact of community archaeology as recorded through the Dig Greater Manchester project. Special emphasis is put on the research done by the project on disability access

and on the wider impact of the project as recorded through one-to-one interviews, focus groups, and feedback forms with the archaeology volunteers.

The Scope of the Project

The project built upon the successes of previous community engagement programmes in the Manchester city region, such as the Tameside Archaeological Survey, 'Dig Manchester', and other Heritage Lottery Fund-supported community heritage projects undertaken during the 1990s and 2000s[2]. It also fits into a national pattern of widening community involvement in archaeology and heritage with professional support, that can be traced back to at least the early 1990s[3]. In July 2009 the National Audit Office published a document entitled Promoting Participation within the Historic Environment and in December 2009 the Public Accounts Committee published a report, also entitled Promoting Participation within the Historic Environment. Both were highly critical of English Heritage's and the DCMS' approach to widening heritage participation and called upon local volunteer groups, charities, and local authorities to 'identify the historical stories in your areas'. The Dig Greater Manchester project aimed to empower these aspirations and do just that[4].

From the outset, Dig Greater Manchester had to be about far more than simply increasing the numbers involved in archaeological work; it had to have real, tangible, community benefit. With that end in mind the project programme was designed to provide not only opportunities for fieldwork and excavation, but also to support this with adult skills workshops and a schools' engagement programme.

The Excavations

The dig sites were chosen using criteria agreed in 2009-10 with the local authorities. Each site had to be on council-owned land, one site per authority, with access to public transport, and within wards with below-average incomes for that local authority. These criteria were designed to encourage access to the project from a wide socio-economic spectrum. The locations chosen for the project contained mostly Post-medieval and Industrial period sites. They included one army barracks (Hulme Barracks in Manchester), one farmstead (Wood Hall in Stockport), two late medieval manor house sites (Etherstone Hall and Radcliffe Tower in Bury), and seven 18th and 19th century factory owner's mansions (Balderstone Hall, Blackburn, Chadderton Hall, Cheetham Park, Hart Hill, Longford House and Moss Bank Park).

Each authority had a small-scale (two weeks) evaluation dig during the first three years of the project, in order to assess the nature and extent of any surviving archaeological remains within each site. The final day of each evaluation was given over to a public open day. The digs were open to adult volunteers of all abilities (see below) from across the eleven local authorities and offered up to 25 volunteer places per day, equating to 300 days of volunteer time per evaluation[5].

Figure 1. Workers' housing excavated at Radcliffe in 2012.

In the final two years of the project (2015-6) there were two large-scale (five-week) 'flagship' excavations, which revisited the two evaluation sites. The choice of location of these digs was based upon the sites' potential to yield further archaeological remains and the public interest in the site during the evaluation phase. Thus, the two flagship digs chosen were Hart Hill House in Buile Hill Park, Salford, and Radcliffe Tower in Bury. Hart Hill House was a mid-19th century factory owners' mansion, whilst Radcliffe Tower was a late medieval and post-medieval manor house[6]. The digs offered at least 25 volunteer places per day, equating to 725 days of volunteer time per flagship site. In addition, each flagship offered a further five one-day training sessions in various archaeological techniques catering for between ten and twenty volunteers, resulting in an additional 290–350 days of volunteer time per flagship. A total of 1588 individual adult volunteers took part in the project between 2011 and 2016.

Figure 2. Cheetham House, Tameside

Adult Skills Workshops and Schools Programme

In addition to the evaluation digs, there were also volunteer places available for in-depth training in various non-intrusive archaeological techniques such as historical research, geophysical survey, archaeological building survey, graveyard survey, and finds processing. The in-depth training took the form of five one-day workshops in each of the eleven local authorities at venues close to the dig sites. These catered for between ten and twenty volunteers, resulting in an additional 290–350 days of volunteer time per evaluation. A total of 116 skills-based workshops were delivered during the life of the project supported by 66 lectures to local and national groups.

As well as adult volunteer opportunities there was a formal education programme, which enabled school involvement in the project at primary, secondary, and further education level. The school programme was run by project's education archaeologist and targeted at Key Stage 1 & 2 children and Key Stage 3 & 4 children. It involved a classroom session introducing children to archaeology, followed by a half-day site visit allowing the children the opportunity to participate in the dig. During each evaluation up to 30 children from ten local schools were offered the opportunity to get involved in the project, which represented 300

school places per evaluation. At the end of each dig the schools involved received a Key Stage-specific teaching package created for use in future student projects. In this way 3,406 school children were given the opportunity to explore their local heritage[7].

Opening Access to All: Enabled Archaeology and DGM

In order to make the project accessible to as many people as possible, opportunities to participate were made available to individuals with learning disabilities and other special needs. Specifically, the project worked with the Manchester Learning Disability Partnership (MLDP) from 2011 to 2013 to provide access to people with learning difficulties on the first four evaluation excavation sites. Budget constraints at MLDP curtailed further formal engagement. There were two groups within the partnership: one that used artwork in order to improve and create learning opportunities, and a second that focused more upon physical work on the sites, including some excavation[8].

Disability Engagement

The opportunity for involvement and connection of those with learning disability should be extended as broadly and deeply as possible within the community, to include people, who for whatever reason, may feel particularly excluded and marginalised. However, this is often difficult. With limited resources and staff, and an overarching duty to the professional processes of archaeology itself, the outreach and support work that can be done, though significant, is not unlimited[9]. For Dig Greater Manchester (and community archaeology in general), there was a continuing issue around how to reach and include the most marginalised, whilst ensuring a high standard of archaeology. These are issues which other projects working with the differently-abled, such as Operation Nightingale, and the museums' sector, have addressed[10].

Museums were legally required to make their venues accessible to disabled visitors by October 2004 under the Disability Discrimination Act 1995[11]. This approach was carried over into the Equality Act 2010 and has meant that all public buildings, including listed structures, had to be made disability friendly. However, this legislation puts the focus on improving physical access to presented and preserved heritage sites, rather than on widening access to participation in investigating the past. The recruitment by the Department of Work and Pensions of a disability champion for the countryside and heritage sectors in early 2019, in addition to the existing 14 disability champions covering areas as varied as banking and music, might signal a shift in at least Government regarding ideas about access being tied to fixed sites[12]. The experience of the Dig Greater Manchester project, and other archaeology projects that have researched this area, such as the Greater York Community Archaeology Project and Operation Nightingale, is therefore still highly relevant as to how to widen the concept of disability access beyond the concept of the heritage visitor attraction.

One of the most marginalised groups remains people with learning disabilities. This group has been supported in Greater Manchester since 1994 by the

Manchester Learning Disabilities Partnership. This is a partnership between Manchester City Council and Central Manchester Foundation Healthcare NHS Trust and aims to integrate the health and social care needs of people with learning disabilities[13]. Occupational therapists (OT) are an integral part of this team and work primarily to improve practical home environments, teach new practical skills, and find opportunities for meaningful daily occupation.

Social and occupational opportunities for people with learning disabilities remain highly limited, despite improvements in general approaches to care and support having been made in recent decades[14]. For all but the most mildly disabled, opportunities for education, employment and ordinary social contact are severely limited, whilst many remain targets for scorn or exploitation within their own communities. Attempts at normalization – the supporting of people to lead ordinary lives – often founder on the rock of resource scarcity, a scarcity which worsened due to local council and national government cuts to funding as a result of the recession of 2008-11. The reality for many people remains a life that is highly segregated.

Since each person has different skills, interests and abilities, the person and the possible occupations or activities needed to be carefully assessed and matched and any adjustments or extra support needed put in place from the beginning. This can range from a little extra prompting or supervision through to observing with minimal participation at the other, with most people falling somewhere between the two. As people learn and develop, so their abilities and need for support change. This is a continuing and complex process, not just for the disabled participants of community archaeology projects but for all volunteers. It requires the constant observation and assessment of a person's enjoyment and motivation, their evolving occupational routines, and their core physical motor and mental processing skills[15].

Having assessed the resources available to the Dig Greater Manchester project and to the MLDP, it was agreed that a small number of volunteers from MLDP would be accommodated as and when they were able to attend, and that their activities would be graded to suit various physical and mental abilities, as far as was reasonable and practical. It was also agreed by the MLDP occupational therapists that all volunteers would be closely supported by occupational therapy (OT) staff as necessary, with graded reduction of support as appropriate for each individual as their experience and confidence developed. It was felt by both DGM and MLDP staff members that the most sensible way to begin would be with smaller numbers of relatively able service users, closely supervised by OT staff, and work up slowly and carefully to increasing numbers and severity of learning disabilities, to including the many people with co-existing physical disabilities. Dialogue would be maintained concerning site locations and access and the different kinds of tasks offered onsite. Finally, the MLDP art groups (run by a professional artist, and meeting the complex needs of some people with much more severe disabilities) were involved from the outset. The group visited by arrangement and observed and made their own artistic records, although the members were not active volunteers[16].

Thus, by working together to identify people's realistic support needs and ensuring co-operation between MLDP and DGM, the staff from both organisations were able to identify potential barriers to participation and address them. In this way the likelihood of including people with a wider range of needs and abilities was greatly increased.

Work and Social Skills Development

Six MLDP volunteers took part in four Dig Greater Manchester excavations. At Radcliffe, the erection of metal fencing provided an excellent opportunity for independent problem solving, spatial awareness development, team working, health and safety awareness, and use of spanners and threaded nuts and bolts. Another task was to lay out straight lines, mark them with string and nails and then cut back the site sections vertically to this line. This encouraged teamwork, visual awareness, three-dimensional awareness and an understanding of the reasons why sections are cut straight, clean and vertical – to clearly distinguish between 'real' undulations in underlying strata and the arbitrary edges of the excavation and to clearly expose strata in the sections themselves. It also required skilled and co-ordinated work with spades, shovels, buckets and barrows. Volunteers from the MLDP began to mix more with other adult archaeology volunteers and professional archaeologists on the site, assisting with a variety of tasks and socialising at tea break[17].

By being invited to think about the physical structures that were visible and put forward possible functions and explanations for them, the MLDP volunteers were challenged to link up aspects of experience and knowledge – for example, the interpretation of a sloping floor and drain in a cellar as a 'wet-room' (a shower-room where the whole floor is the shower, common for many years in supported accommodation), showed both the ability of volunteers to make links to other aspects of their experiences and the sometimes limited nature of these experiences. There were also discussions with the OTs and archaeologists about other interpretative issues, such as the similarities and differences between the visible physical remains of a stone wall and a path.

Two MLDP volunteers, along with a friend, were so keen to attend the Radcliffe dig that they independently caught public transport into and out of Manchester in the pouring rain, not something they would normally do. They also volunteered independently on the Balderstone Hall dig and later visited a canal museum. This was not a usual choice of activity and one which was stimulated by their archaeological experiences[18].

The OTs recorded noticeable improvements in daily living skills and generally better routines. These included developing functional work morning routines, increasing confidence in using public transport, selecting correct clothing to wear, and the opportunities to relate their work day experiences to their friends (one of whom subsequently asked to volunteer). The various physical tasks involved in archaeology can improve general health and fitness and there is a growing literature around this 'wellbeing agenda'[19]. Access to an archaeological excavation may require reasonable balance, and sometimes the ability to walk up and down

slopes and over uneven ground. Trowelling, maintaining balance whilst kneeling or crouching, bucketing, barrowing, shovelling and lifting can all improve physical flexibility, strength, stamina and endurance. The MLDP volunteers said they felt the benefits of these activities, as well as the aches and pains that can follow unaccustomed physical exercise.

Recording Impact

Recording the impact of the project was built into the project design. This was done in two significant ways. Firstly, through a specially designed volunteer participation feedback form. The design of this standard feedback form drew on experience from other projects, especially the Dig Manchester project (2004-9). There were 31 questions, spread across three categories: 'about you'; 'your experience'; and 'ethnicity'. It was offered to all adult volunteers across the eleven dig sites, but not for those participating in the training workshops, as it was felt there would be an almost complete overlap of personnel. Completion was entirely voluntary, although volunteers were encouraged to fill in the form during the digs, with time set aside for this at lunch and tea breaks[20].

Of the 1588 individual adult volunteers who participated in the project between 2011 and 2016, 212 filled in the feedback forms giving a sample size of 13.4%. The gender split in those filling in the forms was 62% female and 38% male, and this reflected the overall gender split on the eleven excavations. In terms of age range 22% fell into the 17-25 age group; 12% belonged to the 26-40 age group; 25% belonged to the 41-60 age group and 41% belonged to the over 60 age group. Again, visual evidence from the excavations and workshops supported this spread of ages for those participating. This also echoed the experience of local archaeology and heritage groups whose membership is focussed on those over 50 years of age, whilst those in their 20s and 30s tended not to join.

Of the adult volunteers participating in Dig Greater Manchester 29% already belonged to a local archaeology or heritage group. At the beginning of the project there were 14 local archaeology and heritage groups within Greater Manchester, with a membership in excess of 1000. However, 71% of those volunteering and responding to the feedback form did not belong to a local heritage group. These individuals found out about the project in a range of ways from posters in the local library, local press reports and social media, to personal recommendation.

In terms of the activities undertaken on site, those individuals who did not already belong to a local group had the least experience of archaeology in terms of fieldwork. However, nearly all of the feedback respondents, 98%, had visited a heritage site within the previous 12 months. For the purposes of the feedback form a heritage site was described as either an archaeological site, historic building, historic park or garden, monument, museum, or heritage event. 5% of respondents thought that the interaction with the professional archaeologists was satisfactory, 23% good and 71% very good. 92% of those questioned were interested in further archaeology or heritage training, whilst 65% would attend future community archaeology digs for a fee.

Finally, 99% of the adult volunteers who responded described themselves as White British. This was in contrast to the ethnicity of the school children visiting the site, who better reflected the ethnic make-up of Greater Manchester, which according to the 2001 census comprised 88.9% White, 6.5% Asian, 1.7% Black and 2.9% other.

The second way in which the impact of the project was recorded was through a series of small focus group interviews. The Centre for Applied Archaeology worked with Dr Sharon Coen, Senior Lecturer in Psychology at University of Salford, to explore the impact of community archaeology on its participants[21]. The project, 'I Dig therefore I am: place, identity and participation in community-based archaeology projects' aimed to explore the role played by participating in community-based archaeological projects in the development and construction of place-identity and attachment.

Most of the studies looking at the relationship between heritage and place identity have focussed on the way in which individuals engage with the historic environment[22]. However, participation in community archaeological excavations with other volunteers from the local area might encourage the emergence of a group-based place identity. The 'I Dig' study therefore aimed to explore, using qualitative methods, identity processes involved in participation in community-based archaeological initiatives. In particular, the Dig Greater Manchester project was interested in whether, and how, individual participation in the digs had an impact on the volunteers' identification with, and attachment to, the local area and the local community[23].

Dr Coen and her team used focus groups with 24 participants (of which 11 were male and 13 were female) in five areas of Greater Manchester (Chadderton, Manchester, Radcliffe, Salford and Stockport) involved in the project during 2014 and 2015. The 24 participants were selected to reflect the range of ages and occupational statuses and to ensure the sample included participants of both genders.

The study was designed in accordance with the 2009 British Psychological Society Guidelines for Research in Psychology and approved by the Ethics Research Panel of the University of Salford. Questions were open-ended and followed the research questions without limiting the discussion[24]. Focus groups were held, where possible, in local community spaces in the area where the digs had taken place to facilitate local participants. At each focus group the researcher welcomed participants and encouraged them to talk freely when the questions were asked but not to talk over one another. When the focus group ended, participants were thanked for their time and debriefed about the purpose of the study and they received a small (£10) reimbursement for their time and travel. Each focus group lasted between 50 and 60 minutes; they were recorded and transcribed with all identifying text removed[25].

Insights from the focus groups suggest, firstly, that place identity is a complex phenomenon and that the boundaries and characteristics of place and what it means to 'belong' to a place are continuously negotiated by individuals. Indeed, by participating in the dig people for whom the local area is an important part of their identity move from a personal to a social (community-based) account of the

local history and heritage. This in turn helped them to move from the concept of 'my' place to 'our' place. At the same time, although at an individual level people might not identify with the local area, by interacting with other members of the community and learning about the local heritage, they could develop a sense of belonging. Participants spontaneously referred to the importance of the 'Home' dig, thus illustrating how exploring heritage in the local area contributes to the development and strengthening of an individual's link to the local area and its community. A second important finding concerned the important role played by stories in fostering a sense of connection to a place (in terms of its history and heritage) as well as to the local community[26].This supports the literature on the important role that stories play in the narrative construction of the 'Self'. Coen also observed that the dig seemed to foster the emergence of a social identity[27].

A limit on the study's conclusions was the self-selection of the sample: volunteers who offered to take part in the focus groups were in most (but not all) cases people who were particularly enthusiastic of the experience. This restricted the applicability of the results to the entire body of volunteers, whilst suggesting that future community archaeology projects might usefully employ a larger study sample.

Conclusion: Why Community Archaeology Matters

This paper has attempted to examine the significance and impact of community archaeology as practiced through the Dig Greater Manchester project. This was one of three research aims set out at the beginning of the project in 2011. The impact of the project was measured in several ways; through working closely with a small number of volunteers with learning disabilities; through assessing the diversity and inclusiveness of the project through specifically designed feedback forms; and through tightly drawn focus groups which looked at the impact of the project on individuals' concepts of place, identity, and wellbeing.

Having volunteers with learning disabilities present and visible on the Dig Greater Manchester archaeological sites enabled them to form links and relationships with other volunteers. The MLDP volunteers acted as 'ambassadors' for people with learning disabilities. Their presence helped to challenge the stereotypes and preconceptions regarding ability amongst both the archaeology volunteers and professional archaeologists. Whilst they needed extra support and specific accommodation on a one-to-one basis, which did involve significant resources, they proved to be as committed to making a real contribution to uncovering the archaeology and heritage of the city region as any other volunteer.

The data from both the feedback forms and the 'I Dig' focus groups re-enforced the view that community-based archaeology digs are a positive way of engaging a wide range of people in an activity which promotes the building and sharing of knowledge, at the same time as promoting social cohesion and respect for the local environment and its inhabitants. Amongst the impacts of the Dig Greater Manchester project on the volunteers was the fostering of common goals, a sense of equal status in discovery, and the development of new contacts and relationships that aided a feeling of wellbeing. The national recognition of the project

through being highly commended in the British Archaeological Awards for both 2014 and 2016 in the community archaeology category, reflected the efforts of the project to explore these personal impacts. Nevertheless, there were some negative aspects of the project, such as the lack of adult volunteer ethnic diversity and the lack of volunteers from the 26-40 years age bracket. These outcomes are by no means unusual in community archaeology. The strength of the Dig Greater Manchester project has been in its contribution to the quantification of these positive and negative aspects of heritage engagement. This should allow future projects to better address some of the negative issues at the design stage.

By accessing, exploring and celebrating the city region's unique heritage, Dig Greater Manchester has helped communities to better understand and enjoy their local archaeology in a hands-on way. The project can demonstrate that it has helped to cultivate a sense of place and distinctiveness rooted in local heritage amongst many individuals and local groups. Having created an opportunity for local communities to become involved in exploring their own history and heritage, it is to be hoped that the project has acted as a catalyst for inspiring further heritage engagement across the city region. Its immediate legacy is the growth in membership of the Greater Manchester Archaeological Federation (up to 17 members by 2017), the continuing success of the Greater Manchester Archaeology Festival and the existence of an active, informed, city-region volunteer archaeology network.

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'What's in a name?' Considering the nominal influence of Manchester

TERRY WYKE

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> 'This town is known throughout the world for its cotton manufactures; but it is little more than a name to foreigners'.
>
> (P. A. Nemnich, *Description of a journey from Hamburg to England* (1799))

Multi-dimensional indices such as the Global Power City Index purport to measure and rank the power and status of the world's cities. No such indices are available for the nineteenth century, though, if they were, it seems likely that Manchester would have featured. Contemporaries seemed in little doubt that Manchester was, to use the language of the modern business world, an alpha city. Following the opening of the Bridgewater Canal in the 1760s Manchester took off, its factories with their towering chimneys providing one of the defining symbols of the new industrial age. Having only warranted a single sentence in the first edition of the *Encyclopedia Britannica* – 'a large town of Lancashire, forty miles south-east of Lancaster'[1] – Manchester filled 13 pages by the 7th edition, having become 'the second town of the empire in point of population, and the most important on account of its manufactures'[2].

Manchester's dominance in both the manufacturing and marketing of cotton yarn and cloth meant it acquired an international reputation. As a consequence it became fixed on the mental maps of foreigners, part of their public geographies. Foreign travellers – industrial tourists such as Philipp Nemnich – now visited the town in increasing numbers. Foreign reference works, in which dominant perceptions were distilled, confirmed Manchester's primacy. According to the *American Cyclopaedia,* Manchester was 'the chief market in the world for cotton yarn or thread, the supply of which passes through the hands of numerous resident foreign merchants, who export it to their respective countries, giving to Manchester in this respect a character quite unique among inland cities'[3], whilst in *Pierre Larousse's Grande Dictionnaire Universel* 'Manchester est le plus grand centre manufacturier de Grande-Bretagne et la métropole de l'industrie cotonnière.'[4] Foreigners' perception of the city's pre-eminence mirrored those who were proud to identify themselves as Mancunians. This self-confidence was neatly captured in the after-dinner story about the Provost of Glasgow writing to the Mayor of Manchester to settle the question which of their cities should be called the second city of the empire, the inquiry prompting the reply that his letter had been forwarded to the Lord Mayor of London.

Accepting that it was the cotton industry that was fundamental in carrying the ideas and processes of industrialisation across the globe, an obvious starting point in assessing Manchester's international presence would be to measure its trade with other countries and its role in the diffusion of the factory-based cotton industry. That Manchester was an international city was also evident in the number of foreign businesses in the town, besides it having the largest number of foreign consulates, outside London.[5] However in assessing Manchester's claim to be a world city in the nineteenth century,[6] attention should also be given to what might be regarded as soft indicators of its international standing, in particular the readiness of other countries to use the name of Manchester. Following on the research into topynyms by cultural geographers and others, this essay argues that in assessing the international impact and status of Manchester, its adoption as a place-name in other countries should be recognised alongside more obvious economic indicators of its international presence.

Place-name studies claim a lengthy pedigree in Lancashire, as long before the English Place-Name Society began publishing its indispensable county volumes, the county's place-names had been investigated by a number of scholars, including Henry Cecil Wyld and the Swedish philologist Eilert Ekwall.[7] Manchester's own etymology was also examined, so that by the early twentieth century the principal changes in the town's name from Mamucium (Roman) to Mamecestre (Saxon, Norman) and then towards the end of the 15th century to the modern name of Manchester was generally accepted.[8] This interest in the name of the town was essentially archaeological, little if any consideration being given to the process of place-name transference that had been taking place during the eighteenth and nineteenth centuries.

United States of America

The adoption of Manchester as a place-name was most evident in the USA, where, as is well known, colonisation resulted in British place names becoming an important part of the topynmical landscape. The 1874 edition of Lippincott's Gazetteer of the World identified 38 Manchesters in the United States,[9] an increase on the 22 listed in Haskel and Smith's pioneer gazetteer of 1848.[10] Communities named Manchester easily outnumbered those called Birmingham, Newcastle, Leeds and Liverpool in both of these reference works, a predominance that suggests its pre-eminent status as an industrial town.

Of course, it should not be assumed that all of these Manchesters were named after the industrial city. The earliest examples of Manchester as a place-name in colonial America followed the familiar pattern of naming new communities after prominent English aristocratic families in the expectation that such acts of flattery would encourage them to support development in the new colony.[11] New York, to cite the obvious example, was named not after the Yorkshire town but after James Stuart, Duke of York (later James II), who as the Duke of Albany also gave his name to the state capital. Acknowledging that the date when a settlement was established and the name legally adopted is not always certain,

the first Manchester established in America was a coastal settlement (initially known as Jeffrey's Creek), in what was part of the Massachusetts Bay Colony, taking its name from Henry Montagu, Earl of Manchester (1563-1642) who had been active in promoting the new colony.[12] Similarly Manchester in Bennington County, Vermont (settled in early 1760s) is said to have been named in honour of Robert Montagu, third Duke of Manchester (1710-1762),[13] whilst Manchester on the James river in Virginia (founded in late 1760s) is believed to be named after his son George Montagu (1737-1788), the fourth Duke of Manchester.[14] Manchester (Baltimore County) in Maryland was also established in the 1760s, but in this case it owed its name to the fact that Manchester was the hometown of the father of its developer, Captain Richard Richards.[15]

Although in the eighteenth century the name of Manchester was increasingly familiar in the colonies due to the trade in its eponymous products – 'Manchester wares' and 'Manchester cottons' (hard-wearing fustian cloths) – the Lancashire town did not influence the choice of new place-names. This was to change in the early nineteenth century when the adoption of Manchester as a place-name became common, the choice being made, solely or in part, because Manchester in Lancashire was viewed as an industrial powerhouse, epitomising the spirit of business and entrepreneurship prized in the new industrial society. Manchester (Hillsborough County) in New Hampshire is the best-known instance of this process. It was so named because of Samuel Blodget who was the principal figure in constructing a canal at Derryfield to avoid the Amokseag falls on the Merimack river. Blodget, who had visited Manchester, envisaged establishing a manufacturing town that would become the 'Manchester of America'. He died shortly after the canal was completed and it was left to his grandson, Thomas Stickney, to ensure that the small settlement of Derryfield was renamed Manchester. This was an early instance of place promotion, in which the name and its associations with industry was chosen to boost and promote the community. It proved successful with industry locating on the banks of the canal, including the famous Amoskeag Manufacturing Company which was to become the largest cotton factory in the world, employing over 15,000 operatives at its peak.[16] Manchester in Hartford County, Connecticut provides another example of a place named after Manchester which developed into an important industrial centre. Incorporated in 1823 but in existence before that date, it was to be part of wider textile district.[17] Cotton mills were built on the Hockanum river but it was as the location for what became the country's largest silk mill, established by Frank Cheney and his brothers, that it is studied by economic and textile historians. Manchester (Ontario County) in New York provides a further example of aspirational naming. The community had been called Burt but was officially named Manchester in 1822,[18] developing as a transport centre due to its proximity to the Erie Canal and later its railway connexions, but is best remembered in American history as the place where Joseph Smith 'discovered' the gold plates (Book of Mormon) that led to the founding of the Church of the Latter Day Saints. But this pattern of place-name transference has its variations. In the case of Manchester (Washtenaw County) in Maine, it

appears that the name was taken not directly from Manchester in Lancashire but from Manchester in New York state, the developer John Gilbert having worked (as did his father) on the Erie Canal.[19]

As new lands were opened for development further communities were to take their name from Manchester in Lancashire, their promoters not having any direct connection with the town but aware that it represented a place-name with positive associations. Manchester (Coffee County) in Tennessee is a further example of an existing town taking the name of Manchester, once again signalling its aim to become a successful commercial and manufacturing centre,[20] whilst Manchester (St Louis County) in Missouri was said to have been named after Manchester in England by a settler, its original name being Hoardstown.[21] Indiana was to have two Manchesters, both of which are presumed to have been named after Manchester in Lancashire: North Manchester in Wabash County being given the prefix to distinguish it from the Manchester in Dearborn County, the latter having been established in the early 1820s.[22] Adopting the Manchester name continued after the Civil War, Manchester (Ocean County) in New Jersey being named Manchester by the landowner and developer William Torrey, once again in the expectation that it would attract attention to and promote development in the new community.[23]

For the majority of those communities that took the place-name of Manchester their intention of becoming boomtowns was never realised. Some put down shallow urban roots and were to disappear from maps in the twentieth century. Manchester (Mendocino County) in California was an example of a new community which struggled to attract settlers. Others saw their identity diminished if not entirely lost by being absorbed into larger neighbouring communities. Manchester (Clark County) in Arkansas had been established as a township in 1838. Located in one of the new cotton growing states its fortunes were shaped in part by the demand for raw cotton from Lancashire, tempting the thought that the cotton carded and spun in the mills of Ancoats might have been planted and picked on slave plantations in Manchester, Arkansas. In the twentieth century this Manchester struggled to respond to the industry's problems, eventually becoming part of the Caddo township. This loss of identity was also evident in an earlier Manchester, that in Virginia. It became an incorporated town in 1769 having been originally a military garrison, its favourable location on the James river resulting in it becoming an important slave port. It was however to be overshadowed by Richmond, located directly opposite on the north bank of the river, and was to become part of the state capital in 1910, the area subsequently being identified as South Richmond.[24]

But if no Victorian Mancunian was in any doubt which of the world's three great cotton exchanges – Manchester, Liverpool and New York – was the most important, there appears to have been little interest shown in these multiple acts of nominal flattery. Political and business leaders in Manchester appeared indifferent to establishing formal links with these daughter towns in the United States. When in 1931 George Titt, Lord Mayor of Manchester on a trip to promote the city's businesses in America visited both the silk town of Manchester in

Connecticut and the cotton town of Manchester in New Hampshire the opportunity to establish more permanent links was not taken up.[25] This contrasted with the links developed between Manchester and France after the first world war which included its adoption of the war-damaged town of Mézières in the Ardennes and its active participation in the United Association of Great Britain and France, forerunners of the better known town twinning movement after the second world war.[26] It is still possible to spend an enjoyable afternoon identifying the Quartier Manchester in Mézières (now Charleville-Mézières).[27]

Further research is required into the particularities of these American place-names but what is clear is that the transplantation of Manchester as a place-name was undertaken because of its positive associations with industry and commerce. Whilst some Manchesters followed the pattern of other American towns in being named for personal family reasons, it is clear that landowners and developers laying out a new town were keen to use its name to signal their resourcefulness and ambition. Given Manchester's prominence in the first half of the nineteenth century it was an obvious choice to make. The process slowed down after the civil war and in the twentieth century no new communities were to be named Manchester, though it is noteworthy that in one instance one Manchester did change its name. This was Manchester in Massachusetts, America's first Manchester. Here pressure from its inhabitants resulted in it legally adopting what had been its informal name of Manchester-by-the-Sea, largely on the grounds that the town was confused with Manchester in New Hampshire and other Manchesters in New England. This change in name was approved by the Board on Geographic Names in 1990, its new name being given wider currency in the award-winning film of 2016 which took for its title the town's (unhyphenated) name.

Australia

Manchester as a place-name can be found in other English colonies (Canada, Jamaica) apart from America but it was not a linguistic marker in all of them. Early twentieth-century maps of Australia and gazetteers reveal familiar topynmical patterns, communities being named for sentimental reasons after their native towns: York, one of the first inland settlements in Western Australia, took its name from settlers from the city in Yorkshire, whilst Stockport in South Australia was named by Samuel Stocks jnr, a member of a prominent Stockport family. Officials and administrators were also to be paid the compliment of having places named after them: Liverpool in New South Wales and Gladstone in Queensland being named after politicians who served as colonial secretaries. This resulted, as it did in the United States, in the eradication of native place-names.[28] But, whereas one could organise a road trip across North America visiting places that were or are still named Manchester, this is not the case in Australia. Even in Queensland where attempts in the nineteenth century to provide alternative supplies of raw cotton were largely unsuccessful - including Lancashire cotton operatives emigrating to the new colony during the cotton famine - the most conspicuous of Lancashire place-names is not to be found.[29]

Yet this absence from the country's maps did not mean that the name of Manchester was unknown, let alone unspoken, in the new colony. During the nineteenth century Manchester became for Australians a synonym for cotton goods, in particular sheets and pillowcases; an early instance of place recognition that has become the holy grail of current city promoters.[30] This usage was in decline by the end of the twentieth century but even recently it was possible to find a Manchester department in retail stores in Melbourne (David Jones) and Brisbane (Myer).[31]

Figure 1: Portion of the eastern facade of the Manchester Unity Building, Melbourne. (Stephen Bain, Wikimedia Commons)

More significant than this linguistic marker on Australian culture however was the impact made by the Manchester Unity of Oddfellows which established itself as one of the country's major friendly societies. Belonging to 'the Manchester'

became a part of the lives of thousands of settlers, which in addition to providing the social insurance benefits of a friendly society, came to play an important role in the social life of communities.[32] It organised dinners, dances, excursions and other activities that helped make up the warp and weft of a predominantly respectable recreation in both small and large communities. With one notable exception these activities have remained little more than a footnote in historical accounts. This was the attack by Turkish camel drivers on the Manchester Unity's New Year's Day picnic in Broken Hill (Victoria) in 1915, an incident which has become part of the national historical narrative as it was the only occasion when civilians were killed on Australian soil during the first world war.[33]

As its membership increased, the Manchester Unity opened purpose-built halls which were to become along with churches, chapels and town halls among the most prominent of community buildings. Its public presence continued to increase into the twentieth century, the Manchester Unity erecting architecturally impressive offices on prestigious streets in towns that were becoming cities. In Sydney this took the form of an 11-storey office building (completed 1925) on Elizabeth Street facing Hyde Park, whilst in Melbourne the Manchester Unity's art deco skyscraper (opened 1932) was located on the corner of Collins Street and Swanston Street, directly opposite the town hall. These remain among the signature buildings of these cities, unlike the Manchester Unity offices in Grosvenor Street in Manchester (John B. Thornley, 1915), whose origins and subsequent history has been largely forgotten.[34]

Free Trade

Manchester was the cynosure city of the industrial revolution, its factories and warehouses as much the symbols of the new society as the castles and cathedrals of an earlier age. Its name was spread by commerce, to be followed by the economic ideas that were themselves an expression of that commerce. By the second half of the nineteenth century Manchester's public image underwent further change when following the success of the Anti-Corn Law League, the powerful economic doctrine of free trade became woven into the identity of the city, strengthening its claim to be a city of ideas and influence. Manchester's Free Trade Hall – a splendid new hall was opened in 1856 – became, alongside its warehouses and mills, one of the most cherished symbols of the city. But whilst Manchester took pride in its associations with free trade it was not a doctrine without its critics. In Germany the policies of free trade and non-intervention into foreign affairs espoused by what was referred to as the Manchesterpartei or Manchester-schule were to be widely rejected because they appeared, above all, to benefit Britain.[35] Here Manchester's name had negative rather than positive connotations. Continental visitors to Manchester could see statues raised to Cobden and Bright but there were to be none in Germany. Reading in their Baedekers visitors to Manchester were informed that although Manchestertum was a leading economic philosophy in Europe, for many it 'was used as a term of reproach for those who prefer peace and material welfare to the honour of their country'.[36]

These negative connotations did not stop the name of Manchester being taken up in other industrialising countries. This is evident in it becoming a point of comparison, hence the readiness of other industrialising towns to refer to themselves as the Manchesters of their own country or region. In the United States it was to be Lowell in Massachusetts, not Blodget's Manchester higher up the Merrimack, that became the country's most prominent cotton manufacturing centre; a town which according to the cotton mill manager James Montgomery 'may justly be denominated the Manchester of America, as regards the amount of capital invested for manufacturing purposes, the extent of the business, and the spirited manner in which it is conducted'.[37] Other towns that wrapped themselves in the mantle of being the Manchester of their own country were to include Chemnitz whose rapid take up of cotton manufacturing led to it being named the Saxon Manchester[38], whilst Tampere, whose cotton industry was founded by the Scottish businessman James Finlayson, became Finland's largest industrial town, earning it the title of the 'Manchester of Finland', a soubriquet which was to survive the closing of its mills in its nickname Manse.[39] Later in the century the cotton industry's leading part in the industrialisation of the Catalan region was to see Barcelona spoken of as the 'Manchester of Spain'.[40] Other examples were Ivanovo in Russia, Lodz in Poland and Osaka – the 'Manchester of the East' – in Japan. This embedding of Manchester into the public geographies of other nations was more than journalistic shorthand, it reflected and reinforced Manchester's status in the world economy, making it one of the few places in Britain, excluding London, which was immediately recognisable to foreigners. Place-name transference is only a minor aspect in examining and explaining the alchemy of transformation which established Manchester's status as an international city in the nineteenth century, but it ought not to be neglected. In assessing the importance and impact of Manchester in the nineteenth-century global economy the evidence impressed on the maps of the United States or in English and foreign gazetteers and dictionaries should not be overlooked. Just as place-names help in unravelling the impact of the Romans and Scandinavians on the history of early communities in Lancashire, more attention ought to be given by historians and social scientists to the transplantation of place-names in the nineteenth century.

NOTES

I am most grateful to Alan Kidd for his comments on a draft of this essay, and to the assistance provided by the reference librarians at New York Public Library and Melbourne Public Library for identifying sources about other Manchesters.

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23 Dewey, W. S., *Early Manchester and William Torrey* (Manchester Publishing Company, 1981) [WT had lived there since 1841, incorporated as township in 1865 [Hutchinson, V.L.], *Origin of New Jersey Place names* (1945) p. 19. Pauline S. Miller, *From Ocean County, Four Centuries in the Making* (Ocean County Cultural & Heritage Commission, 2000).

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25 In 1927 Manchester Connecticut presented a centennial history of their town – Mathias Spiess, *History of Manchester, Connecticut* (1924) – to Manchester. The volume is kept in the rare book collection at Manchester Central Library (BR974.6S1).

26 A reminder that earlier forms of the town twinning movement can be found in different countries long before 1945.

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32 Daniel Weinbren, *The Oddfellows 1810–2010. 200 years of making friends and helping people* (Carnegie Publishing, 2010).

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35 Detlev Mares: 'Not Entirely a Manchester Man': Richard Cobden and the Construction of Manchesterism in nineteenth-century German economic thinking' in Anthony Howe and Simon Morgan, eds., R*ethinking Nineteenth-Century Liberalism. Richard Cobden Bicentenary Essays* (Aldershot, 2006).

36 Baedeker, K., *Great Britain. Handbook for travellers* (Leipzig, 1897) p. 340.

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Terry Wyke is honorary research fellow at Manchester Metropolitan University. He has written on different aspects of the history of the Manchester region including the book trade, cholera, cotton industry, Peterloo, public sculpture and transport. His most recent publications include Manchester. Mapping the City *(Birlinn, 2018) with Brian Robson and Martin Dodge;* Spindleopolis in War and Peace (Gallery Oldham, 2018) *with Alan Fowler*

Annals of Manchester, 2017

The idea of publishing an annual record of events in the Greater Manchester area along the lines of the much-consulted Annals of Manchester, compiled by William Edward Armytage Axon, was one of the final projects initiated by Professor Donald Cardwell before his death in 1998. That the publication of such a record will be of interest not only to present readers but future historians and researchers can hardly be questioned. Readers should note that Axon's Annals, covering the years to 1885, is now available on the internet. It is also fully searchable, yielding far more references than can be identified using the printed index, which is heavily weighted towards the names of individuals. This will further increase the usefulness of this most valuable local reference work. As in previous years, corrections and amendments to this year's entries should be sent to Terry Wyke, Manchester Metropolitan University, Department of History, Politics and Philosophy, Geoffrey Manton Building, Rosamond Street West, off Oxford Road, Manchester M15 6LL (t.wyke@mmu.ac.uk). Entries for inclusion in the Annals for 2018 should be sent to the same address.
The entries below cover the period from the beginning of January to the end of December 2017

Sunday 1 January Soprano Ailish Tynan performed at the New Year Viennese Gala in the Bridgewater Hall.

Thursday 12 January Planning approval granted for Factory, a new cultural venue designed by Office for Metropolitan Architecture (OMA), on the former site of Granada TV studios.

Monday 16 January Two people seriously injured following gas explosion which destroyed an end-of-terrace house in Cecil Road, Blackley.

Thursday 19 January Manchester United appointed a full-time counter-terrorism officer following a number of incidents at Old Trafford.

Manchester group campaigning to allow the terminally ill to die with dignity held inaugural meeting at the Friends' Meeting House in Mount street.

Monday 23 January Betty Tebbs, trade unionist and peace activist, died, aged 98. She was born in Bury in 1918 and began working in a local paper mill when 14. She campaigned tirelessly for women's rights and was prominent supporter of the women's peace movement. Her autobiography, *A Time to Remember*, was published in 1997.

Spire Hospital opened on Barlow Moor Road, West Didsbury.

Wednesday 25 January Work on renovating fountains in Piccadilly Gardens completed.

Thursday 26 January Portrait bust of anti-gang violence campaigner Erinma Bell installed in Manchester town hall. The bust, sculpted by Karen Lyons, was made from melted down guns retrieved by Greater Manchester Police.

Friday 27 January Pupils from Manchester schools attended screening of films at Home cinema to mark Holocaust Memorial Day.

Saturday 28 January Nursery manager Chrissy Kendall found dead at her home in Kinver road, Moston. James Neary was arrested and subsequently jailed for life for her murder.

Sunday 29 January A prisoner at Forest Bank prison, Pendlebury died from overdose of the drug spice. Official reports have shown that the synthetic drug is widely available in the prison and the cause of violence among inmates.

Tuesday 7 February The Greater Manchester Sustainable Engineering University Technical College in Oldham was to close at end of academic year due to low student numbers and poor academic results. The £9 million flagship school opened in 2014.

Wednesday 8 February Books by Rachel Renee Russell, David Walliams and Jeff Kinney were among the most borrowed titles from Manchester public libraries in 2016.

Friday 10 February Body of Ian Nally found in Bridgewater Canal, near Trafford Wharf Road. He had been reported missing in early January.

Tuesday 14 February Manchester-based Co-operative Bank put up for sale.

Wednesday 15 February Thieves stole £195,000 from Halifax bank in Sale.

Thursday 23 February Bernard Pennington, Labour Party councillor and mayor of Salford (1999-2000), died, aged 85.

Friday 24 February ITV announced plans to move a number of its London studios to Salford Quays.

Saturday 25 February Centenary of birth of the writer and musician Anthony Burgess celebrated in Manchester. Burgess was born in Harpurhey.

Sunday 26 February Sir Gerald Kaufman, politician, died, aged 86. He was born in 1930 in Leeds into a Polish Jewish family. Worked as journalist, including *New Statesman* and *Daily Mirror*, and then as Parliamentary Labour Party press officer. He was elected an MP for Manchester Ardwick in 1970 and after 1983 for Manchester Gorton. He held junior ministerial posts in the 1970s and shadow portfolios in the 1980s and early 1990s. At the time of his death he was Father of the House. A member of the Jewish Labour Movement he was a fierce critic of Israel. He was a keen student of cinema and his published works included *My Life in the Silver Screen* (1985).

Metrolink Second City crossing officially opened.

Monday 27 February Manchester was recognised as one of the best international student cities in a survey conducted by higher education analysts Quacquarelli Symonds.

Thursday 2 March Bishop of Manchester conducted ceremony re-dedicating St Peter's Cross which marks the site of St Peter's Church. The cross, installed in 1908, had been removed during the redesign of the square which included constructing a new Metrolink line and tram stop. Archaeologists were able to investigate the crypt of the demolished church.

Free books for adults and children were available on Metrolink trams as part of celebrations marking World Book Day.

Saturday 4 March Six maquettes of proposed statue of Emmeline Pankhurst displayed at Home and Manchester Town Hall. The public were asked to vote for their favourite before a panel took the final decision. The winning design was by Hazel Reeves, which showed Mrs Pankhurst standing on a chair. It is planned to unveil it in St Peter's Square on International Women's Day in 2019.

Wednesday 8 March City Council agreed to undertake major restoration of Manchester Town Hall. Plans to use part of the building as a 65-bed boutique hotel were dropped. The building will be closed to the public from 2018-2024. A budget of £328 million was allocated to the project.

International Women's Day celebrated in Manchester. Events included 'Our Manchester Women'.

Friday 10 March Stuart Horner, a prisoner serving life for murder, was jailed for nine years for causing extensive damage to E Wing of Strangeways prison in September 2015.

BBC cancelled tours of MediaCity studios at Salford Quays following a serious security breach in London.

Monday 13 March Greater Manchester Police began operation to arrest dealers and users of the drug spice in the city-centre. This was the largest anti-drug operation in Piccadilly Gardens since 2013.

Saturday 18 March Belle Vue Aces defeated Swindon at the new National Speedway Stadium, Gorton in the inaugural meeting of Speedway Great Britain Premiership League.

Friday 31 March Sir Howard Bernstein, age 64, retired as Chief Executive of Manchester. His successor is Joanne Roney.

Monday 3 April Sir Howard Bernstein appointed Honorary Professor of Politics at University of Manchester.

Tuesday 4 April Manchester sent condolences to St Petersburg following a terrorist attack in its Metro. Manchester and St Petersburg have had a formal friendship agreement since 1962.

Wednesday 5 April Exhibition of the ten shortlisted designs for National Holocaust Memorial displayed at Manchester Town Hall.

Co-operative Education Conference held in Manchester.

Thursday 6 April Metrolink marked 25 years of operation in Greater Manchester.

Friday 7 April Manchester Metropolitan University was ranked among the best Young Universities in the world by the *Times Higher Education* (THE).

Monday 10 April Book of condolence opened in Manchester Town Hall for people to express their sympathy and support for people in Stockholm following a terrorist attack which killed five people and injured many others. The Town Hall was also lit in the colours of the Swedish flag.

Wednesday 12 April Local Government Boundary Commission published its final recommendations on new ward boundaries for Manchester City Council. Manchester is to retain existing 32 wards with three councillors per ward. Changes to boundaries included Piccadilly Gardens becoming part of the Piccadilly rather than the Deansgate ward.

Monday 24 April Public Space Protection Order introduced which restricted public access at night-time on the Undercroft section of the Rochdale Canal between Dale Street and Minshull Street. Gates and CCTV were installed on a section of the canal which has recorded a high number of drownings and muggings.

Friday 27 April Serious fire at Paterson Building, University of Manchester.

Saturday 28 April Piccadilly Gardens re-opened to the public following major refurbishment programme.

Metrolink services disrupted when a vehicle collided with tram near Shadowmoss tram stop, Wythenshawe

Thursday 4 May In the first Greater Manchester mayoral election Andy Burnham, former Labour Cabinet minister, was elected on the first ballot, winning a majority in each of the ten districts: Andy Burnham (Labour) 359,352 (63.4 per cent); Sean Anstee (Conservative) 128,752 (22.7 per cent); Jane Brophy (Liberal Democrat) 34,334 (6.1 per cent); Will Patterson (Green Party) 13,424 (2.8 per cent); Stephen Morris (English Democrat) 11,115 (2.0 per cent); Shneur Odze (UKIP) 10,583 (1.9 per cent); Mohammad Aslam (Independent) 5,815 (1.0 per cent); Marcus Farmer 3,360 (0.6 per cent). The turnout was 28.9 per cent.

Tuesday 9 May Jeremy Corbyn launched the Labour Party's general election campaign in Stretford, unveiling the party's battle bus.

Metrolink tram driver injured by rock thrown through windscreen at Derker on Rochdale-Manchester line.

Sunday 14 May Swimmers took advantage of the opening of one of the pools at the Edwardian Victoria Baths which had been closed since 1993.

Monday 15 May Ian Brady died in Ashworth Psychiatric Hospital. He was jailed for life in 1966 for his part in the infamous moors murders. Brady came to Manchester to live with his mother in 1955, having previously lived in Glasgow.

Wednesday 17 May Eddy Newman sworn in as Lord Mayor of Manchester. He was first elected to the council in 1979, representing Blackley, and then Woodhouse Park. He served as MEP for Greater Manchester Central from 1984 to 1999. He was also deputy mayor in 2016.

Monday 22 May Salman Ramadan Abedi carried out a suicide bomb attack on concertgoers leaving the Manchester Arena (Victoria Station), killing 22 innocent people and wounding over 130. Many of the victims were young people who had been attending the sold-out pop concert by Ariana Grande. The youngest victim was Saffie Roussos, aged 8. Greater Manchester Fire and Rescue Service was later heavily criticised for not reacting more promptly to the attack.

Tuesday 23 May Long queues formed outside the blood donor centre in Brown Street in response to calls for blood following bomb attack at the Manchester Arena. People began leaving floral tributes in St Ann's Square in memory of the victims of the attack. A vigil held in Albert Square at which Tony Walsh (Longfella) read his poem 'This Is the Place'.

Wednesday 24 May Manchester United defeated Ajax 2-0 in the UEFA Europa League cup final in Solna, Sweden. Both teams wore black armbands.

Thursday 25 May Civic leaders and the public observed a minute's silence in St Ann's Square at 11.00 am, part of a nationwide silence to remember the victims of the Manchester Arena attack.

Friday 26 May The We Love Manchester Emergency Fund began receiving donations to help the injured and the families of those killed in the Arena terrorist attack. The fund was to receive over £20 million in donations. Manchester City and Manchester United football clubs gave £1 million each to the emergency charity.

Sunday 28 May Over 40,000 runners took part in the Greater Manchester Run. It was decided not to cancel the event which began with a minute's silence for the victims of the Arena bombing.

Marcus Intalex, Manchester drum and bass artist, died, aged 45.

Thursday 1 June Roy Barraclough, actor, died, aged 81. He was best known for playing the landlord of the Rovers Return in the Granada tv soap opera, *Coronation Street*. He was awarded an MBE for services to drama and charity in 2006.

Sunday 4 June Ariana Grande was among artists performing at the One Love Manchester benefit concert for victims of the Manchester Arena bomb attack at Old Trafford cricket ground. The televised concert raised £10 million.

Thursday 8 June General election held. The Conservative Party remain in government but with no overall majority. The Labour Party won all three Manchester constituencies: Manchester Central: Lucy Powell (Labour Coop) held seat, majority 31,445 (turnout 63.2 per cent); Wythenshawe and Sale East: Mike Kane

(Labour) held seat, majority 14,944 (turnout 60.0 per cent); Manchester Gorton: Afzhal Khan (Labour) elected, majority 31,730 (turnout 61 per cent). A by-election was due in Gorton constituency following the death of Sir Gerald Kaufman in February. In Salford and Eccles constituency: Rebecca Long-Bailey (Labour) held seat, majority 19,132 (turnout 60.8 per cent); Worsley and Eccles South: Barbara Keeley (Labour) held seat, majority 8,379 (turnout 61.9 per cent).

Wednesday 14 June Concerns raised over possible loss of 300 call centre jobs in Didsbury after British Airways confirmed it had entered talks with an outsourcing company.

Friday 16 June Ken Shuttleworth's architectural practice Make resigned from a controversial Manchester skyscraper scheme in city centre. Public concerns over the scheme focused on the height of the proposed tower blocks and demolition of the Manchester Reform Synagogue, Bootle Street Police Station and the Sir Ralph Abercrombie pub.

Sunday 18 June Thousands of people lined street to see Manchester Day parade celebrated in city. The parade included a tribute to those who had died in the Manchester Arena bomb.

Monday 26 June Four residential high-rise buildings in Manchester failed fire cladding safety tests undertaken after the Grenfell Tower disaster.

Thursday 29 June The sixth Manchester International Festival opened. Highlights included a new play about the Lancashire cotton famine starring Jane Horrocks.

Monday 3 July Central Manchester NHS Foundation Trust (CMFT) announced end of surgery for adult congenital heart patients at Manchester Royal Infirmary following NHS review of heart services.

Tuesday 4 July Concert at Bridgewater Hall featuring music and writings of Anthony Burgess to mark the centenary of his birth. Works performed included premiere of his Symphony in C.

Wednesday 5 July Thousands of passengers delayed following major security alert in Terminal 3, Manchester Airport.

Thursday 6 July Mobike bicycle rental scheme launched in Manchester and Salford. The scheme soon experienced problems due to bikes being stolen and vandalised.

Friday 7 July Greater Manchester Schools awards ceremony held at Hilton hotel, Deansgate.

Saturday 8 July Ceremony to mark beginning of building of the Factory Manchester cultural project. The new venue, partly funded by the National Lottery, is designed by Rem Koolhaas's Office for Metropolitan Architecture (OMA).

Monday 10 July Manchester City Council and National Literary Trust display BookBench sculptures at libraries across the city as part of the Read Manchester campaign.

Sunday 16 July Arson attack on the Nasfat Islamic Centre in Newton Heath. The mosque used by members of the Nigerian community has been attacked on two previous occasions. Anti-Islamic incidents have increased in Manchester since the Arena bombing.

Monday 17 July Government announced changes to route of HS2 rail line, moving it away from housing and a school in West Gorton to Ardwick.

We Love Manchester Emergency Fund appointed William Docherty as its chief operating officer. The emergency charity has raised £12 million so far to help bereaved families and those injured in the Arena bomb attack.

Tuesday 18 July Plans announced to redesign Piccadilly Gardens, including removal of Tadao Ando's concrete wall.

Keep Britain Tidy awarded green flags to Heaton Park praising its environmental standards.

Thursday 20 July Service held in Manchester Cathedral to mark the anniversary on that day in 1916 when soldiers from the Manchester Public Schools Battalion, 20th Royal Fusiliers fought in battle of Somme.

Friday 21 July Prayer vigil held in Brookdale Park, Newton Heath near Nasfat Islamic Centre following arson attack.

Monday 24 July Chris Grayling, Transport minister, visited Manchester Airport to see work on the construction of its super terminal.

Thursday 27 July Re-design of the exterior, theatre and orchestra pit of proposed Factory arts centre announced when elements of Rem Koolhaas's original design were found to be unsuitable.

Friday 28 July Chris Boardman, Olympic gold medal winner, appointed cycling and walking commissioner for Greater Manchester.

Mind the Gap photography exhibition at Salford Central Station emphasised the inequalities in wealth and opportunities the city.

Opening of 22nd Manchester Jazz Festival.

Sunday 30 July Death of Tashan Stevens, 27, from Northern Moor. He was stabbed several times during a large-scale disturbance outside Mambo's night club on Dantzic Street, and then fell into Irwell.

Tuesday 8 August Eleven members of gang convicted and sentenced for killing a rival gang member, Abdulwahab Hafidah, in May 2016 in Moss Side

Wednesday 9 August Sait Mboob, aged 18, was stabbed to death in a gang-related brawl in Crosshill Street, Moss Side. Police suspected members of Ardwick 7M gang.

Friday 18 August Lord Mayor of Manchester, Eddy Newman, wrote to mayor of Barcelona expressing sorrow and solidarity following terrorist attack in Las Ramblas which killed 13 people.

Jeremy Taylor was jailed for four years and six months for setting fire to Wythenshawe Hall in March 2016.

Saturday 12 August Manchester Caribbean carnival weekend began with J'Ouvert carnival parade through streets of Moss Side.

Wednesday 23 August Nadeem Muhammad found guilty and sentenced to 18 years imprisonment for trying to smuggle an 'explosive device' on to a plane at Manchester Airport in January.

Friday 25 August Letters and correspondence from Alan Turing discovered at the University of Manchester by Professor Jim Miles. They were catalogued and placed in John Rylands Library.

Manchester Pride weekend featuring Melanie C, Gok Wan and Louisa Johnson.

Sunday 27 August 23-month old boy found dead in house in Beaford Road, Wythenshawe. His mother, Monica Lesicka was later arrested and charged with murder.

Monday 4 September Paul Longshaw, councillor for Langworthy, Salford, died, aged 49.

Prince Harry attended the Walking with the Wounded charity for ex-servicemen and the Manchester City football club to see its community work during an official visit to the city.

Friday 8 September Greater Manchester's fire chief Peter O'Reilly announced he would retire in February. The fire brigade's response to the Manchester Arena bomb is part of an independent inquiry conducted by Lord Kerslake.

Saturday 9 September Manchester Arena reopened with a benefit concert featuring Noel Gallagher and other artists. A committee, chaired by Malcolm Press, vice-chancellor of Manchester Metropolitan University, set up to discuss a permanent memorial to the victims of the bombing.

The Bridgewater Hall held a weekend of concerts and talks to mark its 21st birthday.

Monday 18 September People's History Museum succeeded in raising funds to acquire a rare Manchester suffragette banner.

Official figures indicated an increase in homophobic and transphobic bullying incidents in Manchester high schools.

Friday 22 September Salford Red Devils not to change its name to include Manchester following protests from fans. Salford RLFC was founded in 1879.

Monday 25 September Liz Dawn, actress who played Vera Duckworth in TV soap opera *Coronation Street*, died, aged 77. She was awarded MBE for her work for Manchester Children's Hospital.

Manchester Evening News launched #WE STAND TOGETHER campaign to encourage a more peaceful and caring city.

Margaret Ward of Charlestown was fined £614 for ignoring warnings to microchip her bulldog.

Thursday 28 September National Poetry Day celebrated in Manchester. Children and adults were challenged to 'drop everything and read' for ten minutes.

Friday 29 September Independent report was highly critical of conditions in Strangeways prison describing them as 'reminiscent of Dickensian England'. The prison which has over 1100 prisoners (including Category A) was considered not fit for purpose.

Saturday 30 September Jason Ross stabbed and killed in brawl outside the Suburbia night club, John Dalton street. Dorian Graham was arrested, charged and later sentenced to life imprisonment for the crime.

'Hulme - The Documentary', a community-based film recording changes in Hulme since the 1960s, was premiered at the Whitworth Art Gallery.

Sunday 1 October Thousands of anti-austerity and anti-Brexit protestors marched through city centre ahead of the opening of Conservative Party annual conference at Manchester Conference Centre. The prime minster Theresa May's speech on Wednesday was marked by her having a coughing fit, letters falling off the set, and a security breach when a man approached the stage.

Manchester University NHS Foundation Trust covering Manchester and Trafford launched.

Thursday 12 October Jodrell Bank Observatory put forward as the UK's nomination for UNESCO World Heritage Site status.

Friday 13 October Seventeen tower blocks in Salford, including City West, to be fitted with sprinkler systems following the Grenfell Tower fire.

Monday 16 October The drug spice continued to cause problems in Manchester city centre generating much negative publicity in the media.

Thursday 19 October Opening of Manchester Science Festival at Museum of Science and Industry.

Two buildings in new development in Radium street, Ancoats named in honour of the Manchester suffragists and campaigners for women's rights, Eva Gore-Booth and Esther Roper

Monday 23 October Ancoats Dispensary Trust's plans to restore and transform the late Victorian hospital were thwarted when the Heritage Lottery Fund turned down the Trust's bid for funds.

Tuesday 24 October Serious fire at Wing Fat, Chinese cash and carry store, Beswick led to evacuation of people living in surrounding houses.

Saturday 28 October Monton Unitarian church was first church in Salford to hold a same-sex wedding.

Wednesday 1 November Manchester named a UNESCO City of Literature. The bid was made on the basis of its writers including Elizabeth Gaskell and Anthony Burgess, and its founding of one of the world's first public lending libraries.

Saturday 4 November Festive season began with switching on of Christmas lights in Albert Square.

Wednesday 8 November Kelloggs appealed for memorabilia relating to its head-quarters on Warwick Road ahead of its move to Salford Quays.

New food bank opened at Connect Church, Wellington Road in Salford. There are four food banks in Salford and Eccles, and plans to open a fifth in 2018.

Thursday 9 November Howard Balkind, Labour councillor for Swinton South was de-selected from his seat by what he claimed was a pro-Corbyn faction in the local party.

Thursday 16 November The artist Harold Riley celebrated being given the Freedom of the City of Salford by driving a flock of Derbyshire sheep along The Crescent.

Bruntwood began construction on the Circle Square towers on Oxford Road.

Saturday 18 November Shots were fired by two balaclava-clad men who entered the 'B' Hive pub on Holland street, Pendleton.

Friday 24 November Peterloo mural by the Manchester artist Paul Fitzgerald was installed in Sir Ralph Abercromby pub, a short distance from the site of the 1819 massacre.

Tuesday 28 November Bailiffs cleared squatters' camp in former adventure park in Jackson Crescent, Hulme.

Tuesday 5 December Report into the Manchester Arena bomb by David Anderson QC suggested Salman Abedi might have been detained had security services acted differently.

Wednesday 6 December Manchester Airport Group announced sale of Bournemouth Airport (which it bought in 2001) to Regional and City Airports.

Thursday 7 December Lord Mayor's annual Christmas carol concert in Town Hall.

Friday 8 December Nathan Dewhurst, 18, died at Manchester Piccadilly Station after climbing onto the top of a train and being electrocuted. Services were cancelled as power to the lines was turned off.

Monday 11 December Four children died following a petrol bomb attack on a house in Jackson Street, Walkden. Their mother, Michelle Pearson, was seriously injured in the fire. Zak Bolland and David Worrrall were arrested and subsequently jailed for life for the crime.

Tuesday 12 December Counterfeit goods worth an estimated £3 million seized by police from 11 shops in Strangeways.

Thursday 14 December Anton Farrell who murdered Karl Harrison in June in Bradley Avenue, Lower Kersal in a dispute over his former girlfriend was jailed for a minimum of 21 years.

Saturday 16 December Visitor numbers to Manchester Town Hall increased as people visited building before it closes in January 2018 for a major refurbishment. It is scheduled to reopen in 2024.

Thursday 21 December Ofsted inspectors reported that children services in Manchester were no longer considered to be inadequate.

Historic England was more favourable to the re-submitted plans for the redevelopment of area between Jackson's Row and Bootle Street. The original plan included the demolition of Bootle Street police station and the Sir Ralph Abercromby pub.

Friday 22 December Winter night shelter to help the city's rising number of rough sleepers opened in church in Miles Platting.

Damon Keegan, 25, sentenced to three years and four months for using drones to smuggle drugs and USB sticks into Strangeways prison (HMP Manchester).

Gorton South MP Afzal Khan reopened Levenshulme Library as a community arts and cultural space. The library was closed in February 2016.

Monday 25 December Tameside council leader Kieran Quinn died in hospital having suffered a heart attack. He was taken ill while delivering Christmas cards to his Droylsden constituents.

Saturday 30 December Serious fire in the Lighthouse, a 12-storey apartment block in Joiner Street, Northern Quarter. The fire began on the ninth floor.

The official number of rough sleepers recorded in Greater Manchester (268) continues to increase with the majority in Manchester (94) and Salford (49).

Sunday 31 December Thousands of people attended firework display in Albert Square to mark the beginning of the New Year.

BOOK REVIEW

William Fairbairn – The Experimental Engineer
by Richard Byrom*

This is a remarkable book that fills a most important gap in our knowledge of William Fairbairn (1789-1874), one of the most knowledgeable and progressive engineering practitioners of the 19th century. Richard Byrom has researched the history of the Fairbairn family, and its engineering works in Ancoats, for many years and is to be congratulated on a very comprehensive text, accompanied by several appendices. The book has the style of an academic thesis, being comprehensively referenced, and incorporating the statements and arguments of many previous authors.

The book describes the many engineering ventures that Fairbairn pursued from the structural work of many mill buildings, together with the design, construction and erection of bridges, water wheels, stationary engines, cranes, ships and marine engines. Of particular interest was his railway-related work, including the development and design of bridges, including tubular bridges, and the construction at the works of steam locomotives for railways around the world manufactured between 1838 and 1863.

From humble beginnings as a millwright apprentice in Northumberland, Fairbairn founded his manufacturing business with James Lillie at the age of 28. He developed the business that became a major engineering firm and employer and he became a well-respected member of scientific, engineering and Manchester communities. He went on to play leading parts in many scientific bodies including the Royal Society, Manchester Literary & Philosophical Society (for which he was President), Manchester Steam Users Association, British Association for the Advancement of Science, Institution of Civil Engineers and the Institute of Naval Architects. He wrote many papers and books, particularly on his experimentation with materials, boilers, tubular bridges and methods of construction.

The author has not ended his narrative about the Ancoats works at the time William stood down from its day to day management in 1854. He goes further to describe in depth the gradual demise of 'a great company' when the reins were passed to Fairbairn's second son, Thomas. With no particular interest in engineering, but with a great love of, and involvement in, the world of art, Thomas failed to take the decisions necessary to allow the firm to compete in a developing and competitive industry. Although first becoming a private limited company and subsequently a public limited company the firm's fortunes declined and, just months after William Fairbairn's death in 1874, it was wound up and the works closed.

The book concludes with detailed appendices of the mill buildings that Fairbairns were involved with, together with the water-wheels, stationary steam

engines, ships and marine engines, bridges and cranes, together with a useful summary of all the locomotives that were made at the Ancoats works. Further appendices provide a comprehensive listing of all Fairbairn's papers and talks that he gave during his long career, as well as a list of all his many reports. The author has achieved a truly comprehensive book about a great engineer, and the Railway & Canal Historical Society is to be congratulated on an excellent publication.

Michael R. Bailey

**448pp. 250mm x 178 mm Hardback with coloured dust jacket, and with monochrome and colour illustrations £40 ISBN 978-0-901461-64-3. Railway & Canal Historical Society, 4, Broadway, Lincoln, LN2 1SH nevmobirch@virginmedia.com*

Obituaries

ROSEMARY CAROLINE MARSH
24 February 1936 - 18 October 2018

Rosemary was born on 24th February 1936 in Newcastle, the only child of John and Dorothy Saunders. Dr Saunders was a physiologist at Newcastle University; Dorothy was a London University English graduate but does not seem to have worked after marriage. The family moved to Hexham when she was four where her home remained until she married. After local school she attended Church High School, Newcastle where she developed the interest in art which she followed up on the fine art and history of art degree course at Newcastle, then a college of Durham University. On this course she was pupil of Victor Pasmore, an influence which encouraged the study of 19th and 20th century subjects. She was proud of being a Geordie as was evident when we attended the BAFM meeting in October his year and visited some old haunts.

After graduation, she did a PGCE which led to a teaching in job in Birmingham where she met Roger Marsh, then working for GKN. They were married in Hexham Abbey in 1960. Soon after this Roger moved back to the UKAEA in the North West and they settled at 66, The Downs, Altrincham where they lived ever since. She taught for a time at Wilmslow High and some adult classes at the local FE. Their two sons, Henry and John were born and brought up here. They walked and Rosemary enjoyed swimming especially later when they took a regular annual break in Mallorca.

They had a good social life and took advantage of Manchester's music and theatre.

She naturally was drawn to the art world in Manchester, gravitating to the Whitworth Art Gallery where her obvious knowledge and abilities were quickly spotted by Pat Prestwich, a prominent and far-sighted founder member of the Friends of the Whitworth. Rosemary joined the working team at the Whitworth and and the Friends Committee becoming for several years, a very effective Chairman . Pat encouraged Rosemary to get involved with BAFM of which she, Pat, had been a founder member along with David Mawson. Here again her competence, clear thinking and ability to see the essentials were recognised and led to her being seen as an obvious representative for the UK at WWFM.

Rosemary travelled extensively for WWFM in Europe, Australia and North and South America. WWFM committees were sometimes a test of diplomatic skills: it could be difficult reconciling the attitudes and expectations of such a diverse group of people from S. Americans to Scandinavians but even when frustrated by their debates, Rosemary always managed to remain calm and rational with the result that anyone who ever worked with her held her in the highest esteem.

Roger's work took him away quite a lot, mainly to Europe but they also travelled together in Europe and to Japan, a country which particularly interested them, becoming members of the Japanese Gardens Society. They took great delight in their grand children, Henry and Adele's two girls and John and Heather's daughter and son, an interest which they extended to their nephews and niece and their children.

After Roger died in 2014, Rosemary re-involved herself with BAFM and WWFM, and took up her own art interests again going painting and drawing with friends. She was a member of two quite different book groups and the local film society and was well, active and busy.

She was enjoying an autumn break in the sun with a very good friend with whom she was always relaxed and cheerful when she died so suddenly leaving her large circle of relations and friends shocked, deeply saddened and with a large hole in their lives.

N.E.G. Tennant.
6 November 2018

REV DR RICHARD L. HILLS, MBE

1 September 1936 - 10 May 2019

Richard Hills, who joined the Lit&Phil in 1968 and was one of its Honorary Members, died following a long and brave fight against Parkinson's disease. This reflected the determination he had shown throughout his lifetime, not least in the lengthy process by which he introduced Manchester citizens to the new discipline of Industrial Archaeology and in the foundation and development of the city's much-acclaimed Museum of Science and Industry (MOSI), now a principal attraction.

Born in Lewisham, the son of a clergyman, it was at Charterhouse school that he had shown an extracurricular fascination for mechanical engineering in its many forms. He also became interested in climbing, encouraged by the Everest mountaineer, Wilfred Noyce, a master at the school. In 1957 after National Service he entered Queen's College, Cambridge to read Economic History, which introduced him to the industrial revolution of the 13th century, when water power was being harnessed and on a much larger scale, that of the 18th and 19th centuries when steam power became dominant. However, he had noticed that, although the creation and refinement of these sources of power had been well studied, their technological development had been only recently taught, it was this with its many adaptations throughout industry which had led to the huge growth in Britain's economy and contribution to civilisation. Virtually no museum existed to illustrate this industrial development - a deficiency which prompted Richard's arrival at UMIST in 1965.

His study at Cambridge had been delayed when he sustained a leg injury requiring lengthy treatment. Nevertheless, he eventually graduated and until

1965 taught in two schools (including Worcester College for the Blind). In 1964, Imperial College of Science and Technology, London conferred its Diploma of Membership on him for a thesis entitled Drainage of the Fens.

While at Cambridge, he had purchased a vintage 1924 Lancia Lambda which he would use for 50 years, preparing for the benefit of other owners a well-illustrated twenty-page manual of maintenance work he had carried out on the vehicle.

In 1963, Lord Bowden, the UMIST Principal, discussed with the Institute's Professor Cardwell the feasibility of establishing a museum of science and industry in Manchester to characterise the scientific, technical and industrial history particularly of the North West. Richard first met Cardwell in 1965 and their relationship resulted in the development of what initially became the North West Museum of Science and Technology in Grosvenor Street. Richard accepted the offer to become the Museum's first Director having control over the acquisition of exhibits and collections and also heading a small staff, including retired millwright and draftsman Frank Wightman who was capable of dismantling for storage those exhibits too large to display. A comprehensive collection was placed on display in Oddfellows Hall in Grosvenor Street, including some working mechanical exhibits and process demonstrations (particularly for the textile industry). By the time the collection was transferred to Liverpool Road over half a million people had visited. Shortly after the Museum opened, he founded the (still extant) Manchester Regional Industrial Archaeology Society making available lectures and site visits to members of the public. With Chethams Library in Long Millgate he also inaugurated deposits of archaeological reports (now exceeding 150 in number) prepared by MRIAS members and outside researchers, accessible to members of the public. He had also acquired a major interest in the history of papermaking and agreed in 1968 to give the artefacts of the National Paper Museum a permanent home in Grosvenor Street.

In 1978, Greater Manchester Council (GMG), acquired the large and iconic site of the 1829 Liverpool Road Station on which the Museum of Science and Technology would be established. The design of the Power Hall containing large exhibits such as former mill steam engines built in the North West was an important contribution Richard made. However, probably his greatest single triumph was his location, purchase and shipment from South Africa to Manchester (its place of manufacture) of one of the few Beyer-Garratt GL Class locomotives, the most powerful built in Britain, comprising three coupled units, in total weighing 160 tons and now a principal exhibit at MOSI.

After the move, the GMC formed its own trust to run Liverpool Road as a new museum. It was proposed that Richard should become Curator-Designate whilst a new Director - in the event a person with little knowledge of the history of science and technology - would be appointed. Such a position held no appeal for Richard and after the efforts expended in establishing the museum, there was regret at his decision to retire.

Although having had little time for outside interests, Christianity had always played a part in his life and he was ordained at Manchester Cathedral during

1987. In addition to serving as a curate in various parishes and at his local parish church in Mottram-in-Longdendale, he became Secretary of Ordained Scientists, seeking to explore Science and Technology in religion and the effects of the Industrial Revolution.

A significant change in his life occurred during 2008 after he had been diagnosed with prostate cancer, when he married Bernice, one of the members of the local congregation. A very happy marriage ended when Bernice died from cancer in 2016. He filled the void in his life by writing his autobiography, *The Seven Ages of One Man*, detailing how remarkably wide-ranging and successful his life had been.

He published some 15 major works, including *Development of Power in the Textile Industry from 1700-1930*, *Paper-Making in Britain 1488-1988*, a three-volume biography of James Watt and over 190 articles on widespread subjects, relating to industrial history. A noteworthy paper 'Feasibility Study for a Textile Museum at Quarry Bank, Styal' for the National Trust in 1969, resulted in the preservation of the mill's working state.

Recognition of his achievements included Honorary Membership of both the British and International Associations of Paper Historians; Manchester University's Medal of Honour and an MBE for services to Industrial Heritage.

Quiet and precise, respecting of others as well as himself, modest yet with widespread interests, it seemed very appropriate that early in 2019 arrangements were made for Richard to visit MOSI during the visit of George Stephenson's original locomotive 'Rocket'.

David J Higginson, August 2019

Members will be saddened to learn of the deaths of the members listed below during the period 1 July 2017 to 30 June 2018

Bob Richards (d. October 2017)
Michael Hartley (d. December 2017)
Barbara Barnes (d. February 2018)
Derek Caldwell (d. February 2018)
Jeremy Andrews (d February 2018)
Janet Marsden (d. May 2018)
Ruth Williams (d. 2018 aged 94)
Jean Aikman (d. December 2017) see Obituary vol 155

Named Lectures 2017–18

A complete list of the Named Lectures prior to 2017 is given in volumes 151 to 155 of the Memoirs.

The Joule Lecture

2018 March 5 — *The Life and Works of James Clerk Maxwell* — 155 pp 105-112
Professor Kenneth Letherman

The Percival Lecture

2018 May 23 — *Principled Collaboration - the Rights, Responsibilities and Possibilities of Community-University Partnerships*
Professor Melanie Tebbutt

The Manchester Lecture

2018 June 21 — *Developments of computers in Manchester since "The Baby"*
Dr James Sumner following an introductory talk by Mary Archer DBE

Proceedings of the Manchester Literary and Philosophical Society

ANNUAL REPORT OF THE COUNCIL, 2017-2018

Lectures arranged by Council

During the 2017/2018 season there has been a series of very varied lectures featuring the wide breadth of interests of members of the Society and hopefully also drawing in members of the public. Some have occurred, of necessity, at a different time of the year than in previous sessions.

The date of the AGM had to be changed for administrative reasons at short notice from 28th September 2017 to 7th November 2017. Nevertheless Professor Janet Wolff's lecture, which had been scheduled to be presented following the AGM on 28th September, continued as planned on that date as a joint lecture with the Arts Section and is reported on in that section's report. The AGM took place on 7th November 2017 and took place before the lecture by Mike Higginbottom on Victorian Cemeteries which is also reported on in the Arts Section report.

'The Evolution of the University of Manchester Estate: Making of the Modern Masterplan'

Mrs Diana Hampson, a chartered surveyor, who has been the Director of Estates and Services at the University of Manchester since 1997, where she is responsible for all strategic and operational matters relating to the University of Manchester's extensive property portfolio, gave the next Council Lecture. Diana had been specifically invited by Council to give this lecture on 24th October 2017 so that members of the Lit and Phil attending lectures on the university campus could learn more about what building developments had been occurring around them and what was planned. She was able to do that in a very comprehensive way and indicate how the estate was being developed to enable and support the research and teaching of the University of Manchester but also to locate much of the estate to a single campus along the Oxford Road corridor. The opportunities that these changes give for working with the City of Manchester were indicated. Diana was able to enlighten members about the delivery of the University's innovative £1 billion Campus Masterplan which is coming to fruition and developing and which all who attended have been able to see subsequently over the last nine months. Regrettably that night was one of those of severe road transport disruption in Greater Manchester and many members travelling to the lecture had their journeys curtailed so attendance was not as high as hoped for and expected at a very informative lecture.

The Percival Lecture

In past years this lecture which is organised with one of the Manchester universities has taken place in February but this was not logistically feasible this year when it was being organised with Manchester Metropolitan University so it took place as reported later in May 2018.

'Russia's Place in the World'

Bridget Kendall MBE, the first female Master of Peterhouse College, Cambridge, that university's oldest college, and the highly respected former BBC Moscow

Correspondent, gave a profoundly knowledgeable and fascinating lecture on 19th March 2018, to a packed house in Lecture Theatre A at University Place, the University of Manchester. Professor Stephen Hutchings, Professor of Russian Studies at the university and a long-term friend of Bridget's, acted as host on behalf of the University of Manchester and the President, Dr Diana Leitch, introduced the speaker on behalf of the Lit and Phil. The lecture given without slides was excellent for both its content and delivery style. With its title 'Russia's Place in the World', which had been chosen many months before, it was apposite as the relationship between Russia, the UK and other countries had started to change shortly before the lecture in March. Bridget was able to use her extensive knowledge, background and experience both to address the subject of her lecture which was how Russia had changed over the past 100 years and to also explain to the audience the developing situation. She answered clearly and honestly the many questions that were asked at the end of the lecture and the attendees gave a very resounding thanks to her at the end of what had been a superb lecture. She retired with those who had booked supper after the lecture to the Brodsky Restaurant at the RNCM. Prior to the lecture she signed copies of her new book 'The Cold War: a New Oral History of Life Between East and West' for those who wanted to purchase a copy. The books had been secured for sale at this lecture by Blackwell's Bookshop on Oxford Road and they had a table in the foyer of University Place where drinks were served before the lecture for everyone attending.

Who are the Humanitarians Now?

Professor Tony Redmond OBE, Professor of International Emergency Medicine at the University of Manchester and Emeritus Professor of Emergency Medicine at the University of Keele, gave the Council Lecture on 17th May 2018. He is also the Deputy Director of the Humanitarian and Conflict Response Unit (www.hcri.ac.uk) which he co-founded at the University of Manchester and the CEO of UK-Med (www.uk-med.org) an organisation that provides international emergency humanitarian medical assistance. So Tony was a hugely knowledgeable expert able to explain to us the background to the word 'humanitarian' and how it has evolved until the current day from its original meaning. Drawing on his experience of 30 years working in the field and responding to sudden-onset disasters of all kinds and conflicts overseas he was able to explore past and present humanitarian responses and how they impacted situations. In a very revealing lecture he explained how the area of humanitarian response is changing and the attempts that are being made to 'professionalise' the medical responses so that they are appropriate, meaningful and long-lasting. He emphasised the need for standards of operation and answered simple questions for the general audience such as 'the best way of helping – money or goods'. The attendees were very appreciative of hearing the truth from a real expert and the lecture was very well-received.

The Percival Lecture

Historically this lecture, which is one of the Society's named lectures, has taken place in the spring but was delayed this year as Manchester Metropolitan's chosen lecturer was unavailable at that time so it was given on 23rd May 2018. It is a lecture reserved for members of the Lit and Phil and special invitees.

***'Principled Collaboration – The Rights, Responsibilities and Possibilities of Community-University Partnerships'* – Professor Melanie Tebbutt**

The President gave a short resume of the background to the Percival Lecture which had been prepared for this occasion as many attendees were new to the Society and the history of this lecture. I am repeating it here to set the context of this lecture and by way of explanation to all members about its history.

"Good Evening and as President of the Manchester Literary and Philosophical Society can I welcome you all to the latest Percival Lecture of the Society. The Society is extremely grateful to Manchester Metropolitan University for hosting this event and for providing this evening's speaker, Professor Melanie Tebbutt. The Pro Vice-Chancellor of MMU, Professor Sharon Handley, will introduce Melanie shortly but just a brief background to the Percival Lecture.

In 1944 Professor Michael Polanyi, then President of the Lit and Phil, and a Professor of Chemistry at the Victoria University of Manchester, proposed to the then Vice-Chancellor, Sir John Stopford, that an annual lecture of the Lit and Phil should be held at the University of Manchester given by a member of the university staff. It was agreed in spring 1945 and the Percival Lecture and the accompanying social reception started then. The lecture was called after one of the Society's founders in 1781 – Dr Thomas Percival, a former pupil of Warrington Academy. The first lecture was given on 11th February 1947 by Professor Wardlaw, an expert on banana cultivation, and Head of the Department of Botany, a department with which your current Vice-Chancellor, Professor Malcolm Press, was associated. For the next 50 years until 1996 the lecture continued in the original format but times and finances were changing and in 1998 a new regime was agreed whereby the lecture would rotate with the hosting of the lecture as a prestigious event being shared between the universities of Manchester, MMU and Salford. That is how it has continued to this day. Professor Sandra Burslem, now Dame Sandra Burslem, the Vice-Chancellor of MMU gave the first lecture entitled 'Universities after the Millennium' on 20th May 1998 – exactly 20 years and 3 days ago. Regrettably this evening our oldest member, Mrs Marjorie Ainsworth, aged 96, who has attended nearly every Percival Lecture, is ill and has had to withdraw from attending. I would now like to call on Professor Sharon Handley to introduce this evening's speaker, Professor Melanie Tebbutt".

Melanie, who is a Professor of History at MMU and an expert on working with local communities, often in challenging areas, gave a very thought-provoking lecture on the ways in which collaboration between academia and ordinary residents can work or not work. She described some of her ground- breaking work with young people in which she has great experience and it was an enlightening lecture for all who were there. At the end everyone moved to the dinner which was hosted by MMU and had an excellent meal which was much appreciated. Regrettably that evening there was a major incident in Greater Manchester which brought the transport system to gridlock and many members and invitees were unable to get to the venue and the lecture. A few of the members and invitees who had been marooned in the traffic for up to two hours made it to the meal but sadly completely missed the lecture. They were however, able to converse with

staff from MMU and make new contacts during the meal which will be followed up during the next session.

The Manchester Lecture

This year the Manchester Lecture was held on the evening of 21st June 2018 at the Manchester Museum of Science and Industry (MSI), courtesy of Sally McDonald, Director of MSI, and was a joint celebration of the 70th Anniversary of the first stored-program computer 'The Baby' on 21st June 1948. It was a fitting end to the 2017/2018 session of lectures but it was more than that as Lit and Phil members and the public were able to see the Computer Volunteers running the replica of the Baby that day and talk to them about all the work they do. Dame Mary Archer, DBE, Chair of the Board of Governors of the Science Museum Group, of which MSI is part, gave an introductory talk about the Science Museums Group collection of computers and this was followed by Dr James Sumner, Senior Lecturer in the History of Technology at The University of Manchester giving a lecture on the developments of computers in Manchester since 'The Baby' in 1948. The huge audience was most appreciative of both lectures.

Remarkably one of the original members of the team at the University of Manchester on 21st June 1948 was present that night, Professor Dai Edwards, and we were joined remotely from the central coast of NSW, Australia by the only other person who is still alive from that day, Dr 'Tommy' Thomas who sent his best wishes from the other side of the world for our meeting and lectures. Both men are 90 and were just finishing their physics degrees in Manchester in 1948. (Computer Studies was an unknown degree at the time). Before the lectures started the President, Dr Diana Leitch, conveyed Honorary Membership of the Manchester Literary and Philosophical Society on Dame Mary Archer, Professor Dai Edwards and Dr Tommy Thomas, who were most appreciative of this honour. Both lecturers were presented with our publication of John Dalton's papers and thanked for their talks by the President. It had been a very fruitful liaison with MSI and the work done by the Curator of Engineering, Sarah Baines, with the Lit and Phil organisers was particularly mentioned by the President.

Dr Diana M. Leitch MBE, FRSC
President 2016-2018

Lectures arranged by the Arts Committee

Art is social: 'the visible meaning of a good picture'

Janet Wolff – 27th September 2017

The first lecture was given by a distinguished member of the Society, Janet Wolff, Professor Emerita of Cultural Sociology at the University of Manchester and author of many books on the sociology of art.

Janet took as her starting point the debates generated by John Berger's interpretation of Thomas Gainsborough's painting, Mr And Mrs Andrews. Berger had asked why the painting had been commissioned, and suggested motives other than aesthetic ones: 'They are landowners and their proprietary attitude towards

what surrounds them is visible in their stance and their expressions'. This provocative statement, in Berger's landmark 1972 BBC series, 'Ways of Seeing', turned out to be a formative and influential intervention in art history and art criticism. In an erudite and superbly illustrated account, Janet explored how the history of modern western art has conventionally been seen as a sequence of styles and movements: Realism, Impressionism, Post-Impressionism, Cubism, Futurism, Expressionism and Abstract Art; likewise as a chronology of great artists, each of them achieving a kind of revolution in art. She showed how, in recent years, this linear account of 'great movements' and 'great artists' has been supplemented – and questioned – by sociologists and social historians of art, who have argued that it is not possible to understand aesthetic developments without paying attention to social factors: contracts and commissions, museums and galleries, dealers and critics, and so on. This led her to consider the difference a social history of art has made to the story of art in the modern period, and what the implications might be for perennial questions of beauty, value and aesthetic taste. The thought-provoking nature of the talk was amply underlined by the range of questions it generated from an attentive audience.

Dickens and Magic

Ian Keable – 10th October 2017

A magical evening was next on the Arts Section agenda. Few people know that Charles Dickens was also a talented amateur conjurer, fascinated by spiritualism and ghosts. But hey presto! Lecturer Ian Keable lifted the lid on the author's magical talent, using his own sleight-of-hand to reveal and re-create Dickens's favourite tricks. Ian, who graduated from Oxford in PPE, qualified as a Chartered Accountant, then went on to become a professional magician. He is a member of the Inner Magic Circle with a Gold Star. He has also received the Magic Circle Comedy Magic Award.

Dickens's had a love of uncovering the tricks and tools of conjurers, spiritualists and Victorian "psychics". Ian opened up the secret world of Charles Dickens for us – mesmerising the audience with his own magical skills, as he recounted Dickens' years performing his own highly amusing and entertaining shows. In this humorous and mystifying event, even those members of the audience on the front row, just feet away from Ian, remained baffled. It was a magical evening of entertainment in every sense of the word.

Victorian Cemeteries

Mike Higginbottom – 7th November 2017

A talk about cemeteries might seem to verge on the ghoulish but Mike Higginbottom's enthusiasm and extensive knowledge of his subject of Victorian Cemeteries made his lecture far removed from the macabre. Within the space of 45 minutes, he explored the growth of the cemeteries and exposed how the social pecking order continued even after death. Extravagant monuments jostle for space with the quirky and the plain. The graves of the famous, and the infamous become part of the tourist trail. Oscar Wilde's tomb in Père Lachaise Cemetery in Paris is a case in point. No doubt the occupant of the Egyptian style tomb designed by

Jacob Epstein would approve that it is now covered with lipstick kisses. It was a talk that could have gone on for much longer and perhaps there may be a chance in the future to hear about another Victorian obsession in Mike's talk Temples of Sanitation.

Why the Anglo-Saxons Matter: King Alfred and the Making of England
Michael Wood – 28th November 2017

Film-maker and historian Michael Wood hardly needed introducing to our audience. A familiar face on the BBC, and born and brought up in Manchester, he is passionate about the Anglo-Saxons and their role in shaping British history to the present day. Michael, who is currently Professor of Public History at the University of Manchester focused on what he believes is one of the most exciting and formative periods in British history – the Viking Age – when three generations of the family of Alfred the Great created the early English state. Before attending Manchester Grammar School, Michael was a pupil at Benchill Primary School and had an out of the blue surprise when he was reunited with one of his teachers from that school, who had come to see his lecture. It was many years since he had seen her, and he was clearly delighted and moved to see her again. This lecture attracted a very large and appreciative audience, many of whom enjoyed the chance to engage with Michael in the Question and Answer session.

Lit & Phil Museums: the role of Learned Societies in the creation of Museums in Britain, especially the North West
Anthony Burton – 30th January 2018

We tend to take our local museums for granted, but how and why they were formed, and against what odds, makes for a fascinating history. The role that learned institutions – such as the 'Lit and Phil' societies – played in that history is little known, and that was the topic addressed by Anthony Burton. Eminently qualified to lead his audience on this journey, Anthony, who spent most of his working life as a curator at the Victoria and Albert Museum, London, and was himself its historian, described and contextualised the creation of Lit-and-Phil museums with both authority and lightness of touch. Manchester Lit and Phil, though one of the earliest in the world, did not start a museum, though other learned institutions in Manchester did. Focussing especially on Lit-and-Phil museums in Liverpool, Preston, Kendal, Derby and Chester, Anthony described their foundation and how they manage to survive in the present, mostly under local government auspices. Characteristically, alongside some often-noteworthy libraries, their collections of exhibits would normally include natural history, geology, archaeology, and ethnography – subjects categorised as 'philosophy' (meaning science) – and sometimes art as well. This range of material did expose them to some mockery, as 'heterogeneous and absurd jumbles', but the intellectual ambition that inspired them was admirable, as Anthony convincingly showed in what was a supremely well-researched and well-illustrated lecture.

The Dr Derek McCulloch and Cafe Mozart event:

In the Beginning was the Word – singing the poet's song in a foreign land, scheduled for Thursday 1 March 2018 had to be cancelled at the last minute because of

severe weather including heavy snow. It was re-scheduled for Monday 2 July 2018 and will be reported in next year's Annual Report.

Patricia McWilliam-Fowler
Chair of Arts Committee

Lectures arranged by the Science and Technology Committee

This year's programme, put together under the Chairmanship of Michael Sinnott, was a good mixture of applications of science and technology to practical problems, one on the 'history' of science, and others with a medical bias. The attendance at the lectures was buoyant, with an average audience of over 90.

The first lecture, on 16 October 2017, was given by **Professor Robert Young, FRS, FREng** (University of Manchester) who added the subtitle "When Science Meets Politics" to his original title ***Engineering with Graphene***. His talk illustrated the interplay between scientific discoveries, their application, and the desire of politicians to be seen to be "picking winners" in technology. The talk therefore made an excellent sequel to Sir Konstantin Novoselov's Dalton lecture on "The History of sp2 Carbon in England" (26 October 2016), which dealt with history and science.

The National Graphene Institute, a collaborative graphene research facility of the University of Manchester, with £65m UK Government and EU funding, was announced in 2011, with the remit of applying the material in engineering and technology. Professor Young expected key applications would be found in electronics and printed circuits, energy storage, biomedical devices, membranes and barriers, and composites and coatings, on which the speaker's own research focussed. Incorporation of graphene can make plastic/epoxy electrically conducting, allowing composite materials to be used in aircraft components (lightning strikes), and electrical de-icing systems.

Graphene is now used in high-end sports equipment, such as racquets and bicycle tyres, and has been incorporated into panels of McLaren Formula 1 racing cars, in all cases because of high strength and low weight. McLaren partnered with Richard Mille, a Swiss maker of very high end watches, to produce the Graphene Watch, which was the major display in Harrod's window in October 2017. Investment in graphene as a material continues – China announced extensive support for graphene research after President Xi's visit to Manchester, but the big spender has been the EU.

The next talk, ***Insect Control – ideas from the unexpected*** on 1 November 2017, was by **Ian Whelan**, who had developed his knowledge as a product development manager in a household chemical company before he started his own company. His first product was Hedrin, a physical insecticide acting against head lice, especially in children, where poisons were problematical. Previous insecticides had been based on killing the insect, and these proved to be persistent environmental pollutants. They also resulted in spontaneous mutations in insects which could lead to resistance: some studies show 98% of human lice are resistant to pyrethrins - a chemical insecticide.

Physical insecticides work completely differently. The first silicone-base product against lice was Hedrin, based on an idea by a Guildford housewife. It later developed into Dimethicone, which had two components, an involatile long-chain silicone, "dimethicone", and a volatile cyclic silicone, which evaporates and leaves the insect in a shroud of the involatile silicone, that blocks the spiracles and interferes with water transport. The lice suffocate, and dehydrate, or if they need to lose water, burst.

Whelan then described further developments of similar products which could be used against fleas, which were interestingly not defined as a biocidal product because they did not directly kill the insect, and a 'food grade cellulose polymer' that controlled poultry red mites. Finally, he proposed using a silicone layer on ponds to lower the surface tension of the water, resulting in mosquito larva sinking to the bottom.

Whelan demonstrated that someone with an inquisitive mind and training in the 'university of life' can make a significant contribution in some of the intractable problems encountered in everyday life. He explained how he has been awarded a Winston Churchill Fellowship to establish collaborations with various Greek scientists to explore the ethnobotany of the region, especially for insect control materials.

On 4 December 2017, **Alan Segrott**, the Bridge Project Engineer for the Mersey Gateway right up to the completion and opening of the crossing in October 2017, gave a timely lecture on this new crossing of the River Mersey entitled ***The Mersey Gateway – a link to the Northern Powerhouse.*** The lecture started with a review of various bridge structures over millennia. He explained how the problems of the tremendous loads on the shoreline side anchors, imposed by the weight of the most bridge designs, could be overcome by the cable-stayed bridge in which the deck was hung from the main pillars of the bridge by a 'triangular' arrangement of cables. This design has the additional advantage that the deck can be maintained horizontal throughout its length – an excellent example of such a design is the Millau viaduct in France, which is 2.25 km long.

The Mersey Gateway Bridge is based on the cable-stayed design and has become essential for relieving congestion on the existing Millennium suspension bridge over the Mersey at Runcorn, promoting local economic development, and providing a landmark that fits the environment. A number of different options were considered for the route and, although the River Mersey is not a very wide river, it was decided to extend the project on the south side to meet up with the M56 Motorway. This resulted in the project extending over a 1 km long cable-stayed bridge with approximately 8 km of new and upgraded highways. Mr Segrott made excellent use of photography, CGI, and time-lapse video to show how the work progressed. The use of modularisation throughout the construction meant that the pouring of concrete could progress rapidly, as the moulds were moved along the project. An interesting feature of the construction of a cable-stayed bridge is that the construction does not progress out from the shore to the pylons but progresses in both directions from the pylon to the shore or other location point - thus reducing any bending loads on the pylon.

While much of the lecture concentrated on the technical aspects of the bridge, Mr Segrott explained that planning such a large project required many aspects to come together, including political will, conceptual design, public and environmental consultation, raising the funds and then the engineering design and implementation. The first appraisal began in 2003, and DoT funding was obtained in 2006. A public inquiry was held in 2009, and final DoT Conditional Approval was obtained in 2013, with final tenders being received then. The Merseylink Consortium was appointed as the contractor in April 2014, and work commenced then: the bridge opened in October 2017. It was officially opened by H.M. The Queen on 14 June 2018.

On 12 February 2018 the subject returned to the life sciences with **Professor Kevin Ryan, FRSE** (University of Glasgow) presenting a lecture entitled ***Cell Death in life - good and bad!***. The best understood form of cell death is apoptosis (from the Greek for a falling off of leaves and petals), which was identified just under 50 years ago. It is usually a benign programmed event in which the dead cell is engulfed and digested by others. The intrinsic pathway of 'good' apoptosis depends on the release of proteins from mitochondria. Unwanted apoptosis occurs with trauma, stroke and heart attacks, and with neurodegenerative diseases such as Parkinson's, Alzheimer's, and Huntingdon's diseases, and dementia. Cell death can however be positive and in humans apoptosis can prune away unneeded structures, control the number of cells in particular tissues, and sculpt complex organs.

In addition to apoptosis, cells can die by two other mechanisms: autophagy, and necr(opt)osis. Necrosis is caused by factors external to the cell or tissue, such as infection, toxins, or trauma which result in the unregulated digestion of cell components. In contrast, autophagy (Greek, "self-eating") allows for the orderly degradation and recycling of cell components. In disease, autophagy has been seen as an adaptive response to stress, which promotes survival, whereas in other cases it appears to promote cell death and morbidity. The speaker showed a picture of his two-day-old son crying from hunger as an example of an autophagy-modulated response to starvation. However, autophagy has implicated in various forms of human disease including cancer, diabetes, inflammatory disease, neuro-degeneration and is critical for the innate and acquired immune response.

Work in the speaker's own laboratory identified the genes turned on by the cell-death inducing protein p53. The product of gene FLJ11259 was localised to the lysosomes, where it regulated autophagy: it was given the name "Damage Regulated Autophagy Modulator", the appropriately Caledonian DRAM.

In normal animal tissue cells grow where and when they should, individual cells receiving both positive growth signals leading to proliferation and survival, and negative growth signals leading to differentiation or death. The balance is lost in cancerous tissue, in which negative signals suppressed, leaving a balance of positive signals. Targeting anti-cancer drugs to cell death works: the p53 family of proteins are strong promoters of apoptosis, and 100% of mice with both p53 genes disabled develop cancer within six months of birth. So, as the title of the lecture suggested cell death can be both good and bad - the challenge is to use it in the most beneficial way.

Professor Kenneth Letherman (ex-University of Manchester) began his talk ***The Life and Work of James Clerk Maxwell***, on 5 March 2018, by pointing out that although James Clerk Maxwell is a hero to many physicists he was not more widely recognised and celebrated until recently. During his short lifetime from 1831 to 1879 he made significant contributions to many fields including electromagnetism, molecular theory of gases, optics, astronomy, bridge structures, dimensional analysis and the principles of steam engine governors: his first paper was presented to the Royal Society of Edinburgh when he was only 14 years old. At 16 he went to Edinburgh University to read Natural Philosophy and in 1850 published a paper "On the equilibrium of elastic solids", a remarkable achievement for a 19 year old which demonstrated his ability to enter a new and important field and make an original, fundamental analysis. From 1850-56 Maxwell studied at Cambridge and in 1855 was elected to a Fellowship at Trinity College. During this time from his studies of colour vision he invented the colour triangle and showed that white light resulted from mixing red, green, and blue light.

His next move was to a chair in Natural Philosophy in Aberdeen and during this time he won the prestigious Adams Prize by explaining the conditions for the rings of Saturn. As the only mathematician to make headway on the problem his outstanding analysis won him the prize of £130 in value. In 1860 he was appointed to a chair at King's College, London, a position he held until 1865. He was elected a Fellow of the Royal Society, met and collaborated with Michael Faraday, and in a lecture to the Royal Institution showed a projection of the first ever colour photograph. He worked with Faraday on standardisation of electrical units. His analysis of the flyball governor laid the mathematical foundation for modern control theory and automation. In this period he also worked on the kinetic theory of gases, developing the equations describing the distribution of energy amongst molecules. Now known as the Maxwell-Boltzmann distribution its derivation was described by Lord Kelvin as showing "a touch of genius". In 1871 Maxwell was appointed the first holder of an endowed chair in Experimental Physics in the University of Cambridge. This endowment culminated in the world famous Cavendish Laboratories. During this time he increasingly suffered from "heartburn". In all probability it was stomach cancer, the disease from which his mother had died. With no effective treatment he died in November 1879, aged only 48.

For many years Maxwell studied, analysed and published work on electricity and magnetism. In 1868 he published a set of 20 equations which unified these previously separated topics and laid the foundations of electromagnetic wave theory. Now reduced to four partial differential equations these underlie the operation of many modern devices including radio, TV and mobile phone signals. Importantly he derived an equation for the speed of an electromagnetic wave which allowed it to be calculated from available electrical data. That it corresponded so closely with the best available measured value for the speed of light was convincing evidence for his unifying theory. These equations have been described as the second greatest unification in physics after Newton's first.

The final talk of the year, on 3 May 2018, was given by **Professor Sir Stephen O'Rahilly FRS (University of Cambridge)** entitled ***Why do we get fat and why***

does it make us ill?. The lecturer explained that obesity is a result of the law of conservation of energy and matter. If energy intake in food exceeds that consumed by metabolic processes and physical exertion then it has to be stored. In practice this is achieved by laying down fat or adipose tissue. Fat is a particularly efficient form of storage since it contains about 9 cal/g, more than double the calorie content of carbohydrate which is not stored in the body to any extent. Prof. O'Rahilly preferred to talk of adiposity rather than obesity, because the latter carries potentially pejorative overtones. Adiposity, commonly expressed as BMI (kg/m2), is increasing in developed and many developing countries at an alarming rate and clearly this has to have an environmental and cultural basis. In relation to income, food has never been cheaper, more calorie dense and richer in sugar and fat. Mechanised transport and labour-saving devices make it easy to live without expending much energy in physical exertion.

The question arises as to whether lean people are 'morally superior', using willpower and making conscious choices in terms of diet and physical exertion to avoid becoming overweight, or are they simply biologically different? Studies of identical twins who were separated soon after birth and given to different foster parents show that their BMI resembles that of their twin rather than that of the family in which they grew up. There are however likely to be significant genetic factors underlying profound obesity particularly when present in childhood.

It has been known for many decades that lesions in the region of the hypothalamus can profoundly affect appetite, ingestion of food and body weight and that this is mediated through circulating factors.

A little over 20 years ago two young, severely obese children were investigated in Professor O'Rahilly's department and were found to lack functional leptin (Greek λεπτος = thin), a hormone identified by Friedman in 1994 and produced in fat cells, which acts on the hypothalamus to suppress appetite. In starvation when the amount of adipose tissue declines to very low levels, leptin concentrations fall and appetite is stimulated. The leptin deficient children are ravenously hungry regardless of how much they eat, and they become massively obese in the first few years of life. It proved possible to restore the appetites and weights of these children to normal with a daily subcutaneous injection of synthetic leptin. Leptin is not however a potential treatment for obesity in normal subjects because of the shape of its dose-response curve because at the concentrations found in normal weight and obese subjects further increases in concentration have very little effect. O'Rahilly's group have also identified a number of other genetic mutations leading to obesity, and he discussed these. He explained that much of the genetic component of the variation in BMI in the general population is likely to be the result of multiple genetic polymorphisms of relatively small effect. Genome-wide Association Studies (GWAS) have identified 97 genetic loci associated with BMI. The authors concluded that as much as 21% of variation in BMI can be accounted for by common genetic variation.

Having discussed the causes of excess adiposity O'Rahilly then pointed out that being overweight has adverse mechanical consequences contributing to osteoarthritis of the hips and knees, gastro-oesophageal acid reflux and sleep apnoea.

It is also associated with a variety of common cancers including breast, colon and adenocarcinoma of the oesophagus. At the metabolic level increased weight is associated with insulin resistance, type II diabetes, high blood pressure, atherogenic cardiovascular disease and fatty liver.

Finally he asked what can we do to avoid obesity and its consequences? At the simplest level we need to avoid positive energy balance and weight gain. Restricting energy intake however is not easy particularly for those who have the misfortune to have inherited a major single gene mutation, like the leptin deficient children, or alternatively, and more commonly, several genetic polymorphisms which predispose to increased appetite and hyperphagia. While specific treatment is available for leptin deficiency no specific treatments are yet available for most genetic defects. Some drugs used in the treatment of diabetes do promote significant weight loss but most have not stood the test of time because of adverse effects. Bariatric surgery, though limited in its availability (particularly in the UK), can be extremely effective in reversing the metabolic effects of morbid obesity. For the time being we are largely reliant on lifestyle measures supported by public health programmes to induce cultural change. In this way it is hoped to arrest the current epidemic of increasing adiposity and avoid the numerous health hazards to which substantial weight gain predisposes.

Des Winterbone
Chair of Science & Technology Committee

Lectures arranged by the Social Philosophy Committee

The past year contained an eclectic series of lectures beginning with **Dr David Bellingham** who spoke on ***Legal and Ethical Title: selling off art from English country house collections*** on 4 October 2017. He used Chatsworth House in Derbyshire and Syon House in Middlesex as case studies to excellent effect. This was followed on 21 November 2017 by a lecture on Aviation and the Environment, a subject about which members knew very little, but which was brought to life with excellent illustrations by an enthusiastic lecturer, Professor John Fielding.

On 13 December 2017 **Dr Michael Cannon** spoke on overcoming the problems of bacteria becoming resistant to antibiotics under the title ***Antibiotics: the Calm before the Storm***. He described the emergence of 'superbugs' that could potentially have catastrophic consequences. 25 January 2018 saw a visit by Professor Julian Pine on Tuning In and Talking: how parents can influence their children's language development. The lecture began by discussing research which shows that parents who talk about what is in their children's current focus of attention tend to have children who go on to develop large vocabularies. It then described an intervention study which showed how 'tuning in and talking' can be used to boost language learning in children from low socio-economic status.

On 15 March 2018 March, **Georgina Ferry** spoke under the title ***Diamonds to DNA: the women who revealed the hidden structures of nature*** where she looked at the circumstances of three women, Kathleen Lonsdale, Dorothy Hodgkin (a member of the Manchester Lit & Phil) and Rosalind Franklin. She discussed how

they were able to succeed in science at a time when few women had professional careers of any kind.

The final lecture of the year was given on 11 April 2018 by **Professor Stephen Graham** who explored the idea that today's towns and cities can no longer be read as a two-dimensional map but must be understood as a series of vertical strata. In ***Vertical Cities: from basement to rooftop*** he explained how to rethink the city at every level – how the geography of inequality, politics and identity is determined in terms of above and below.

Peter Barnes
Chair of Social Philosophy Committee

Lectures arranged by the Young People's Committee

A matter of considerable concern to us this year has been the small number of young people in the audience for two of our lectures, although there was a good attendance of members of the Society. We are studying the possible reasons for this shortfall.

At the first lecture on 14 November 2017 **Professor Manjit Dosanjh** spoke on ***Hadron Therapy: from physics to medical applications***. She explained the history of particle physics techniques, starting with X-rays in the late nineteenth century. One of the problems with cancer treatment is destroying cancer cells, or at any rate preventing them multiplying, without damaging normal cells. Proton therapy has the advantage that the energy required for cell destruction is only given up when the particles stop, unlike smaller particles, which lose their energy as they travel through tissue.

Developments at present are concerned with increasing the particle energy (and hence their velocity), which requires some complicated and expensive equipment. Her inspiring and aspiring talk, as usual with Young People's events, produced many questions from the audience, which our speaker gave careful and considered answers.

Dr Michael R Bailey spoke on ***Railway Engineering yesterday and today*** on 6 February 2018. His intention was to compare the processes of preparation and construction of Robert Stephenson's London and Birmingham Railway, opened in 1838, with today's projected HS2 railway, the first phase of which is also between London and Birmingham. He described how the young Stephenson, son of course of the possibly better known George Stephenson, took on the task of planning the L&BR, getting Parliament to pass the necessary legislation and then assembling a team of surveyors, lawyers (parliamentary and conveyance specialists) and accountants, and finally supervising engineers and contractors.

Michael spoke of the stations constructed, with the famous Doric Arch at Euston and its smaller, but similar, structure at Curzon Street in Birmingham, which still stands today and will form part of the projected HS2 terminus. He also mentioned the number of bridges and tunnels on the route, some of which required new methods of construction. HS2 will also involve many tunnels (some for environmental reasons) and bridges, though with totally different methods of

construction, being largely of concrete. However much the same groups of people are or will be needed for this work, as for the 1938 venture.

The final lecture of the year was by **Dr Robert Poole** on ***Earthrise*** on 24 April 2018. His title was taken from the idea of the first view of the earth from the moon and space, compared with our familiar view of "moonrise" from the earth, and he described many of the unexpected views that were obtained from early space craft. This to some extent made people realise the planetary nature of the earth and encouraged the idea of travel to other planets in the Solar System. The talk was illustrated with several video presentations and other details taken from NASA archives

Angus McDougall
Chair of Young People's Committee

Treasurer's Report

The Statutory Accounts presented here comply with the Charity SORP (FRS102). To aid members understanding of these accounts, I have included in my report a detailed Income and Expenditure Statement for the year ended 30 June 2018.

Income and Investment Portfolio

Our subscription income for the year was down against budget and in comparison to last year. This is due to two factors. Firstly our subscription income for 2017 included two years of gift aid claims (one for 2016/17 and one for 2015/16). Secondly, we had fewer paying members in 2018 compared to 2017 – 264 compared to 282. This is disappointing to note as 2017 membership had shown an increase over 2016. We need to do all we can to reverse the downward trend of membership and start to increase numbers again.

Our investment portfolio performed worse than last year. This is seen as a result of volatility in the global stock markets, particularly at the start of the calendar year 2018. Nevertheless, our fund did return a positive position for the year and we remain committed to our approach to investment risk which is heavily weighted towards equity holdings.

Expenditure

We continue to maintain a tight control over the Society's expenditure and in particular the costs associated with running our lecture programme. We did have to postpone an event early in 2018 as a result of the severe weather in February/March. This resulted in costs being incurred relating to room hire for the lecture that did not proceed. When it was rescheduled for later in the year, we had to pay a second time for the room hire resulting in additional cost. Notwithstanding this, our formal arrangement with the Royal Northern College of Music continues to work well and is a major factor behind the reduction in function costs since 2016.

Staff costs reduced in year as both our office staff requested a reduction in hours which was agreed to by Officers. The other notable reduction in expenditure from 2017 is in the investment management fees charged by Brewin Dolphin. This is a result of a reduction by them in the scale of their charges during 2018.

Overall our performance during 2018 is satisfactory, although it is disappointing to note that had we simply been able to hold our paying membership to the same level as in 2017, we would have reduced our 2018 deficit by over £2,000. As I said at the start, our membership is something we should focus on going forward.

Trevor Rees
Honorary Treasurer

The Manchester Literary & Philosophical Society
Income and expenditure account for the year ended 30 June 2018

	2018 £	2017 £
INCOME		
Subscriptions and Gift Aid	29,371	36,360
Investment income	44,337	50,201
Donations and legacies	75	50
Sundry Income and Donations	111	157
TOTAL INCOMING RESOURCES	73,894	86,768
EXPENDITURE		
Function costs		
Functions and meeting costs	15,668	14,782
Printing of Memoirs and Programmes	3,926	3,678
	19,594	18,460
Office costs		
Rent and services charges	13,042	12,022
Heat and light	565	333
Website	2,081	1,653
Maintenance /office improvements	1,898	4,638
Staff costs	28,385	31,859
Library	-	1,250
Stationery and photocopying	1,585	2,096
Postage, telephone and equipment hire	2,036	1,474
Insurance	1,974	1,494
Depreciation	1,098	573
Sundries	292	843
	52,956	58,235
Society costs		
Legal and professional fees	1,064	1,330
Independent examination fee	2,493	1,888
Investment management fee	9,986	12,406
Bank charges / PayPal	861	895
	14,404	16,519
TOTAL COSTS	**86,954**	**58,235**
Net operating (deficit)/surplus	**(13,060)**	**(6,446)**
Net investment gains	**23,534**	**156,264**
Net Movement in Funds	**10,474**	**149,818**

The Manchester Literary & Philosophical Society
Balance Sheet for the year ended 30 June 2018

	2018 £	2017 £
Fixed Assets		
Tangible assets	-	1,098
Investments	1,452,760	1,459,485
Investment in Subsidiary	100	100
	1,452,860	1,460,683
Current Assets		
Debtors	-	870
Tax repayment due	5,365	13,800
Prepayments and accrued income	1,223	492
Cash at bank and in hand	47,117	27,387
	53,705	42,549
Creditors: Amounts falling due within one year	(7,700)	(14,841)
Net Current Assets (Liabilities)	46,005	27,708
Net Assets	1,498,865	1,488,391
Funds of the Charity		
Unrestricted funds		
Expendable endowment fund	1,498,865	1,488,391
Total Funds	1,498,865	1,488,391

The charity was entitled to exemption from audit under section 477 of the Companies Act 2006 relating to small companies.

The trustees / directors acknowledge their responsibility for complying with the requirements of the Companies Act 2006 with respect to accounting records and the preparation of accounts.

The above statements have been extracted from the Annual Report and financial statements which were approved and authorised for issue by the Trustees at a Council meeting held on 20 August 2018 and signed on its behalf by:

P HILTON Secretary
T REES Treasurer

Company Registration Number 933
Registered Charity Number 235313

Honorary Librarian's Report

With the move to Church House in 2016, Stella Lowe stood down as Honorary Curator and Librarian. The Society wishes to record its gratitude for her 18 years' service in this role, fulfilled in a period when the Society moved several times, necessitating in her having the added upheaval of packing up then reorganizing the library and archives on each occasion.

The latest move enabled the library to be housed in the small meeting room, where members can view the entire run of Memoirs and Proceedings, the *Dictionary of National Biography* and a small collection of approximately two hundred books. Miss Charlotte Buckley donated some local history books from her late father's collection. In addition, two books have been presented to the Society by their authors: *William Fairbairn - The Experimental Engineer*, by Richard Byrom and *The Seven Ages of One Man*, by Richard L. Hills.

The Society employed the services of an archivist, Jane Speller, to restructure the archival material. The availability of a small room off the main office has allowed all the archives to be brought together. Work is currently underway to list the contents of the storage boxes.

The Society continues to receive enquiries involving particular papers, former members etc., both from this and other countries. A theatre producer came to view the Dancer artefacts.

On the housekeeping side, the Index of Speakers has been updated and the cataloguing of the book collection completed. A card index of the Named Lectures has been created.

Christine Chappelle
Hon. Librarian

Officers and Council 2017-2018

President
Diana Leitch

President-Elect
Susan Hilton

Vice-Presidents
Chris Baker Tony Jackson

Honorary Secretary
Peter Hilton

Honorary Treasurers
Trevor Rees Greg Mauchline

Honorary Librarian
Christine Chappelle

Honorary Memoirs Editor
Graham Booth

Members of Council
David Shreeve, David Brailsford, Kenneth Letherman,
Joanna Lavelle, Chris Boyes, Ronald Catlow, Peter Barnes,
Patricia MacWilliam-Fowler, Desmond Winterbone, Angus McDougall

SECTION OFFICERS
Chair: Patricia MacWilliam-Fowler
Minutes Secretaries: Tony Jackson, Joanna Lavelle

Science & Technology
Chair: Desmond Winterbone
Secretary: Brian Tyler

Social Philosophy
Acting Chair: Peter Barnes
Secretary: Philip Hulme

Young People's
Chair: Angus McDougall
Secretary: Vacant

Administrators
Julie Brockenshaw Kathryn Slater

Presidents of the Society

Date of Election	
1781	Peter Mainwaring, MD; James Massey
1782-1786	James Massey, Thomas Percival, MD FRS
1787-1789	James Massey
1789-1804	Thomas Percival, MD, FRS
1805-1806	Rev George Waler, FRS
1807-1809	Thomas Henry, FRS
1809	*John Hull, MD, FRS
1809-1816	Thomas Henry, FRS
1816-1844	John Dalton, DCL, FRS
1844-1847	Edward Holme, MD, FLS
1848-1850	Eaton Hodgkinson, FRS, FGS
1851-1854	John Moore, FLS
1855-1859	Sir William Fairbairne, Bart, LLD, FRS
1860-1861	James Prescott Joule, DCL, FRS
1870-1871	Edward William Binney, FRS, FGS
1872-1873	James Prescott Joule, DCL, FRS
1874-1875	Edward Schunck, PhD, FRS
1876-1877	Edward William Binney, FRS, FGS
1882-1883	Sir Henry Enfield Roscoe, DCL, FRS
1884-1885	William Crawford Williamson, LLD, FRS
1886	Robert Dunkinfield Dabishire, BA, FGS
1887	Balfour Stewart, LLD, FRS
1888-1889	Osbourne Reynolds, LLD, FRS
1890-1891	Edward Schunck, PhD, FRS
1892-1893	Arthur Schuster, PhD, FRS
1894-1896	Henry Wilde, DCL, FRS
1896	Edward Schunck, PhD, FRS
1897-1899	James Cosmo Melvill, MA, FLS
1899-1901	Horace Lamb, MA, FRS
1901-1903	Charles Bailey, MSc, FLS
1903-1905	W. Boyd Dawkins, MA, DSc, FRS
1905-1907	Sir William H. Bailey, MIMechE
1907-1909	Harold Bailey Dixon, MA, FRS
1909-1911	Francis Jones, MSc, FRS
1911-1913	F.E. Weiss, DSc, FRS

1913-1915	Francis Nicholson, FZS
1915-1917	Sydney J. Hickson, DSc, FRS
1917-1919	William Thomson, FRSE, FCS, FIC
1919	G. Elliot Smith, MD, FRS
1919-1921	Sir Henry A. Miers, DSc, FRS
1921-1923	T.A. Coward, MSc, FZS, FES
1923-1925	H.B. Dixon, CBE, PhD, FRS, FCS
1925	†Rev A.L. Cortie, SJ, DSc, FRAS, FInstP
1925-1927	H. Levinstein, DSc, MSc, FIC
1927-1929	W.L. Bragg, OBE, MA, FRS
1929-1931	C.E. Stromeyer, OBE, MInstCE
1931-1933	B. Mouat Jones, DSO, MA
1933-1935	John Allan, FCS
1935-1937	R.W. James, MA, BSc
1937-1939	R.H. Clayton, MSc
1939-1940	D.R. Hartree, PhD, MSc, FRS
1940-1944	H.J. Fleure, DSc, FRS
1944-1946	M. Polanyi, PhD, DSc, MD, FRS
1946-1948	T.B.L. Webster, MA
1948-1950	E.J.F. James, DPhil
1950-1952	H. Hayhurst, FRIC, AMIChemE, FRES
1952-1954	Sir Geoffrey Jefferson, CBE, LLD, FRCS, FRS
1954-1956	P.F.R. Venables, PhD, FRIC
1956-1958	F.C. Toy, CBE, DSc, FInstP
1958-1960	C.E. Young, MSc
1960-1962	H. Lipson, DSc, FInstP, FRS
1936-1964	L.Cohen, BCom, FBIM
1964-1966	Margaret Pilkington, OBE, MA, FMA, JP
1966-1967	H. Hayhurst, MSc, CEng, FRIC, AMIChemE, FRES
1967-1969	Brian Rodgers, BSc(Econ)
1969-1971	G.N Burkhardt, PhD, FRIC
1971-1973	G.J. Kynch, PhD, MScTech, ARCS, DIC, FIMA
1973-1975	E.N. Abrahart, PhD, FRIC, FSDC
1975-1977	A.E.R. Goulty, MA
1977-1979	H. Lipson, CBE, DSc, FInstP, FRS
1979-1981	H.M. Fairhurst, MA, FRIBA
1981-1983	D.G. Wilson, OBE, DL, FIB, FBIM
1983-1985	L.J. Postle, PhD, FInstP, FInstMC

1985-1987	Sir Netar Mallick, MB, ChB, FRCP
1987-1989	B.S.H. Rarity, PhD, FRAS
1989-1991	P.G.Livesey, FCA
1991-1993	D.S.L. Cardwell, PhD
1993-1995	E.F. Cass, MA, ACIB
1995-1997	A. Donnachie, PhD, CPhys, FInstP
1997-1999	Dianne Wilson
1999-2001	I.E. Gillespie, MD, MSc, FRCS
2001-2002	A.G.D. Yeaman, JP, CEng, MIMechE
2003-2005	K.D. Buckley
2005-2007	Vivienne Blackburn, BSc
2007-2009	Mary, Lady Mallick, JP, BA
2009-2011	David J Higginson, LLB
2011-2014	Kenneth M Letherman, BSc, MSc, PhD, DSc, CEng, FIEE
2014-2016	Sir Netar P Mallick, BSc, MB, ChB, FRCP
2016 -	Diana M.Leitch BSc, PhD, FRSC, MBE

* Elected 28 April, resigned office 5 May 1809
† Died 16 May 1925

Honorary Members

As at 30 June 2018

1990	Professor Sir J M Ashworth
2017	Mrs A Boulton
2017	Mrs H Bradshaw
1989	Mr M N G Evans
1968	Reverend Dr R L Hills
2013	Professor L Merrick
1999	Professor Sir G Prance
1990	Sir M Richmond
2013	Professor Dame N Rothwell FRS
1994	Sir R Scott
2004	Dame J Smith
2015	Dr T Sommer
20017	Mr P Wilson

Elected Corresponding Members

As at 30 June 2016

1972	Professor A Thackray
1946	Mrs R Williams

The Dalton Medal

The Dalton Medal is the Society's highest award and a distinction only rarely bestowed. It is given to those who have made a distinguished contribution to science.
The Medal has been awarded to:

1898 Edward Schunk, FRS
1900 Sir Henry E Roscoe FRS
1903 Professor Osborne Reynolds FRS
1919 Professor Sir Ernest Rutherford, OM, FRS
1931 Sir Joseph J Thomson, OM, FRS
1942 Sir Lawrence Bragg, CH, MC, FRS
1948 Professor P M S Blackett, OM, FRS
1966 Professor Sir Cyril Hinshelwood, OM, FRS
1981 Professor Dorothy Hodgkin, OM, FRS
1997 Professor Sir Harold Kroto, FRS
2002 Sir Walter Bodmer, MA, PhD, FRCPath, FRS
2005 Professor Sir Roger Penrose, OM, FRS
2009 Professor Sir Bernard Lovell, OBE, FRS
2012 Professor Lord Martin Rees, OM, Kt, FRS
2016 Professor Sir Konstantin Novoselov, FRS, FRSC, FInstP

Ordinary and Corresponding Members as at 30 June 2018

* Denotes corresponding members † Deceased

We are not including Members' addresses due to the requirements of the Data Protection Act, but these are being published in a separate booklet for Members.

2011 Mr G P Abraham
2018 Dr L Adab
2014 Mr J W Adams and Mrs B Adams
1955 Mrs M E Ainsworth
1989 Professor S T S Al-Hassani
2017 Mr S D Ali
2017 Mr D Alvarado
2018 Dr K Amano
2017 Dr S Andi OBE
2017 Mrs M Ardern
2000 Mrs J E Argust and Mr J P Argust
2009 Mr D Astbury
2017 Mr M U Bhatti
2008 Mr G Baker and Mrs C Baker
2008 Mr C E J Baker and Mrs J Baker
2011 Dr R Baldwin and Mrs C Baldwin
2017 Dr D Bamber
2017 Mrs H Bambrough
2018 Mr A Bardsley
2002 Mr N P Barnes
1991 Dr B Benster*
1986 Mr P K Berry
2012 Mr C Bezer
2016 Dr B Bodner
2008 Professor J G Booth and Mrs M C Booth
1991 Mrs A Boulton
2017 Mrs T Bosanko
1999 Mr C J Boyes
2008 Mr I Bradford
2004 Mrs H Bradshaw
2003 Mr D Brailsford

2009 Mr J Brandrick
2016 Mr R Brice
2005 Mr D Brooks
2011 Mr M R Brown
1990 Mr K D Buckley and Mrs N Buckley
2017 Mrs H Burch
2018 Mrs I Burger
2009 Dr C Burke
1985 Dame Sandra A V Burslem
2018 Mr A Burton
2017 Miss V Byrne
2006 Mrs J Caldwell
2010 Mr I C Cameron and Mrs S Cameron
2009 Mr N O Campbell
1981 Mr J L Carroll
2015 Mrs H Carter
2012 Dr M Carter
2017 Mr B Cassidy
1981 Dr R E Catlow
2012 Mr J Cave
2017 Ms A Chaouch
1997 Professor M Chiswick and Mrs C Chiswick
2011 Mr R Chiverton
2004 Mr J Clegg
2016 Dr L Cook
2012 Professor C Cooper
2017 Mrs J Corbett
2015 Mrs S Crawford and Dr A Crawford
2010 Mr B C Crebbin
2018 Mrs K Crossley
1999 Professor D Crowther and Mrs M Crowther
2013 Dr M Cunningham
1993 Mr R A da-Costa
2018 Dr D Daji
2010 Dr W Darlington
1968 Mr J H W Davidson
2012 Mrs J Davies and Mr W Davies
2009 Professor J K Davies
2018 Mrs M Davies

2016 Dr S Davies
1959 Mr D H de Maine
2004 Dr A Deiraniya
2013 Professor M Desai
2008 Dr J A Dewey
1986 Professor A Donnachie and Mrs D Donnachie
2017 Mr L Donnelly
2006 Dr P Donnelly and Mrs A Donnelly
2017 Mr P Downes
2013 Mrs E Dyson
1978 Mr J C Eagle and Mrs D Eagle †
2017 Mrs Y Eardley
2014 Mrs E J Eastwood
2010 Ms B Eliot
1984 Mr T A Elliot
1994 Professor M Elstein and Mrs C Elstein
2013 Dr N Emekwuru
1988 Mr P Emerson Jones
1989 Mrs J Evans
2017 Mr T Fanning
1983 Professor P G Farrell*
2015 Ms S Faulkner
2015 Mrs R Fay
2013 Miss A Fazackerley
2012 Dr P Fenn
2010 Mr F L Fernley
2004 Mrs A Fitzpatrick
2017 Miss N Fletcher
2015 Professor J Frame
1990 Mr R Frost
2017 Dr P Fyans
2011 Professor C Galasko
2013 Mr D Gane
2017 Professor V Gardner
2018 Mr J Glenn
2017 Professor J Goldbart
2017 Dr I Gostimskaya
2015 Mr M Gourley
2011 Mr I W Grant and Mrs A M Grant

2007 Professor J Green
1994 Mr S H Halsall and Mrs M Halsall
2010 Mr M Hancocks
2016 Dr J Hassall
2018 Mrs A Hassan
2003 Mr G Hayes and Mrs A Hayes
2009 Judge T B Hegarty and Ms I L Hegarty
1989 Professor J R Helliwell
2018 Miss K Heung
2008 Mr P Hewitt
2009 Miss G Heyworth
1989 Mr D J Higginson
2011 Mrs E B Hill
1986 Mr P G Hilton and Dr S R Hilton
2017 Mr P Hodges
2003 Mrs C L Holland
2009 Mr B Hooley
2014 Mr J Horner
2009 Mr J Howell
2015 Mrs J Howells
2006 Mr P E Hulme
2012 Mr M Hunt
2016 Mrs H Hůlová-Sharpe
1985 Professor I Isherwood † and Mrs J Isherwood †
2010 Professor A R Jackson
2001 Mr J S Jackson and Mrs M Jackson
2009 Professor J D Jackson and Mrs L A Jackson
2013 Mr T Jackson-Baker
2018 Ms N Jaeger
2018 Dr I Jafarian
1991 Professor M I V Jayson
2010 Mr D W Jenkins
2003 Dr G Jessup †
2018 Dr D Johnson
2017 Professor N Jones
2007 Mr L Jowsey and Mrs D Jowsey
2017 Ms P Khan
2008 Mr J Kennedy CBE, KSG, DL
1997 Mr M P Kershaw and Mrs E Kershaw

2018 Dr Z Kingdon
2017 Miss F Knight
2010 Professor P M Kumar
2017 Miss H Lamb
2017 Dr J Langrish
2010 Mrs J Lavelle
2007 Mr M J Lees
1988 Mr W R Lees-Jones
2008 Dr D Leitch and Dr D M Leitch
2003 Professor K M Letherman and Mrs R Letherman
2017 Mrs A Lewis
2010 Mr R Lewis
2017 Miss C Liu
2012 Mr G Lloyd and Mrs J Lloyd
2015 Mrs M Lord and Mr P Lord
2017 Miss K Lovat
1962 Miss S J Lowe
2017 Dr C Lucas
1990 Mr N M MacPhail
2008 Mrs P Mainprize
1981 Mr C E Makepeace and Mrs H Makepeace
1999 Dr P J Makin
2010 Mr C Malkin and Ms C Brice
1975 Professor Sir N Mallick and Lady M Mallick
2013 Dr H Mamtora
2017 Ms G Mann
1994 Mrs R Marsh †
2016 Mr D Martin
2009 Dr M A Martin
2013 Mr G Mauchline
2017 Mr R G Maund
1983 Mrs M McCauley
2010 Dr A McDougall
2018 Dr M McDowall
2017 Dr A McNab
2013 Mrs P McWilliam-Fowler
2017 Mr B Meakin
1988 Dr J P Miller
2004 Mrs G Mitchell

2012 Mr D Morris
2017 Miss A Morris
2016 Mr A Morris and Mrs H Morris
1988 Dr J J Moscrop and Ms C Orgell-Rosen
2002 Dr J G Mosley and Mrs J Mosley
2018 Ms K Mure
2017 Mr B Murphy
2001 Mr J D Naylor
2017 Mrs S Neesham
2009 Mrs Y Neild
2018 Mr S Nemir
1997 Dr P Newton and Mrs K Newton
2017 Mr M Norgate
2007 Mr J O'Neill
2008 Mr M Oglesby and Mrs J Oglesby
2016 Mr G Palmer
2016 Dr J Patterson and Dr J Patterson
2017 Ms L Peabody Brewer
2013 Mr D Peat OBE
2018 Mr A Pickwick
2001 Mrs B Piper
1981 Dr J E B Ponsonby
1998 Miss H M Poole
2014 Mr R Poole
1986 Dr T Porter and Mrs M R Porter
2013 Mr A Postill
1985 Reverend Dr W P Povey
2018 Mr N Power
2008 Mr D Poyner and Mrs J Poyner
2011 Mr S Procter and Miss C Rigg
1982 Mr F R Purslow
2005 Mr A Rahman
1981 Mr R C Rees
2016 Mr T Rees
2018 Mrs M Repanos
2002 Professor B Richards
2004 Mr W N B Richardson
2014 Mr J A Riley
1981 Professor T E Roberts

1966 Professor A C Rose-Innes and Mrs B Rose-Innes
2006 Mr I A Ross
2007 Mrs E M Ross
1983 Mr R K Ross
1992 Dr P Rowlands
2004 Mr P Rubery
2017 Dr J I Saani
2005 Mr M R Sanderson
2008 Dr R Sandler and Mrs L Sandler
1971 Mr M H J Sargent
2008 Dr C Saunders
2017 Mr M Schaefer
2016 Mr W Schnurr and Mrs L Westrup
2004 Mr R Schofield
2017 Mr R Schofield
2003 Mrs S M Sharp
2015 Professor P Shenton
1995 Mr G A Shindler
2011 Dr D R Shreeve
2010 Professor M L Sinnott
2015 Dr A Siriwardena
2013 Dr A Smith
1989 Mr J Spencer
2016 Mr P Steele and Mrs S Steele
2017 Mr B Stevenson
2016 Dr R W Stoddart and Mrs P Stoddart
2001 Mr R N J Sutton
2011 Ms M Taylor
1975 Mrs M A Taylor
2000 Ms W Taylor
2012 Mrs C Taylor-Bruce
2000 Mrs N E G Tennant
2017 Professor J Thomas
2009 Professor D G Thompson and Dr H F Thompson
1981 Dr J S Thompson and Mrs H Thompson
2017 Ms M Thompson
2011 Dr J Tipping
2016 Dr J Tomlinson
2017 Mrs C Treasurer
2016 Mr A Treece

2010 Mrs H M Turner
2015 Mr M F Turner and Mrs J Turner
2010 Dr B J Tyler
2017 Mr D Vanzandt
2004 Mrs P Verdin
2018 Dr J Wager
2005 Mrs J M Wainwright
2009 Professor T W Warnes
2008 Professor J C Waterton
2014 Mr N P Webb
1964 Professor G Wedell
2014 Dr C Weinkove
2017 Mr I Whelan
1999 Mrs S A Whitaker and Mr P N Whitaker
2015 Mr T Whitehead
2017 Mr A Whitfield and Mrs A M Whitfield
2015 Mr C Whittall
2017 Mrs A Wilkinson
2010 Mr B D Williams and Mrs E M Williams
2012 Dr P C Williams
2008 Mr P Willson
2017 Dr W Wilson and Mrs E Wilson
2008 Mrs B Wingard
2013 Professor D Winterbone
2017 Ms J Wolff
1994 Mr A J Wood*
2009 Mr B Yates
1981 Mr A G D Yeaman
2013 Mr R F H Young and Mrs B Young
2010 Mr L Zastawny

The Manchester Literary and Philosophical Society was founded in 1781 for the advancement of literature and science and the widening of interest in public affairs.

The Main Society meetings are open to the public as guests of the Society, as are the Society's Young People's Lectures.

The Memoirs have been published since 1785. A combined author and subject index up to 1999 is available.

Cover illustration: Song slide from 'ArrahWanna', A.L.Simpson, New York (1906) (from the author's own collection) Taken from Dr Jeremy Brooker's article: 'A Grand Gothic Magic Lantern Entertainment'