# Manchester MEMOIRS

Manchester Lit&Phil

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Editor: Graham Booth

# Manchester Memoirs

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Being the
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## Manchester Literary & Philosophical Society

Editor: Graham Booth

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Dr. Susan R Hilton M.B. Ch. B., DRCOG, MA, FPPH
*President 2018-2021*

# President's Report

It has been a rather unusual and challenging third year of my Presidency of the Manchester Literary and Philosophical Society ('Lit & Phil'), and I pay tribute to all the hard work and dedication of the different Sections, their committee members, the members of Council, and especially to our very hard-working and professional staff, Rachel Croft (Partnerships and Membership Development Manager) and Aude Nguyen Duc (Operations and Volunteers Manager). We have also added Will Stonier to our Office Team, and he took up the post of Events and Development Co-ordinator on 4 January 2021. Our Office Team have also been working from home most of the time. The Society also had a one-off opportunity to give notice on our office premises in October 2020, so, after much discussion and research on nearby alternative office space, the decision was taken to move out of Church House and relocate to our new premises in the Ancoats district of Manchester. This took place in April 2021, with our collection of archives, artefacts, books being moved to secure and appropriate storage for the time being. Also, as much as possible of the paperwork was digitised. I thank our office team for their hard work on this enterprise.

Again, it has been a challenging year, due to the Covid-19 pandemic, causing major alterations to the way of life for all, which includes the changes which the Society has had to introduce in order to continue to fulfil its role and mission. As the Lit & Phil has been in existence since 1781, it is crucial that despite all the difficulties, we survive and find ourselves able to carry on with all the educational and social activities with which we are so strongly associated. One of the aspirations of the Council and Officers had been to hold some of our lectures online, but we were forced to move all our lectures to an online platform, and we have had to do this since March 2020. However, the steep learning curve needed for this has been overcome, though we are very anxious to have 'live' events as soon as possible, especially important for the social side of our lectures, and much valued by all our members.

Members of the Council put in so much time and hard work for

the Society, and these are - Vice-Presidents Chris Baker and Tony Jackson, who have provided invaluable information, advice, and support, as have the Honorary Secretary (Peter Fenn took up this post in April 2021) and the Honorary Treasurers Trevor Rees and Greg Mauchline.

The post of President Elect has been vacant since September 2019, and I stayed on an extra year as President for 2020-21. We now, after an EGM on 13 May, have a new President Elect, Mr Ian Cameron, who will take up the post of President at the AGM on 21 September 2021. Ian is currently a member of the Social Philosophy committee and has been a member of the Lit & Phil since 2010. He has already shown much enthusiasm for the role of President, and I wish him well over his term of office.

The Section Chairs – Dianne Bamber (Science and Technology), Patricia McWilliam-Fowler (Arts), Peter Barnes (Social Philosophy), and Peter Whitaker (Young People) have all run their committees efficiently and provided the lectures for each Section in good time. They are very advanced into the planning of more for the next season – and beyond. Each Section holds an annual meeting, to elect members of that committee, and provide a report on their activities during the year. We now hold these meetings consecutively so that in one hour, members can hear all these reports and have the opportunity to join a committee, or just to hear about the Section activities. This year the meeting was held on 1 June and was well-attended.

Professor Graham Booth has produced another set of *Manchester Memoirs*, which is available free to all members online, and the book is full of very interesting and detailed information about the Society's activity over the previous year. Elected Council Members Chris Boyes, Ronald Catlow, Joanna Lavelle, and Desmond Winterbone have all contributed ideas and practical help in many ways. We also thank Christine Chappelle, our honorary librarian, for all her hard work with the archives and artefacts held at the Society Offices and her advice regarding the recent move.

Throughout the 2020-21 season there have been a great number of lectures, all online, several seminars, though few extra-mural visits (a city walk around Manchester is planned for 21 July, Covid regulations permitting). Due to the ongoing pandemic, and the

varying lockdown measures we have held all our meetings and events online, via the BlueJeans video-conferencing platform. It has been a steep learning curve for all, but I particularly thank our office team for their technical expertise, and also their patience as members and guests also had to learn much new technology – along with our speakers of course.

The 2020 AGM was held on 22 September, and this was online. We were unable to have the speaker originally booked as the post-AGM event but will be re-booking her as soon as the Royal Northern College of Music becomes available again. See the summary of the Council lectures as described in another part of the Annual Report, along with the summaries from all the Sections regarding their own lectures and events, as well as the ongoing programme for the 2021-22 season, as far as we can plan at the moment. The quality and depth of each event was universally high, in keeping with the ongoing tradition of the Lit & Phil, despite the limitations of online meetings, and there were many lively question and answer sessions following the lectures.

We recently had our 240th birthday, and there was a week of publicity around this, on social media and in the Newsletters (the latter are produced every month for the members). The events planned for the coming term (Michaelmas) promise to be our usual high standard, and we hope for a mixture of online and live lectures, depending on venue capacity and Covid regulations. We also hope to have 'hybrid' events when in a venue, so that some members can watch at home if they prefer. I thank each Section Committee for their continuing enthusiasm and time. Our three professional staff, Rachel Croft, Aude Nguyen Duc, and Will Stonier are continuing to provide an excellent and professional service to the Society, with many innovative ideas. Their marketing experience, IT skills, and many other talents have helped the Lit & Phil to run even more efficiently, and we are very grateful to them for all they do for the Society.

The Council lectures are administered by our Council Lecture Working Group, with input and suggestions from all Council Members of course. So, I thank Malcolm Brown, Chris Boyes, David Brailsford, Dhun Daji and Nancy Jaeger for their input to this Group. Malcolm has also continued to efficiently facilitate our

strategic planning group, which has been meeting regularly for the last two years, though with the pandemic we had to focus more on short-term planning for several months. We are now starting to put in place some the objectives for the longer term, always with Council approval, of course. This is necessary, as we are aware that there are an increasing number of societies and organisations who have similar events to ours, which are providing competition. The role of social media is a very important factor, though we recognise that this method of communication will not suit all current and prospective members. Social activities are crucial for many of our members, and these will begin to re-emerge as we come out of lockdown – though a new initiative by Joanne Lavelle and John Glenn, known as 'Forewords' and Afterwords', have provided a platform for informal chats online before and after most lectures.

Occasional surveys, and regular feedback after lectures, continue to be very important, to guide the Lit & Phil as to the opinions of our members, and we are always very glad to hear suggestions from our members too. Members are of course free to make comments at any time, and if interested, to ask to volunteer their services to the Society, such as being on a section committee, or getting involved more actively at live lectures.

The Treasurers have continued to review the Society's finances and always report on these at each meeting of Council. They regularly review our investment portfolio with our investment advisers, Brewin Dolphin, and report their findings to Council. The Society continues to be funded by the investment income, along with members' subscriptions and occasional donations. Total membership numbers have fallen slightly this year (some due to the Covid pandemic, and reluctance or inability to attend online events), and Council is continuing to look at ways to reverse this trend, whilst giving members value for their subscription fees. We regularly have new applications for membership and are hoping to attract more, especially with an aim to be more diverse.

Looking to the future, I am sure that Council and the Section Committees will continue to produce excellent topics and lecturers, of interest to many of our members and guests. We encourage any member who wishes to take part in a committee to put their names forward. The Constitution of the Society dictates the tenure of

office of each section and Council member, and this is continually reviewed.

Termly brochures were composed during 2020-21, and this will be continued. Digital information is much more to the fore, though we are very aware that some members are unable to access this, so postal versions are also produced. As mentioned, every month a Newsletter goes to members, updating them on current lectures, events and other news. A Society Forum was set up last year where members can place comment, ideas, and interesting topics they have come across – very useful, especially to those who have been self-isolating. The website is at www.manlitphil.ac.uk and contains full information about the present and past activities of our Society.

Finally, I wish to thank all our loyal members for their continuing support of this great Society and hope that membership will continue to be renewed – as well as all new members who have joined during the last season.

Dr Susan R Hilton M.B. Ch. B., DRCOG, MA, FPPH
President 2018-2021

August 2021

# Life in a City of Business, Noise and Strangers: work, family and faith in industrial revolution Manchester

*A lecture to commemorate the 600th anniversary of the foundation charter for Manchester Cathedral*

HANNAH BARKER

*15 September 2021*

Let us imagine ourselves walking around the streets by this wonderful cathedral in the late eighteenth century, as the city experienced the beginnings of what would later become known as the industrial revolution. A visit to Manchester 250 years ago would have been an assault on the senses. Though some parts of the town experienced 'improving' measures from the mid-eighteenth century onwards, it was not until the extensive street-widening schemes of the nineteenth century that most central thoroughfares were anything other than narrow and dark, with buildings tightly packed together and their upper levels often jutting out over the streets below.[1] Those wishing to navigate their way around would often have found mud and waste underfoot where pavements had yet to appear, streets bustling with a population hurrying about their business, and the air filled with both the shouts of market and itinerant sellers, and the types of odours one might expect to encounter in the days before municipal sanitation schemes and systematic curbs on air pollution. These sorts of urban experiences – exacerbated in the 'shock city' par excellence as it grew at unprecedented speed – drew mixed reactions from visitors and residents alike, so that, while one commentator described Manchester as 'a dog hole' in 1792, another noted excitedly in 1811 that he thought it 'a busy place' that offered 'a good deal to be seen and learnt'.[2]

Although many provincial towns experienced huge change during the late eighteenth and early nineteenth centuries, perhaps nowhere in Georgian Britain witnessed more dramatic upheaval

than Manchester. Certainly, few places can have attracted more comments on the nature and pace of change from contemporaries at once excited and horrified by it. Manchester was among the fastest growing towns in late Hanoverian England. Between the last quarter of the eighteenth century and the first three decades of the nineteenth, its populations increased more than fourfold. After visiting Manchester in 1784, the industrial spy, de Givry, reported to his masters in Paris that Manchester was not only 'large and superb', but that it 'has been built almost entirely in the past 20 to 25 years'.[3] His view is supported by population estimates. A survey conducted between 1773 and 1774 of 'the houses and inhabitants of the town and parish of Manchester' by 'a person employed for the purpose... at the joint expense of a few gentlemen in the town' counted 24,386 inhabitants in 5,678 families.[4] More modern estimates have suggested that in 1775 the population was closer to 30,000.[5] By 1788, the town's population had increased further to almost 43,000.[6] When the first nationwide census was taken in 1801, numbers had risen to 70,000. This climbed further to almost 80,000 in 1811, over 108,000 in 1821, and more than 140,000 in 1831.[7]

Local commentators were less critical of urban expansion than many visitors, and celebrated the alacrity with which the inhabitants of industrial towns added to their stock of public buildings and invested in cultural space. Joseph Aston remarked in 1819 that 'during the last fifty years, perhaps no town in the United Kingdom, has made such rapid improvements as Manchester. Every year has witnessed an increase of buildings. Churches, Chapels, places of amusement and streets, have started into existence with a rapidity which has constantly afforded matter of astonishment in the minds of occasional visitors'.[8] Spurred on by a combination of commercial motives and cultural aspirations, the residents of northern manufacturing towns were busy transforming the urban landscape. Manchester saw its first infirmary built in 1752 with a lunatic asylum added in 1766. The Theatre Royal was opened in 1775, followed by a Concert Hall in 1777; a Literary and Philosophical Society was started in 1781, and the Assembly Rooms opened in 1792.[9] The later eighteenth century witnessed a rash of library openings in the north of England. According to Kelly, a subscription library was founded in Manchester in 1765.[10] More impressive yet was Manchester's Portico

Library, which was erected between 1802 and 1805 for around £7,000 and boasted a library and a newsroom.[11]

As Manchester grew as a regional centre, it developed specialist and luxury trades and crafts such as silversmiths and jewellers, coachmakers, wine and spirit merchants, barometer and looking-glass makers – all of which nearby towns such as Bolton and Bury lacked.[12] Economic prosperity and diversity, the increase in overseas trade, and a concomitant rise in the middling sorts, lent Manchester a new degree of sophistication during the second half of the eighteenth century that the authors of local histories and guides were eager to describe. The strong continental trading links which Manchester was forming in the industrial revolution prompted the town's historian, John Aikin, to remark in 1795 that:

> Within the last twenty or thirty years the vast increase of foreign trade has caused many of the Manchester manufacturers to travel abroad, and agents or partners to be fixed for a considerable time on the Continent, as well as foreigners to reside in Manchester. And the town has now in every respect assumed the style and manners of one of the commercial capitals of Europe.[13]

Though one might doubt this judgement a little, a quick glance through local newspapers would show you that foreign influences loomed large. You could find advertisements for Johnson and Williams's American soothing syrup, Dr Brodum's botanical syrup from Denmark, Venetian blinds, French corsets and brocades, Genoa silks, Indian muslin, Persian carpets, Italian crapes, French bonnets, Tuscan hats, and Oriental ointment and cordial. Although the grocer, Robert Turner, sold 'London Oysters', he also supplied Manchester's residents with Jordan almonds, Turkey figs, French plums, and Spanish nuts. In addition, and to add to their polite refinements, the inhabitants of Manchester could learn to speak and read French, Italian, Latin, and Spanish, and could also be tutored in 'Spanish guitar' and 'Italian singing'.[14]

The providers of these goods and services – the businesses that dominated the streetscape of Manchester from the eighteenth century onwards – were central to the economic growth and urban transformation that characterised the Industrial Revolution in Britain. Our view of the commercial world in this period tends

to be dominated by narratives of particularly big and successful businesses, and those involved in new and large-scale modes of production. Yet in places such as Manchester, Liverpool, Preston, Bolton, Salford, Blackburn, Warrington, and Wigan, it was not great factories and mills that altered the urban and economic landscape – at least not before the 1820s – but rather the proliferation of small businesses. As Maxine Berg has argued, the transformation of towns and regions in the early industrial revolution in Britain was achieved 'on the backs of a myriad of smaller and medium scale producers, and not on the spectacular but isolated successes of small numbers of giant industrialists and financial elites'.[15]

*Figure 1: View of Market Street, Manchester, 1821: John Ralston,Views of the Ancient Buildings in Manchester (Manchester, 1823-5), plate 4.*

Then – as now – shops offering both daily necessities and more exotic luxuries packed town centre streets. Ralston's view of Manchester's Market Street in 1821, for example, shows the distinctive timber-framed, jettied and gabled structure of William Hyde's grocery shop: at the centre of the picture on the left hand side of the street, with its porch leaning at a rather drunken angle. Next to Hyde's

shop (moving towards the foreground) was the cheese monger and provision dealer Charles Pollitt's premises, in another timbered building. In the more modern four-story brick building adjacent to that, John Hemingway, silversmith and watchmaker operated, with Clough and Hill, ironmongers, next to it and closest to the viewer. On the other side of Hyde's shop was Mary Walker's ironmongers, and next to her, Catherine Crossley's toy warehouse, then an 'exhibition of ancient and modern paintings', the premises of John Wickstead, umbrella maker, and the Red Lion public house. Across the street were shops and workshops variously run by a druggist, a boot and shoemaker, a hosier, a linen draper, another cheese monger, a straw hat maker, a cutler and surgeon's instrument maker, a milliner and a tea dealer.[16] This eclectic mix of small manufacturers, shopkeepers and service providers was replicated both in other Manchester streets, and in other towns, across the North West. Today shop-workers usually commute into town centres to sell goods produced elsewhere, whilst the buildings in which they work tend to house offices above the ground and first floor levels. But in the late eighteenth and early nineteenth centuries, these buildings were generally inhabited day and night by individuals who both lived and worked in them, and who constituted anything from 20-60% of the urban population.[17]

The lack of attention paid to tradesmen and women in the past can be explained, at least in part, by their tendency not to leave a particularly significant mark on the historical record. Sometimes the glimpses found in the archive are frustratingly brief. The portrait of Nathan Wood, pattern and heel maker, inside his house (overleaf) is a good example. Here Wood has been drawn by his friend and neighbour, the saddler, Thomas Barritt, sometime in the opening decade of the nineteenth century. We see Wood sitting proudly (if rather awkwardly, given Barritt's limited drawing skills) in his workshop at the front of his house on Hanging Bridge in Manchester, facing the Collegiate Church, which is visible through the window.

Although the image is suggestive of industry, and also of the sitter's Anglican piety, it is limited in terms of what it tells us about Wood and his life. Was he successful in business? How did he view his position in the commercial and social milieux of early


*Figure 2: Thomas Barritt's portrait of Nathan Wood, Chetham's Library, Manchester Scrapbook, fo. 4.*

nineteenth-century Manchester, and how did others see him? Who else lived and worked with him? How did household and familial relations function? What was the rest of his house like, and how was living and working space organised? These things we do not know, for there seem to be few other surviving records of Wood's life, save for his listing in trade directories over a thirty-year period. But though we know little about Nathan Wood's particular experiences, one can glean some significant insights into the lives of men and women like him, and at least a partial reconstruction of the world in which they lived by piecing together evidence from a diverse set of sources, including court records, wills and inventories, paintings, maps, newspapers, business records, correspondence, diaries and memoirs.

One life I've been able to find out more about is that of George Heywood, a journeyman grocer turned small shopkeeper, who moved to Manchester from Huddersfield in 1809.[18] It was Heywood who noted excitedly in 1811 that he thought it 'a busy place' that offered 'a good deal to be seen and learnt'. Heywood's modest lifetime ambitions were to own a grocery shop and find a companionable wife. As a lower-middle-class man of humble means and limited ambitions, Heywood does not fit the heroic mould of those working-class diarists and autobiographers of the nineteenth century that have more readily captured historians' attention. Yet it is precisely this 'ordinariness' that makes Heywood's journal – now safely sitting in the John Rylands Library – important. His smaller-than-life adventures are the very stuff of small business life and reveal something of a world from which historians and social commentators have traditionally shied away, but which typified life in industrial revolution Manchester.

When he arrived in the town, fresh from serving out his apprenticeship in his native Huddersfield, his first job was with William Hyde at his grocer's shop in Market Street. The situation did not last long. 'Here I had a hard place,' Heywood later claimed. His new employer 'was several times without porter and this made the work heavier upon me as there were only 2 apprentices besides myself'. Although Heywood was clearly unhappy in his work, he complained more about his living conditions with Hyde, noting that

> his house was not very comfortable his beds were very poor, he made more distinction between his family and

> servants than I was used to or wished to see. We were all together, porter, servant, etc. in a very small kitchen, 2 of us slept in a room just large enough to hold a bed.

Such was Heywood's discomfort – both physical and emotional – with an individual he characterised as a 'very sharp man in business and about his servants, almost continually finding some fault,' that he described himself as 'very strange and unsettled all the time I was with him.'

Living with employers, servants, apprentices, business partners, one's own blood relatives, and those of one's employer was a common experience in Manchester during this period and it was more complicated families 'in trade', who form the focus of my of my research, who often lived in the same buildings in which they worked. The period of the industrial revolution in England is often thought of in terms of the separation of home from work – for both middle and working class alike (who moved either to live in the suburbs and work in the town, or to work in the factory) – although for the majority of those involved in small family businesses, the domestic and the commercial continued to coexist under one roof. Uncovering the uses and meanings of household space provides us with insights into both the power relations within households and the different understandings of 'family' among an important section of urban society.

The use of space becomes important when you consider the sorts of buildings in which families and employees both lived and worked – which were often extremely cramped. The relationship between power and space within trading households is most apparent regarding access to certain spaces, which varied both between households, and among members of the same household. This variation can be explained in terms of differing understandings of 'the family' among those in trade, which was itself apparently affected by the amount and type of interior space available to households. There is clear evidence of both the continuance of what Naomi Tadmor termed the 'household family'- defined by coresidence and submission to the authority of the head(s) of the household – into the nineteenth century,[19] as well as the existence of keenly felt gradations of status within households, which often distinguished between those who were related by blood or

marriage to the head of household – their 'nuclear' or immediate family – and those who were not. This does not mean that those related by blood to the head of household, even very closely, might not assume subordinate positions within households. Indeed, this seems to have been the fate of all children while under their parents' roof, whatever their age.

Not only do trading households not fit neatly into models that depict the development or consolidation of the nuclear family in this period, but they also contradict the picture of growing domestic privacy during the eighteenth century.[20] This development has been charted by historians who have described how visitors and customers were increasingly kept apart from 'private' family space, while servants, employees, and lodgers were confined to separate areas within households. While, in some households, rooms such as the parlour or house place were, at least at certain times, reserved for members of the householder's immediate family, this was not always the case. In other houses, restrictions on the size of living accommodation, and the fact that even the householder might have bedded down with his or her employees, made such formal distinctions of space unlikely. Privacy was clearly important in small business households in terms of upholding certain standards of respectability – hence the separation of the sexes to preserve modesty and to prevent inappropriate sexual relations was seen as important – but privacy does not seem necessarily to have been conceived in terms of personal space, nor the constant distancing of the immediate family from others. Among those in trade, it appears that company and physical proximity were often more highly prized than a more modern understanding of private family life. Indeed, such proximity – so long as it was conducted in a fairly harmonious manner seems to have been crucial to both the smooth running of trading households, and the businesses that they operated, as it forged and cemented the types of bonds and understandings that were crucial to the success of joint enterprises.

Though George Heywood was unhappy at his treatment at the hands of William Hyde, he certainly found life more agreeable when he lived with his next employer, Ann Owen, at 39 Hanging Ditch, not least because the pair became lovers. Even before they reached such a state of intimacy, Heywood appears to have been

treated more equitably with other family members and – crucially – was allowed into the parlour or sitting room. Heywood and Owen shared their first romantic kiss together in this room, presumably with none of her seven children present. On another occasion, she appears to have locked her eldest son out of the house during the day in order to meet privately with Heywood, which indicates that, while the parlour was not a sleeping room, it was easily accessible upon entering the house from outside and open to all members of the household. Heywood twice mentions looking through a parlour window to see Mrs Owen, at one time climbing through it when she refused to open the door to him after they had rowed. In happier times, Heywood spent time with Mrs Owen in the 'sitting room', back yard, and the shop, as well as meeting her outside and going for walks. This pattern of outdoor socialising was repeated when he courted his future wife, Betty Bowyer, and suggests that meeting sweethearts, away from the gaze of others, was most easily achieved outdoors in relatively overcrowded trading households, even when one was head of the household and thus more able to exclude subordinate members from certain rooms.

After leaving Ann Owen (following a row with her male relatives keen to protect the family inheritance), Heywood moved four doors down along Hanging Ditch to live with John Jones and his wife Elizabeth, in what was likely to have been a house of similar proportions. Mr Jones's house was likely to have consisted of six main rooms, at least one of which would have been given over to the business if the cellars were suitable for storage, and more than one if not. The ground floor probably contained a shop at the front, a parlour behind, and a kitchen in a rear outrigger. Upstairs, the three or four other rooms devoted to domestic use – whose walls were thin enough to hear conversation through them – would have had to accommodate Mr and Mrs Jones, a female servant, three adult male employees (one of whom, Humphrey, was also related to the Joneses), and at least four children between the ages of 10 and 1 – the three daughters and one son of John and Elizabeth Jones – plus Mrs Jones's two daughters from her first marriage, who were in their mid to late teens. This almost certainly meant that children and employees had to share rooms for sleeping (and probably beds). Trading households such as this, where household members lived

cheek-by-jowl, could not hope to carve out 'private' space for the householder's immediate family (assuming they would have wanted to do so). The manner in which individuals lived in such households also influenced the way in which family was understood. As he moved from household to household, we can see in Heywood's diary evidence both of the 'household family' in the houses of Mrs Owens and the Joneses – where all members of the household were considered as family – as well as of the existence of keenly felt gradations of status within households such as that of Hyde, where distinctions were made between individuals who were related by blood or marriage to the head of household, and those who were not.

Limitations of space would also have affected the ways in which households operated and heightened the need to control certain types of behaviour. For example, domestic activities that demanded the segregation of the sexes – such as washing and mending intimate forms of clothing – required individual household members to be sensitive to the use of particular spaces at certain times of day. Heywood appears not to have understood a set of unwritten rules within the Jones's packed household, which were designed to uphold propriety and reduce interpersonal friction. Although he had lived in crowded conditions before, and had lodged with an employer's family at least three times prior to moving in with John and Elizabeth Jones, tensions about his conduct and his inappropriate use of space still arose. An argument that Mr Jones had with George when he lived at his house is particularly telling of the ways in which living-in was organised and the tensions that could result. Relations between the two appear to have been difficult for some time, which, according to Heywood's account, was largely the result of his attending Unitarian lectures and neglecting to go to the Methodist chapel with the Jones family. It also seems that Mrs Jones was unhappy about Heywood's diary-keeping, which she apparently viewed with suspicion. In November 1814, Heywood reported that John Jones 'attacked me...before we opened shop in a very unexpected manner'. His accusations are worth quoting at length because of the detail with which they reveal the complexity of living-in arrangements in the household:

> Mr Jones begun by saying that he thought I had better lodge out, I felt astonished at this and asked him why, he

said he thought he should give me no reasons at present but proceeded to do it thus:

> You go rummaging up and down the house. You lose many hours about these premises that you have no need to do. It's very inconvenient at meal times. You go out every night and the consequence is Threapland [another journeyman] copies your example that he gets I cannot manage him and Humphrey will do the same. You sit up late every night and it's very unbecoming of you. Women have work which they don't wish every one to see such as mending their clothes, and you sit up every night till Betty [the domestic servant] goes to bed and frequently keep us up for an hour. I don't say its criminal, I don't say you have any bad intention but I say it is highly unbecoming and has the appearance of evil. Why can't you go to bed when the other young men go? I respect Betty as my own sister and should endeavour to put a stop to any snare which I saw laid for her. When you came here you used to go to chapel at least once a day, now you never go. You come in and out and go where you like, the others see you and they don't like to be drummed as they think to chapel. You come to wash you at unlikely times, you have so much time in a morning and have to wash you when the girls are there till I have told them when you come to come out, it is very unbecoming of you. I don't say you have any bad design upon them but it's very unbecoming I have been here 18 years and know that bad practices always begin with such like trifles. Yesterday you come to wash you near 10 o'clock a very unlikely time and you went into the bedroom when Betty was there, you ought to have left the room again immediately. There you begun to black my character, my wife heard you into our bedroom and I'll believe her before any woman, I will not suffer it any longer, that is my determination at present however.

Although men and women appear not to have been generally segregated in terms of daily activities during the eighteenth and early nineteenth centuries, there were clearly exceptions to this rule where sexual impropriety or modesty were concerned: hence

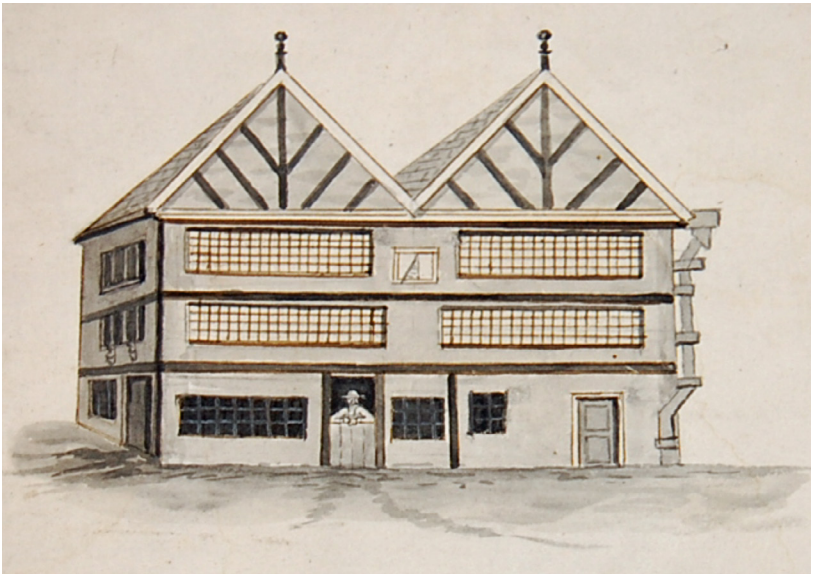

*Figure 3: Barritt, 'Mr Howard's house and Shop' (1819), Manchester Central Library, Archives+, Local Collection, m03712*

Jones's chiding Heywood for washing when female members of the household were present, and for sitting up late in the parlour or kitchen when they wished to mend their clothes. His anxiety appears to have been heightened by the scene of George and Betty's solitary meeting, a bedroom, which suggests that these were considered less scrutinised spaces, and hence more risky meeting places. Interestingly, Jones was clear about his own relationship to Betty, whom he respected 'as my own sister', thus underlining his understanding of the 'family' in relation to the household, and his own paternal role. Later on, Mr Jones appears to have made some apology, and tried to get Heywood to stay, since it would be 'inconvenient having to send for me and sometimes me having to wait till he was ready', if he boarded out. Yet in the same conversation he reportedly told Heywood that he could not cope with so many employees living with him: '3 was more than he could do with in the house', and that 'he could not do with more than 2 on account of so many children if he had no children he could do with a dozen of us'. In many ways, then, the accommodation of children and employees appears to have been interchangeable in Jones's mind.

Not long after the row between George Heywood and John Jones, George left the Jones's establishment, and moved into 18 Old Millgate with his new business partner and former fellow journeyman, Robert Roberts. At the age of 27, Heywood was a head of household for the first time in his life, and, once he had secured his shop and house on Old Millgate, he seems to have been content, and did not move until his death almost thirty years later. Number 18 Old Millgate appears in a sketch of 'Mr Howard's house and shop' by Thomas Barritt from 1819 which appears actually to represent George Heywood. He soon took possession of the whole enterprise once his partner died. With Roberts gone, George and Betty were left in charge of 18 Old Thomas Millgate, which they soon filled with their nine children, plus a variety of employees.

Fairly typical of their class, they appear an unspectacular couple, save for George's habit of diary keeping which survived to the present day. But in their modest adventures and ambitions, they were typical of the retailers and small-scale manufacturers who as a class were central to the story of Manchester during the early industrial revolution. As men and women of largely humble means, it is perhaps not hard to see why they have failed to capture historians' attention. Yet without them, the urban landscape in Britain during the late eighteenth and early nineteenth centuries would have been completely different – and the very transformations in economy and society that we associate with this period would have been profoundly affected as a result. This means that to fully understand the period of the English industrial revolution, in addition to exploring the lives of the Wedgwoods and the Boultons, we also need to know about the experiences and the aspirations of individuals such as George Heywood, Ann Owen, John Jones and Betty Bowers.

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# The "Tiny" Spacecraft Revolution

CRAIG I. UNDERWOOD

*27 September 2021*

## Introduction

Since the turn of the new millennium, technological advances have made it possible to construct small "shoebox"-sized satellites which can each be built for between ~£100,000 and ~£1 million that are none-the-less capable of carrying out sophisticated and useful space missions. These so-called "nanosatellites" open up many new possibilities for space exploration – including missions undertaken by non-traditional space actors.

In 2000, The University of Surrey/Surrey Satellite Technology Ltd. (SSTL) launched the UK's first nanosatellite – the 6.5 kg "SNAP-1"[1] which demonstrated autonomous orbital manoeuvring and remote inspection using advanced commercial-off-the-shelf (COTS) technologies, including an early use, in orbit, of miniature video cameras. Since then, the number of nanosatellite missions launched, in progress or in planning, has grown exponentially – now numbering well into the thousands.

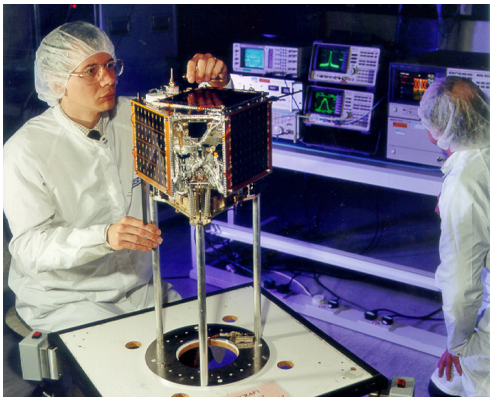

*Figure 1. The Author and the SNAP-1 Nanosatellite under Construction in the Surrey Space Centre, University of Surrey. Image Credit: University of Surrey/SSTL.*

This class of spacecraft is now dominated by "CubeSats"; a standard, first developed by Prof. Jordi Puig-Suari of California Polytechnic State University and Prof. Bob Twiggs of Stanford University in the USA in 1999. A CubeSat is formed of units of approximately 1 litre useful volume (10cm x 10cm x 10cm) – known as "1U". There are 1.5U (10cm x 10cm x 15cm), 2U (10cm x 10cm x 20cm), 3U (10cm x 10cm x 30cm), 6U (10cm x 20cm x 30cm) and 12U (20cm x 20cm x 30cm) variants. Each "U" has a mass limit of up to 2 kg (originally 1.33 kg). Their great advantage is that the use of standardised form-factors, in turn, allows the use of standardised, enclosed, launcher interfaces (usually called pods), which greatly simplifies the process of integrating the satellites into a launch vehicle and deploying them into orbit.

Nanosatellites have enabled whole new classes of Earth-orbiting space missions to be undertaken by universities, commercial enterprises and space agencies, and, in particular, have made it affordable to deploy multi-satellite constellations involving large numbers of spacecraft, as many tens of nanosatellites can be launched and deployed together from a single launch vehicle. The first interplanetary space missions have already been undertaken[3] and soon such spacecraft will be routinely exploring the Moon and solar system beyond[4].

## Small Satellites and Surrey

Nanosatellites come under the general category of "small satellites". The term "small satellite" can have many different meanings, but has generally been taken to identify satellites characterised by the slogan "Smaller, Faster, Cheaper, (Better)" – i.e. satellites designed and built rapidly (typically in a year or so), by a small team, within a highly restricted budget, with a willingness to innovate and take a higher level of risk than is the norm in the highly risk-averse and relatively conservative traditional space industry – a philosophy neatly summarised by the Japanese word "hodoyoshi" ("good enough" or "reasonably reliable"). Thus, in this context, "small" is more a question of design-and-build philosophy than of size.

Of course, not all space missions are amenable to taking a "small satellite" approach however it is surprising what can be achieved – as has been demonstrated time-and-again by Surrey over the last 40 years, across more than 70 space missions.

Despite it being more a matter of philosophical approach than of size alone, often size is used as a common classification system to aid comparison and a slight variation of the established classification [5] is shown in Table 1 below:

*Table 1: Typical "Small" Satellite Classification*

| Size | Mass | Approximate Cost | Approximate Build Time |
|---|---|---|---|
| Small | 500 kg – 1,000 kg | £50M – £100M | 5 years |
| Mini | 100 kg – 500 kg | £15M – £50M | 3 years |
| Micro | 10 kg – 100 kg | £1M–£10M | 1.5 years |
| Nano | 1 kg – 10 kg | £100,000 – £1M | ~1 year |
| Pico | < 1 kg | < £100,000 | < 1year |

The first artificial Earth satellite, Sputnik 1 (launched by the USSR, 4 October 1957), had a mass of 83.6 kg, and the first successful US satellite, Explorer 1 (launched on 31 January 1958) had a mass of just 14 kg – putting both in the microsatellite class by today's standards.

Whilst early satellites were necessarily small, due to the limitations of the then available launch vehicles, satellites quickly grew to the large (multi-tonne) and vastly expensive (£100s of millions) satellites we see today. Thus, during the 1960s-1970s, access to space was seen to be something relevant only to the super-powers – primarily the USA and USSR. The UK was in fact the sixth nation (after the USSR, USA, France, Japan and China) to launch a satellite (the 66kg Prospero launched on 28 October 1971 from Woomera, Australia) using its own independently produced rocket Black Arrow. However, the UK had by then already cancelled the programme, concluding that launching rockets was of little economic value to the UK, and that if we needed satellites launched, we could rely on others to do it for us[5].

In the mid-1970s, a student at the University of Surrey, and keen amateur radio enthusiast, (now Prof. Sir) Martin Sweeting, realised that with the advent of the microprocessor and digital microelectronics generally, satellites could be built that were much smaller and cheaper than hitherto, and yet have capabilities that could match or even exceed those of the traditional large satellites – and so began the UoSAT (University of Surrey Satellite) programme.

This programme ushered in the modern era of sophisticated "micro" satellites.

Initially, the satellites produced were part of the amateur radio satellite service, and so they also carried an OSCAR (Orbiting Satellite Carrying Amateur Radio) designation. Their purpose was to support science and engineering research (for example developing new digital communications technology) and to support STEM (Science, Technology, Engineering and Mathematics) education by enabling schools and colleges to easily pick up their signals.

Surrey's first satellite, UoSAT-1 (UoSAT-OSCAR-9) was a 54 kg microsatellite built between 1979 and 1981 by a team of just 5 students and 5-6 academics/technicians for around £250,000 and launched free-of-charge by NASA as a "piggy-back" satellite, alongside NASA's Solar Mesosphere Explorer (SME) satellite, on 6 October 1981 into a 550 km altitude near-polar Sun-synchronous orbit. The satellite was a great success and demonstrated, amongst other things, that a voice synthesiser chip (the Texas Instruments' DIGITALKER™), could be used to "speak" the satellite's telemetry data and transmit this on its VHF and UHF radio broadcast downlinks for reception by radio amateurs, school pupils, and university and college students, using simple hand-held amateur-band radio receivers[6].

*Figure 2. (left) UoSAT-2 (UoSAT-OSCAR-11) in Preparation for Launch, April 1984; (right) Martin Sweeting Receiving Signals from the Satellite. Image Credits: University of Surrey/SSTL.*

NASA was sufficiently impressed, so that in 1983, they offered a second free flight opportunity, which resulted in Surrey's second spacecraft, UoSAT-2 (UoSAT-OSCSAR-11) which was a 60 kg satellite, designed and built in just 6 months at a cost of ~£500,000[7]. This satellite was launched piggy-back with Landsat 5 on 1 March 1984 into a 705 km Sun synchronous orbit.

This is when the author got involved – initially working in Scarborough as a Sixth Form College Physics teacher using the UoSATs with his classes[8], before moving down to Surrey in January 1986 to support "satellites-in-education" provision across the UK. Using his University of York Physics/Computer Science degree background, he upgraded Surrey's ground-station using the newly available microcomputers (BBC micros, then IBM PCs). He also helped design the new generation of modular SSTL satellites, enabling them to survive the harsh thermal and ionising radiation environments of space, and designed and built various scientific and remote sensing payloads for them, including cosmic ray detectors, ionising radiation dosimeters, ultra-violet radiometers, and CMOS (digital) cameras.

In mid-1985, Sweeting had set up a company – Surrey Satellite Technology Ltd. (SSTL) – then wholly owned by the University – as a mechanism to sell Surrey's satellite "know-how" to the world, bringing in revenue to enable Surrey to continue to design and build satellites and to push forward research on his concept of low-cost access to space. The University of Surrey/SSTL thus quickly gained a world-wide reputation as the leaders in this field, and throughout the 1990s, launched mission after mission, for customers around the world.

*Table 2: University of Surrey/SSTL Missions 1981-2001*

| Satellite | Mass | Launch | Altitude (km) | Customer | Payloads |
|---|---|---|---|---|---|
| UoSAT-1 | 54 | 1981 Delta 2310 | 550 (SSO) | Univ. of Surrey (UoS) | Research |
| UoSAT-2 | 60 | 1984 Delta 3920 | 700 (SSO) | UoS | S&F, EO, rad |
| UoSAT-3 (HealthSat-1) | 50 | 1990 Ariane 40 | 820 (SSO) | UoS & USA (SatelLife) | S&F, rad |
| UoSAT-4[a] | 50 | 1990 Ariane 40 | 820 (SSO) | UoS and ESA | Technology |
| UoSAT-5 | 50 | 1991 Ariane 40 | 780 (SSO) | UoS | S&F, EO, rad |
| S80/T | 50 | 1992 Ariane 42P | 1330, 66° | France (CNES) | LEO comms |
| KitSat-1 | 50 | 1992 Ariane 42P | 1330, 66° | Republic of Korea | S&F, EO, rad |
| KitSat-2[b] | 50 | 1993 Ariane 40 | 820 (SSO) | Republic of Korea | S&F, EO, rad |
| PoSAT-1 | 50 | 1993 Ariane 40 | 820 (SSO) | Portugal | S&F, EO, rad |
| HealthSat-2 | 50 | 1993 Ariane 40 | 820 (SSO) | USA (SatelLife) | S&F comms. |
| Cerise | 50 | 1995 Ariane 4 | 670 (SSO) | France (DGA) | Military Sig. Int. |
| FASat-Alfa[c] | 55 | 1995 Tsyclon 3 | 680, 82.5° | Chile (FACH) | S&F, EO-ozone |
| FASat-Bravo | 55 | 1998 Zenit-2 | 820 (SSO) | Chile (FACH) | S&F, EO-ozone |
| TMSAT (Thai-Paht) | 55 | 1998 Zenit-2 | 820 (SSO) | Thailand | S&F, EO (NIR-Red-Green) |
| UoSAT-12 | 325 | 1999 Dnepr | 650, 64.6° | SSTL & Singapore | EO, comms |
| Clementine | 50 | 1999 Ariane 4 | 580 (SSO) | France (DGA) | Military Sig. Int. |
| SNAP-1 | 6.5 | 2000 Kosmos-3M | 700 (SSO) | UoS SSTL | Technology |
| Tsinguha-1 | 50 | 2000 Kosmos-3M | 700 (SSO) | China (Tsinghua University) | S&F, EO |
| TiungSAT-1 | 50 | 2000 Dnepr | 640, 64.6° | Malaysia (ASTB) | S&F, EO, rad |
| PicoSAT-9 | 67 | 2001 Athena-1 | 800, 67° | USA (USAF) | Military |

**Key to table 2:**
S&F = Store-and-Forward (Digital) Communications (comms);
EO = (Optical) Earth Observation; rad = radiation detection;
LEO = Low Earth Orbit;
SSO = Sun-Synchronous Orbit; Sig. Int. = Signals Intelligence;

a Failed after two days in orbit
b Built in South Korea using SSTL platform and KAIST payload
c Failed to separate from the SICH 1 Ukrainian satellite host

These satellites, all built at the University of Surrey – Surrey Space Centre (SSC), pioneered digital "store-and-forward" communications and carried out critical research into the space radiation environment and the effects of ionising radiation on commercial-off-the-shelf (COTS) microelectronics[9]. They also pioneered the use of digital CCD cameras in space, with UoSAT-1 being the first non-military satellite to carry such a camera (1981).

This research eventually led to the highly successful Disaster Monitoring Constellation (DMC) – the world's first international constellation of Earth Observation (EO) microsatellites, capable of providing images of anywhere on Earth within a 24 hour period for supporting humanitarian rescue and relief efforts[10].

The constellation was initiated with the launch of the AlSat-1 (Algeria) in November 2002, followed by the launch of BILSAT (Turkey), NigeriaSat-1 (Nigeria) and UK-DMC (UK) in September 2003. All spacecraft were built at SSC and were based on SSTL's 100 kg microsatellite platform (SSTL-100). By 2004, the constellation had been fully established with the satellites in their equi-spaced positions around their shared 686 km altitude, 10.30 am local-time at ascending node (LTAN), 98.5 minute period Sun-synchronous orbit.

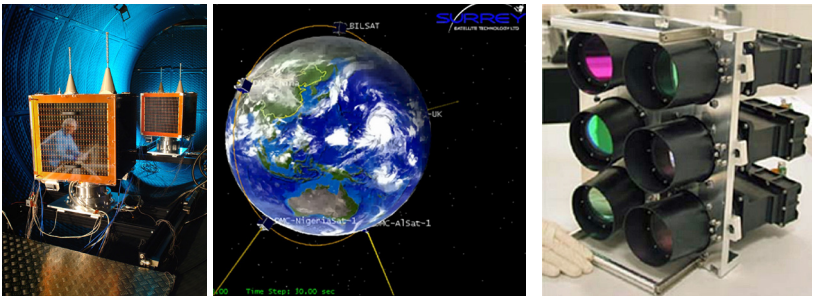


*Figure 3. (left) UK-DMC and NigreiaSat-1 being prepared for Thermal Vacuum Test; (centre) DMC Orbit Configuration; (right) Six Lens Tri-Colour Band Imager (SLIM-6). Image Credits: University of Surrey/SSTL.*

All four spacecraft carried tri-colour near-infra-red (NIR), red (R) and green (G) band imagers that matched the USA's Landsat bands 2, 3 and 4. BILSAT had an additional blue (B) channel, and used area-array CCDs, whereas the others each carried a common 6-lens push-broom linear CCD-array-based imager, capable of imaging a line of 20,000 pixels over a 660 km swath at ~32 m ground-sample distance (GSD). Up to twenty-four 2500 x 2500 pixel (80 km x 80 km) "tiles" could be imaged per colour band per image-take per orbit.

The system was put to immediate use, most notably helping provide images for use as maps by the emergency services following the devastation of the Boxing Day 2004 Asian Tsunami disaster, as well as supporting relief efforts following Hurricane Katrina in August 2005. The system, which has involved 14 satellites since 2002, is currently capable of imaging to better than 1 m GSD and is on call 24 hours per day/7 days a week, and is part of the International Charter on "Space and Major Disasters" – a worldwide collaboration first activated in 2000. The DMC is managed by DMCii (a spin out company of SSTL), EARTH-i and 21AT, China. On average it is called upon about once per month to help with major global catastrophes.

Unfortunately, visible band optical imaging satellites can only see in daylight and cannot see through clouds, however synthetic aperture radar (SAR) satellites can see through cloud and are able to image day or night. SSTL working with Airbus D&S's SAR team at Portsmouth, designed and built the UK's first SAR satellite – the 440

kg NOVASAR-1, launched on 16 September 2018 by a PSLV rocket from Sriharikota, India[11]. Today, constellations of SAR satellites are being launched, such as the ICEYE constellation of 85 kg SAR microsatellites[13].

Surrey's research on Global Navigation Satellite System (GNSS) reflectometry (that is picking up satellite navigation signals reflected off the Earth's surface), first demonstrated on UK-DMC, has led to NASA's CYGNSS constellation[12] of eight 25 kg satellites which now make continuous measurements of ocean surface winds, both globally and especially in tropical cyclones, to study meteorological processes and improve numerical weather forecasts. Over land, the reflectometry measurements can show areas of flood inundation and measure soil moisture for hydrology studies and disaster management.

## Nanosatellites

There is a distinct trend in the small satellite field which echoes that in the world of computers, mobile phones etc. – satellites are becoming ever smaller, or are achieving ever greater capability in the same sized "platform".

The first nanosatellites of the modern era began to be designed in the mid-1990s. The first to be launched was Sputnik 40, a 4 kg Franco-Russian amateur radio satellite built by students as a one-third scale model of Sputnik 1 to celebrate the 40th anniversary of the launch of the world's first artificial satellite. Sputnik 40 was carried to the Russian space station, Mir, by a Soyuz-U rocket, and was launched, by hand, by cosmonauts Anatoly Solovyev and Pavel Vinogradov during an "extra-vehicular activity" (EVA) on 3 November 1997.

The Technical University of Berlin's 8.5 kg TUBSAT-N and the 3 kg TUBSAT-N1 nanosatellites followed, launched on 7 July 1998 using a Shtil-1 rocket from the Russian submarine K-407 Novomoskovsk operating in the Barents Sea. These satellites carried amateur radio store-and-forward communication transponders and TUBSAT-N also carried an experimental reaction wheel and CCD star sensor.

But the real nanosatellite revolution began in 2000, with the launch on 27 January of the Arizona State University's 5.9 kg ASUSat 1 – which sadly failed after 14 hours due to a power system problem that meant the solar arrays did not supply power and the

spacecraft operated on battery power alone. This was followed by Surrey's own 6.5 kg SNAP-1, launched by a Russian Kosmos-3M rocket from Plesetsk on 28 June, the 10 kg Saudi Arabian Saudisat-1a and Saudisat-1b launched by a Russian Dnepr rocket from Baikonur on 26 September, and the 6 kg Swedish Munin, launched on 21 November on a Delta II rocket from Vandenberg Air Force Base in California[13].

SNAP-1 carried 3 payloads: a four (250 x 288 pixel CMOS monochrome) camera Machine Vision System (MVS) comprising three panchromatic wide-angle cameras and one NIR narrow angle camera, which was used to image the Russian Nadezhda and SSTL-built Chinese Tsinghua-1 spacecraft immediately after SNAP-1's separation; a UHF inter-satellite link intended for use with Tsinghua-1 and a spread-spectrum communication system.

SNAP-1 also carried an advanced SA-1100 32-bit RISC-processor based On-Board Computer (OBC), and a full 3-axis Attitude and Orbit Control System (AOCS), based on a miniature pitch-axis momentum wheel with three magnetorquer rods, a 3-axis flux-gate magnetometer, a credit-card sized GPS receiver and a 50 mN thrust butane "warm" gas propulsion system.

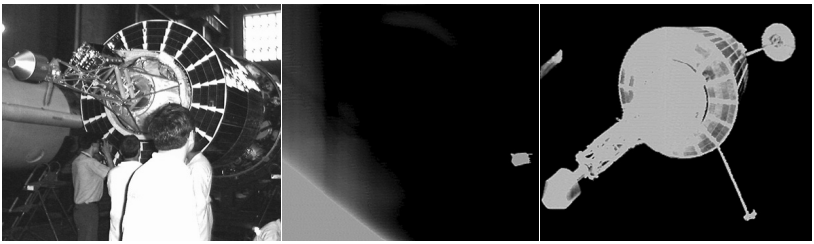

*Figure 4 (left) Tsinghua-1 Mounted on Nadezhda Prior to Flight; (centre) Tsinghua-1 and Earth Imaged by SNAP-1 MVS Camera 2 at 10.5s after Separation; (right) Nadezhda Imaged by SNAP1-1 MVS Camera 3 at 2s after Separation. Image Credits: University of Surrey/SSTL.*

Using this system, the 6.5 kg SNAP-1 was able to manoeuvre itself to attempt a rendezvous with the 50 kg Tsinghua-1, firing its thruster ~4 times per day and changing its velocity by ~10 cm/s per day. Starting from a position ~2 km below and well ahead of Tsinghua-1 on 18 August 2000, SNAP-1 was able to climb to ~1 km above Tsinghua-1

to slow down, closing the separation distance from 15,000 km to 2,000 km by 18 March 2001 – all with just 32 g of propellant. SNAP-1 had to battle the effects of atmospheric drag, which have a more pronounced effect on smaller satellites due to their naturally poor ballistic ratios (smaller spacecraft have a proportionately larger surface area per unit mass, thus suffer more drag).

SNAP-1 was designed, built and launched in just 9 months at a cost of less than £1million – a remarkable achievement at the time, however, this sort of mission is now routinely possible thanks to further development of technology, and in particular to the invention of CubeSats. To this end, The University of Surrey, like Universities around the world, has used the CubeSat platform as the basis of its own recent space missions – independent of SSTL.

## The CubeSat Era

Following the success of SNAP-1, in 2000 the author proposed a new satellite platform, which would make use of "credit-card" (90 mm x 55 mm) sized modules. The resulting spacecraft, PalmSat, (so named as it would fit in the palm of a hand, similar to the palmtop computers then becoming available – precursors to today's "smart-phones") would have a mass of 1-2 kg and would be able to carry out a remote inspection mission similar to SNAP-1. PalmSat would be a hexagonal prism of 15 cm diameter comprising six 7.5 cm x 14 cm side solar panels, with six 7.5 cm x 14 cm solar panels deployed from the base. It would have required a miniature attach fitting ring to hold it on to the rocket ready for deployment.

Meanwhile, in the USA, Professors Puig-Suari and Twiggs had had a similar idea for a 1-2 kg spacecraft, but in their case, it would be a simple ~1 litre volume cube (hence CubeSat) and it (or they) would be deployed from a square cross-section rectangular cuboid "pod". This is a much easier form-factor to work with and is safer to launch, and so CubeSats have become widely adopted around the world as a means of building affordable nano-/micro-satellites.

Within a decade, more than 50 CubeSat missions had flown supporting space engineering education, university research and commercial space business development. Various payloads have flown including communications transponders, miniature cameras, hyperspectral imagers, radiation monitors, GPS and ship Automatic Identification System (AIS) receivers, micro-electro-mechanical

systems (MEMS), miniature chemical and electro-magnetic (ion) propulsion systems, smart-phones, etc. Their low cost has enabled new space mission concepts involving "swarms" or "mega"-constellations for global real-time monitoring (real-time "Google-Earth") and mass communications (internet everywhere).

The first UK CubeSat to orbit was Surrey's STRaND-1 – a 3U CubeSat built by students and young academics and engineers from the Surrey Space Centre and SSTL. STRaND-1 carried a smart-phone (Google Nexus-One) and a high performance computer with a camera as its payloads, but it also flew a newly developed Attitude Determination and Control System, which has since become a commercial product – CubeSense); an SSTL GPS receiver; a water/alcohol resistojet propulsion (WARP) system, and a four-way micro pulse-plasma thruster. STRaND-1 was launched on 25 February 2013 on an Indian PSLV-CA rocket from Sriharikota, India, into a 785 km SSO.

STRaND-1 was followed in 2016 by the AlSat-1N 3U CubeSat, built at the Surrey Space Centre as a joint educational mission between the UK Space Agency (UKSA) and the Algerian Space Agency (ASAL). It flew three UK payloads – the AstroTube carbon-fibre-reinforced plastic (CFRP) boom from Oxford Space Systems; the C3D2" camera from the Open University and the Thin-film Solar Cell Experiment from the University of Swansea and Surrey Space Centre. This mission is still operational as of 2022.

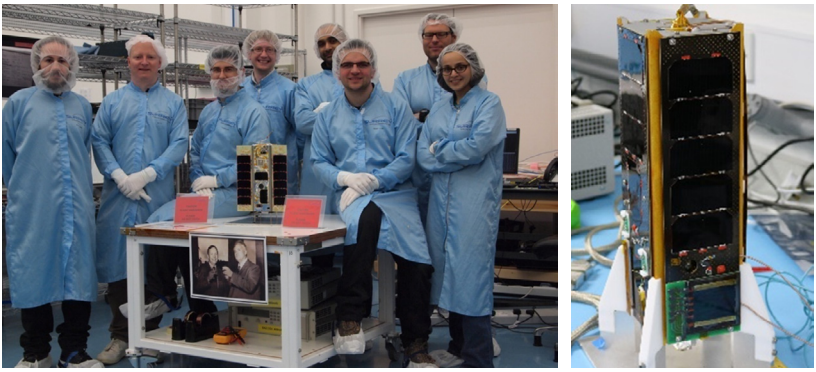

*Figure 5 (left) STRaND-1 With the SSC/SSTL Team;*
*(right) AlSat-1N Ready for Flight.*
*Image Credits: University of Surrey/Surrey Space Centre*

## Space Debris and Pollution

There are already 10s of thousands of satellites in Earth orbit. Every year, we are adding 100s soon perhaps, 1000s more. Aren't we in danger of "filling up" space with junk? The volume of the Earth's orbital environment is enormous – many times the volume of the entire Earth and satellites are useful tools, without which modern life could not function – think how much we rely on satellites for communications, navigation, knowledge of the environment and climate change, weather forecasting, disaster mitigation, defence and security, etc. We need satellites, however, satellites have finite lives, and at the end of their life they do not just "disappear" – in fact, many will stay in orbit for decades, some for centuries and some for ever. These dead satellites are not useful to us, and they do pose a hazard to the future use and exploration of space.

Although space is unbelievably big, there are some individual orbits which are of particular value to us – for example the Geostationary Earth Orbit, or the Sun-Synchronous Orbits. Thus, it is these orbits, which occupy restricted regions of space, that are beginning to get crowded. It is not so much the satellites themselves that are the problem – it is the debris they generate if they collide or break up due to internal explosions (a few have already done so). This debris may impact other satellites, which in turn may cause them to break up, causing even more debris. This runaway cascade effect is called the Kessler Syndrome. If we do nothing about it, space will eventually become unnavigable to future missions as the collision risk will be too high (at orbital velocity, a 0.05 g mass has as much energy as a rifle bullet).

We must therefore start to clean up space. We have to bring "dead" satellites either back into the atmosphere, where they vapourize harmlessly (as a comparison nature dumps about 100 tonnes of metals and rock into Earth's atmosphere every day from space and has been doing so for billions of years), or we need to move them into "graveyard" orbits, where they won't affect space utility and navigation.

To this end, the Surrey Space Centre (SSC), funded by the European Union FP7 programmes DEPLOYTECH and QB50, designed and built the InflateSail 3U Cubesat to demonstrate using inflatable structures and drag sails to bring a satellite down

harmlessly. InflateSail was launched on 23 June 2017 on a PSLV rocket from Sriharikota, India into a 505 km SSO. Shortly after injection into orbit, the spacecraft autonomously deployed its inflatable mast, and then unfurled its 10m$^2$ area polymer drag sail from the end, causing the satellite to experience enhanced atmospheric drag. It plunged into the Earth's atmosphere 72 days later. Without the sail, it would have taken 25 years to fall naturally. This was the first European demonstration of this technique. Two of SSC's drag sails have subsequently been sold to a US satellite company, who have also used them to begin to de-orbit their spacecraft[14].

The next step is Active Debris Removal (ADR) – that is capturing already orbiting spacecraft and disposing of them. Some of the technology needed to do this was demonstrated on SSC's RemoveDEBRIS mission (also funded by the EU under the FP7 Programme).

The Main RemoveDEBRIS spacecraft was a 100 kg microsatellite built and operated by SSTL. This was launched on 2 April 2018 on a Falcon 9 FT rocket from Cape Canaveral, USA, and delivered to the International Space Station (ISS) by a SpaceX Re-supply mission. Astronauts Drew Feustel and Ricky Arnold unpacked the spacecraft and placed it into the ISS airlock, where it was extracted by the Canadarm-2 robot arm, which deployed it into its own orbit on 20th June 2018.

RemoveDEBRIS carried two 2U CubeSats in ISIPods – DebrisSat 1 and DebrisSat 2 built by students and engineers at SSC. On 16 September 2018, DebrisSat 1 was deployed and, when at some distance from RemoveDEBRIS, it inflated its masts to make itself a bigger target. Almost simultaneously, RemoveDEBRIS fired a net at DebrisSat 1, which succeeded in capturing the spacecraft. This is the first time such a technique has been tried in orbit. On 28 October 2018, DebrisSat 2 was deployed as a target for the Vision Based Navigation (VBN) experiment (a camera/lidar system). The VBN camera took 361 images as position and attitude data from DebrisSat 2 were transmitted back to the main spacecraft providing ground truth for the experiment. DebrisSat 2 also forwarded low resolution photos of the deployment from its own camera. Finally, on 8 February 2019, the RemoveDEBRIS harpoon was fired at a speed of 20 m/s at a representative spacecraft honeycomb panel deployed by means of a 1.5 m long CFRP boom. The harpoon struck

and penetrated the target, and the barbs ensured that it did not come free. Unexpectedly, the shock of the impact bent the boom so much that it snapped, however, the tethered harpoon held, it and the broken end ended up neatly wrapped around the remains of the boom![15]

RemoveDEBRIS was the first mission to seriously address the ADR issue, and demonstrated a number of promising future techniques. All parts of this mission have since de-orbited.

## Conclusions

Advances in technology mean that tiny, low-cost satellites are now readily available, providing new paradigms for space mission design. This new era, driven largely by commercial enterprise and developed by academia, has been called by some "Space 2.0" or "New Space". Many of the new actors in space are unaware of the history which led to this revolution, and the role that Surrey has played in these developments over the last 40 years. Space Engineering Research at the Surrey Space Centre is driving the revolution forward to help clean up space, and to "boldly go" beyond Earth to explore the Moon and the planets beyond.

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# Dante and Popular Culture: a slightly irreverent look at how the *Divine Comedy* has infiltrated our lives

EMMA MARIGLIANO

dantealighieri@virgilio.it, *Acrylic on canvas, 2021, by courtesy of the artist, Giuseppe Veneziano*

Most people reading this will be at least a little familiar with Dante, even if that knowledge goes no further than knowing him to be the author of the *Divine Comedy*, or at the very least, *Inferno*, which has been made particularly popular through film and inspired literature. It's certainly often the point at which translators and artists decide to stop – possibly too bowled over by the poet's stunningly graphic descriptions of that dark and

dangerous netherworld. It is true to say, however, since the close of the 19th century Dante's journey throughout the triptych of his afterlife has had a maybe unexpected but certainly far-reaching influence on so many aspects of our lives.

I've chosen to look at Dante's place in popular culture because it is the incursions into art, film, music, advertising and the everyday that have probably succeeded most in bringing Dante to a much more global audience – one that doesn't need to love the poetry in order to 'get' Dante's message. Sometimes the prolific imagery and some memorable lines are enough – the most famous is probably "Abandon all hope you who enter here".

I begin with film because it was possibly one of the first significant movements, from around the mid-19th century, into what we define today as Popular Culture. Many believe that the theatrical, melodramatic, and undoubtedly cinematographic and atmospheric illustrations by Gustave Doré, particularly for Dante and The Bible, opened a door to modernity – thought to be initially through the widespread use of his illustrations in magic lantern shows.

## Film

By the first decade of the 20th century the Italian film industry produced no less than 11 films based on Dante's work and life, of which only a fraction survive. *Il Conte Ugolino*, directed by Giuseppe de Liguoro and Giovanni Pastrone in 1908 is an eight-minute silent film, from which a four-minute fragment has been recovered. The available iconography influenced the appearance of the films and Doré's hand is particularly evident. In 1913 the 44-minute-long *Dante e Beatrice* was released, known also as *La Vita di Dante*. The same visual icons from Inferno tend to be repeated in this film, and one scene was certainly influenced by Henry Holiday's familiar painting of the meeting of Dante and Beatrice on the Ponte Vecchio over the River Arno in Florence.

The most significant, though, is the Bertolin/Padovan production, *L'Inferno di Dante*, launched by Milano films in 1911. John P Welle informs us that it was considered to have brought "cultural prestige for the cinema among (Italy's) traditional literary/cultural elite".[1] He goes on to say that it was the longest film yet made at its advertised length of 1,300 metres, and the most costly at more than L100,000 (equivalent today to around £3.5 million). It was heavily

influenced by Doré's illustrations and the novelist, Matilde Serao, attended the opening and remarked "... if Gustave Doré has written with the pencil of the draughtsman the best graphic comment to the divine poem, this film has brought back to life Dante's work".[2] As an aside, the actors who played Dante and Virgil were chosen for their resemblance to those characters and they both also happened to be mountain climbers – necessary for the frequent climbs up and down the rocky slopes.[3]

There have been experimental art films too, such as *A TV Dante*, a 1990 mini-series from Peter Greenaway and Tom Phillips and postmodern re-telling of the first eight cantos of *Inferno*, with Bob Peck as Dante and no less than John Gielgud as Virgil, with talking head commentaries including a young David Attenborough as the behaviourist.

Of course there have been and continue to be too many more films and TV shows to include here, but one of the iconic images that crops up in film, whether a scene or promotional image is Delacroix's *Barque of Dante* (figure 1).

*Figure 1: The Barque of Dante, Eugene Delacroix, Louvre, Paris. First exhibited 1722. Wikipedia fair use*


*Figure 2: The Sopranos, Series 5, 2004, DVD cover, HBO (Home Box Office)*

*Figure 3: What Dreams May Come, 1998, Polygram (Vincent Ward, dir),*

We can see it more recently in the DVD promotional image for Series 5 of *The Sopranos* (figure 2) and in the still of *What Dreams May Come*, Vincent Ward's somewhat saccharin production starring Robin Williams and Max Von Sydow (figure 3).

## Music and Performance

The *Divine Comedy* has certainly inspired music – by Rachmaninov, Tchaikovsky and Liszt among others - and there are many rock albums with dramatic scenes of Hell on the cover – usually Doré's, such as the album, *Burnt Offerings*, from progressive rock band Iced Earth (1995) showing Doré's Lucifer. Further, the *Dante's Inferno* track is an impressive interpretation of much of the first canticle of the poem – evidence of the influence of the poem itself on its lead singer, proving also to be the most popular piece on the album.

It never is plain sailing through the murky rivers of Hades, evidenced by one of rock band Nirvana's recent Dante-linked litigation. They merchandised a map of Upper Hell first appearing on the 'B' side of its 1989 debut album, *Bleach* – then on T-Shirts, coasters and more. But in April of 2021 it came to the attention of Jocelyn Susan Bundy, granddaughter of C W Scott-Giles – the illustrator of this map which, along with other diagrams, was created by him for the translation of the *Divine Comedy* by Dorothy L Sayers, first published by Penguin in 1949.

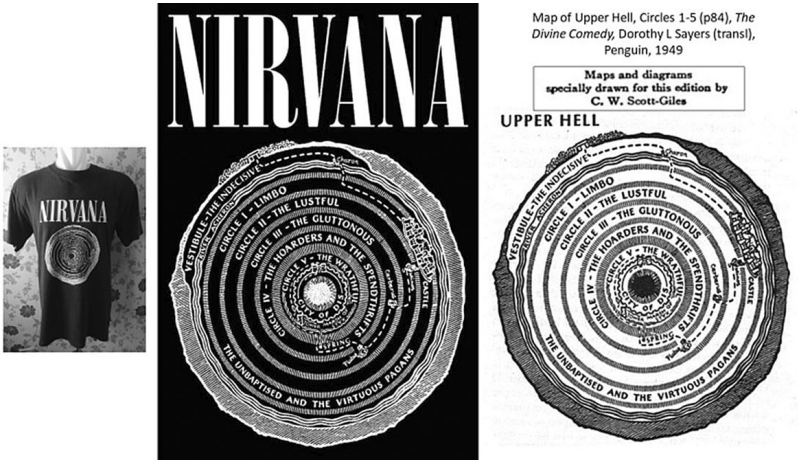


*Figure 4: Nirvana's Map of Hell marketed by the band (from 1989) compared to Giles-Scott's (1949)*

Bundy decided to sue Nirvana who claimed that the illustration was Kurt Cobain's – difficult to argue – whilst also maintaining that it differs from the Scott-Giles one – i.e. a black background instead of the original white background ...? (figure 4). They also claim that the map was in the public domain in America when they came to use it, which was impossible as it hadn't yet come into the UK public domain. At the time of writing it transpires that a Californian judge, asserting that it was based on UK copyright law, dismissed the case, considering it better served by a UK court.[4] The case continues.

During the many Dante 700 events (enjoyed mainly by Italians, thanks to Covid 19 restrictions in force at the time) Verona – Dante's first refuge following his exile – offered a 27-minute performance – *Dante, per nostra Fortuna* – of 21 Cantos from Hell, Purgatory and Paradise created by Massimiliano Finazzer Flory, interpreted through dance. The performance (touring Italy and overseas) was acted out in a backdrop inspired by Gustave Doré's illustrations.[5] This mildly erotic production purports to be interpreted through the eyes of a child who fell asleep whilst reading Dante!

## Comics and Video Games

The first comic interpretation appeared as early as 1949 and was a parody of the *Divine Comedy*, using Mickey and Pluto, designed and illustrated by Guido Martina and Angelo Bialetto, published by Mondadori through its *Topolino* magazine under licence to Walt Disney. 'Topolino' was the Italian name for Mickey Mouse and *L'Inferno di Topolino*, again influenced by Doré's designs, gave rise to a whole series of Disney Dante with comics and annuals of Donald Duck, his three nephews and a host of other contemporary Disney favourites taking on the guise of the Dante characters and having adventures, mainly in Hell, but more related to Disney than to Dante.

Doré's illustrations are often the introduction to Dante for many artists and it was how top Japanese Manga comic artist, Go Nagai, came to the *Divine Comedy*. The image of Doré's muscular Lucifer trapped in ice stayed with him when he created *Mao Dante* in 1971, a Manga adventure honouring Dante merely through the title. He followed that success with another in 1972, continuing the 'demon battle' theme in *Devilman* - borrowing mainly from Milton's biblical references. But Doré wouldn't go away and Nagai decided to create

his own version of the *Divine Comedy* published in Japan between 1994 and 1995 as *Dante Shinkyoku* (*Divine Comedy*), putting his own powerful Manga mark on Doré's illustrations.[6] The work has been translated into other languages.

Dante has really captured the imagination of other comic artists too, such as the Doré-like Lucifer, from Sandow Birk's Dante trilogy, nicely rather than ice-ily trapped in the tightly packed urban sprawl of American skyscrapers and freeways as his teeth crunch on his traitors (Judas, Brutus and Cassius); Texan Gary Panter's steam-punk Hell-riding *Jimbo's Inferno*; American illustrator Seymour Chwast's Raymond-Chandler-inspired *Divine Comedy*; Birmingham cartoonist Hunt Emerson's completely irreverent, occasionally rude and always satirical and hilarious *Inferno* and even such topical accommodations by Canadian Dave Sim in his Doré inspired cartoon strip *Cerebus* in Coronavirus Hell.

Worldwide, another Dante 700 event was "Il Giro del Mondo Dantesco in ottanta fumetti" - "Around Dante World in 80 comics". Comics were selected from 15 countries worldwide, although the UK was conspicuously absent, whilst the USA had numerous entries from different states, and Canada had just two, of which Dave Sim's *Cerebus* was one. Italy was, of course, teeming with selections. The site has a Googlemap pinpointed with each entry from Brazil to Japan. Africa also had no entries and, ironically, there were none from 'down under'! Countries that rarely or never get a mention pricked my attention and some interesting results occur.[7]

Starting from the Americas I looked at *A Divina Comedia de Demetrius* from Brazil – by Will Sideralman and *Descenso a los infiernos*, from Mexico (no illustrator mentioned). Moving across to Europe we find a transcontinental Turkish entrant - *Ilahi Komedya Manga*, and I suspect that this is not Turkish at all, but merely translated from Japanese (by Inan Oner) and published by Yordam Kitap. But I found that this publisher releases social, political and philosophical writings and this publication is perhaps borderline contentious.

In the east of the map were a number of Manga Dante, but the illustration from Russia really drew me. The Pilgrim held a mobile map app (his Virgil?), and an intuitively descriptive graffiti-covered wall as the mouth of Hell, as each circle progressed with the app's directions. I felt it was a fascinating and most interesting interpretation for our times. (Fig. 5)

I also looked at the infamous video game based on an unrecognisable Dante's Inferno - namely, EA's eponymous videogame, released in 2010, immediately followed by comic and film versions.

Christopher Grant wrote an insightful online article on the game "inspired" by Dante's *Divine Comedy*.[8] The storyline is that Dante needs to save Beatrice from the clutches of Lucifer who tells her all about the sins of Dante the Crusader (the usual ones – greed, lust,


*Figure 5: Russian comic and colouring book – 2021*
*(entry for Around the World with Dante in 80 comics)*

anger etc) and ends up having to win a Beatrice that's finding Lucifer ever more attractive as she learns about this new hateful Dante she'd been ignorant of. The whole thing then generally turns into an unsurprising bloodbath.

But where's the influence? The illustration on the cover of the book of the game, published in 2010 by Random House, shows Botticelli's Dante portrait next to the video, supposedly validating the specious claim for the inspiration behind Dante's helmet. Doré is cited as an inspiration, but with little evidence other than, maybe, some vast spaces and forests. Jonathan Knight, the game's principal creator, tells Grant that the Longfellow translation was used because it was much more accessible for today's audience – although most authorities Grant consulted felt that it was archaic and, though revered, not very accessible.

Knight knew his market when he said that he read the poem and thought "this is a video game", but Dante must have turned in his tomb when he heard Knight say, "Through the creative process of developing this game, we have grown quite close to the literary works of Dante Alighieri. It is his vision that we are adapting for this new media ... the game is a celebration of Dante, and ... the classic text ... has inspired us so deeply".[9]

The comic was released days after the game, told from the viewpoint of a compromised Beatrice (as she effectively becomes Queen of the underworld) ... But, as far as I'm aware, Dante gets his woman!

Other so-called Dante-inspired video games follow a similar route – Dante as a warrior hero, vanquishing all the evildoers in his path with other heroes and villains – or perhaps saints and sinners – all typically endowed with six-packs, rippling muscles and lethal weapons.

## Literature, Art and Satire

Unsurprisingly, Dante has had considerable impact in the world of literature and art. In 2003 Adam Kirsch for online magazine, *Slide Culturebox*, wrote in his article *A 21st Century Man; Why is Dante hot all of a sudden?*

> ...our own post-modern literature age has much in common with Dante's pre-literature one. For good or ill, we have become accustomed to thinking in images almost more than in words.[10]

T S Eliot is often quoted as saying that "Dante and Shakespeare divide the world between them. There is no third." This admiration for Dante slipped into his own writing. *The Wasteland* (1922) borrows lines from Purgatorio, a long sequence in *Little Gidding* (1942) is an imitation of Dante's style and Dante's influence can be found in his other works too.

In *Finnegans Wake* (1939) James Joyce refers to "the divine comic Denti Alligator" and admired Dante for giving him the inspiration to invent a new language and referred to him as 'Padre Dante'.

In his novels – *Ragazzi di Vita* (*The Street Kids*) 1955 and *Una Vita Violenta* (*A Violent Life*) 1959, Pier Paolo Pasolini saw Rome as the 'Citta di Dite' – City of Dis - imbuing it with a Dantesque 'bolgia', or hole.

Amiri Baraka (formerly known as LeRoi Jones) wrote his autobiographical novel of African American identity structured, according to the author, to Dante's *Inferno*. But there's doubt, other than assimilation to Dante's sins, that there's much relevance to the poem.

Moving into popular fiction, however, there's no end of Dante novels – in Italy it seems like there's one a month published. Virtually every aspect of Dante and the *Divine Comedy* (particularly *Inferno*) is twisted, turned and moulded into a thriller, a whodunnit, an enigma. Possibly the best-known writer is Giulio Leoni, whose books, first published in 2000, seem to have cornered a big market with his series of crimes investigated by the supreme poet himself. From the seven, so far only three have been translated into English –– reviews indicate less enthusiasm for Leoni's books in the UK. Nonetheless, he's written many historic novels and is very popular in Italy.

Nick Tosches, American crime writer, enjoyed great success with his *Hand of Dante* (2002) about the discovery and theft of the *Divine Comedy* manuscript from the Vatican itself. The Sicilian 'mob' are involved of course, but intriguingly the man called in to investigate is ... Nick Tosches! ... who turns out to be a bit suspect too. Johnny Depp bought film rights in 2007 which, to date, is still "in development" according to the IMDB website.

Matthew Pearl's *Dante Club* (2006) and, many years later, *The Dante Chamber* (2018) both feature giants of literature and art (Longfellow and Harvard colleagues in the US, the Rossetti and Browning crowd in the UK) as amateur detectives tracking down serial killers who use Dante's contrapasso punishments from *Inferno* and *Purgatorio*, respectively, on their victims.

We can go so far as to bring Eliot's heroes together in a novel by Rita Monaldi and Francesco Sorti – *Dante di Shakespeare* - published in Italy in February 2021. The plots in this novel get increasingly weird as Shakespeare's lost last play is discovered and it happens to be about Dante's life! It had good reviews in Italy and seems to have done the rounds here too, but unlikely that it would be a winning combination for either Dante or Shakespeare.

Even if the reader was ignorant of Dante or the *Divine Comedy* they're sure to know who Dan Brown is – and through his *Inferno*, would have met Dante and his sins. Regardless of general criticism of this author and all the lit crit bombs thrown at him – e.g. writing

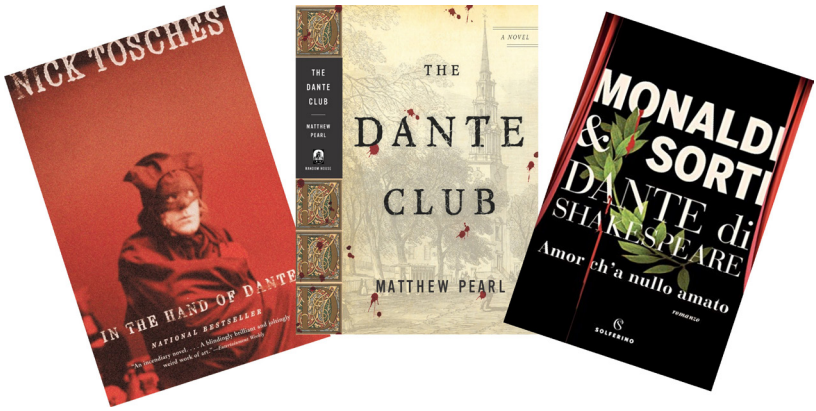


*Figure 6: A selection of contemporary novels based on Dante*

has no literary merit, he gets facts wrong, he's fantastical – Dan Brown is a page turner. We don't question Indiana Jones' or James Bond's impossible feats and adventures because they excite and entertain us, keep us on the edge of our seats. And that's what Dan Brown does, and along the way his readers learn at least a tiny bit of the subject. One certain consequence is that Dante is introduced to a different younger audience who want to know more about those sins, Hell, Florence, chemistry and perhaps even stir an interest in the poem itself (there are many modern accessible translations), and they'll know soon enough that the Vatican doesn't hide Dante manuscripts, or that the *Divine Comedy* isn't a code for conspiracy. Or is it? It's all fun. Brown, Ron Howard and Tom Hanks teamed up once more to make the third Langdon film, where, as the super-symbologist, he understands the enduring impact of Dante on the modern world when just a few lines from the poem seem to be enough to help him prevent the recurring evil-doer's threat to the world.

Although the mid-18th century onward saw more visual interest in Dante and his poem, after around a hundred years of virtual silence (reformation, theology and Catholicism particularly), it was from around the end of the 19th century and its conflicts that inspired artists to re-interpret Dante through visual political statement - replacing some of Dante's sinners with dictators, rulers, leaders and generally unsavoury people of the day

As far back as *Punch* – and further back still – politicians and government were easy targets for satire and caricature.

In Canto XXXII the traitors are described as being stuck in the lake of ice, where Lucifer himself resides, with just their heads showing. In the *Punch* cartoon those sinners include Joseph Chamberlain, who opposed home rule for Ireland, supported colonialism and split both major British parties in the late 19th century. Dante's guide becomes Sir William Harcourt, a staunch anti-imperialist, looking down with disdain at the 'traitor'. The image is directly influenced by Doré's illustration of Ugolino's story, as is a postcard from around 1915/16 – the starvation of Ugolino and his sons retold in Canto XXXIII of hell – a reference to the Irish famine.

The Malebolge, a pit of all that's evil and putrid, is visited in the work of Italian expressionist artist, Renato Guttuso, who made watercolour illustrations of all three Cantos of the *Divine Comedy* for a large folio Mondadori edition published in 1969. The heads of historic tyrants and dictators such as Mussolini, Hitler, Stalin, Mao, Ghengis Khan and others are bobbing up and down in that ditch of effluence.

More recently is the great comic interpretation from Ron Bassilian (author) and Jim Wheelock (illustrator) – transported to Los Angeles. Dante becomes the guide and our author becomes the pilgrim as *Inferno Los Angeles* revisits Dante's epic journey.

Starting from the city's "urban jungle" new characters and contemporary scenarios are woven into Dante's timelessly familiar imagery in an epic graphic brown monotone, occasionally broken by a blue one. In comic style we see Farinata of Canto XI as Leon Trotsky – Farinata degli Uberti was a haughty and arrogant Florentine aristocrat and warrior accused mainly of heresy.

Echoing the lake of Cocytus right up to Lucifer himself, his bat-like giant span of wings flapping and turning the lake into ice, we find a very contemporary work made in Trump's last year of power by the somewhat contentious American artist Jim Shaw. Donald and Melania Trump descend an escalator into that ninth circle of hell, Canto XXXIV, reserved for the traitors – definitely not patriots. It exploits Doré's imagery, but also reveals echoes of Piranesi's *Carcere* (*Prisons*) series and includes Trump's administration too, whom Shaw condemns all to Dante's Hell.

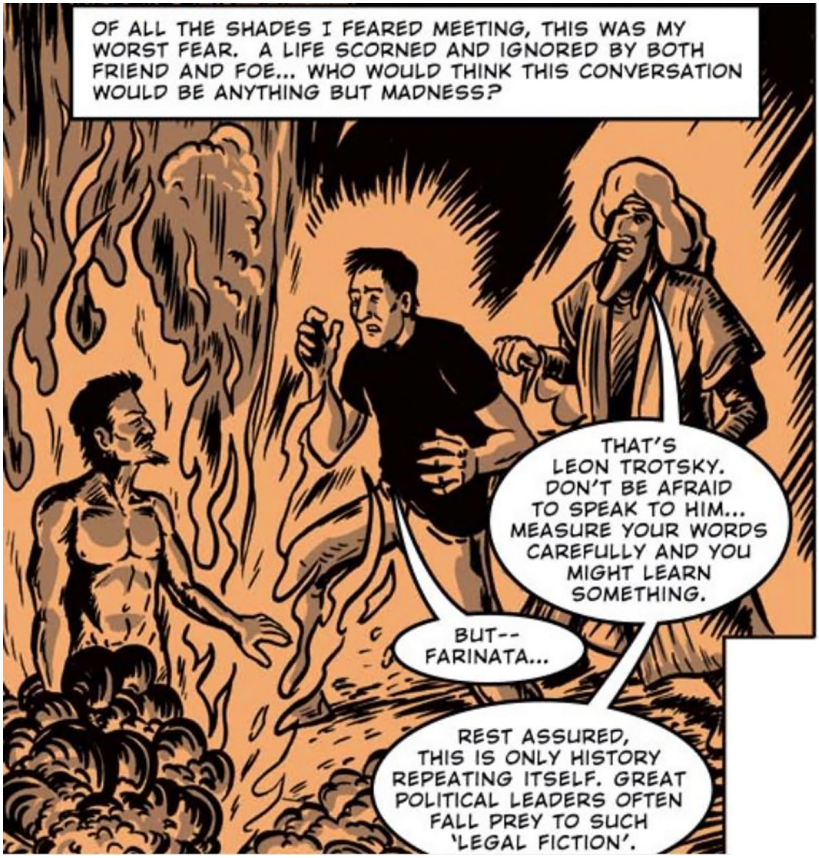


*Figure 7: Pilgrim and guide meet Farinata (Trotsky) in Inferno Los Angeles, 2013, by kind permission of Ron Bassilian, author, and Jim Wheelock, illustrator*

Celebrated British cartoonist, Steve Bell, unashamedly exploits Doré's Inferno, around issues of British Trade with America in the wake of Brexit, Thatcher's closures of coal mines and Michael Howard's short-lived and ineffective leadership. Doré frequently influences Bell's political cartoons.

For the decidedly different I would have to include two Dante themed competitions. The Sand Sculpture competitions, held in beach locations internationally (the Venice Lido in 2009) saw teams

from many countries create stunning huge sculptures of Dante inspired scenes (the theme for that year). The Sultans of Sand were the winning team.

A Body Painting Competition of 2019, on the other hand, required artists to paint the bodies of willing models with Infernal scenes within a time frame. Although some of the entries seemed to miss the Dantean point it looked like great fun for all!

## Adaptations

As we've seen, like most classic works, Dante and his *Divine Comedy* don't escape reinvention. This has mostly happened from the 20th century and it's certainly gathering momentum. But why not have some fun with Dante? It might even give us some insights into his work that we may have missed. Or it might just make us wonder what on earth we are looking at or reading?

Celebrated American artist, Art Young, created *Through Hell with Hiprah Hunt*[11] in 1901. Hunt was a populist preacher who revelled in fire and brimstone and loved anything to do with hell, punishment and the devil. He decides to take a trip to hell just to check that it's quite as bad as it claims to be. This tale tells us about Hiprah's trip, his friendships with the devil and his demons, and his own attempts at stoking and prodding. All great fun in Young's signature illustrative style!

A different kind of parody is *Dan's Inferno; a parody*[12] – a very funny pastiche of Dan Brown's *Inferno* of course – utterly irreverent, not only of Dan Brown but also of Dante, or Dan T Alighieri. We're introduced to "Robert Blandon [Langdon], the world's greatest puzzleologist. Crosswords, Rubik's Cubes, Sudokus - he can do them all." ... which reveals the tone of the book.

Even the great poet Dante doesn't escape erotica. In 1921 villainous sounding artist, Baron von Bayros, created semi-erotic paintings of Dante's *Divine Comedy*. He more or less stuck to the spirit of the poem but added a few unnecessarily titillating touches with the nudes looking as if they were enjoying themselves and some very questionable and possibly blasphemous eroticism amongst the sacred. In the 20th century the erotic became less subtle in some of the literary adaptations. *La Nuova Commedia di Dante*[13] certainly plays with the poem but in a decidedly decadent style – Roberto Piumini provides the words and Francesco Altan the illustrations.

The blurb says

> and if the divine Dante had explored our disgraceful contemporaneity? Here it is. The drowned and the rescued. Milosevich and Benigni ... Bruno Vespa and Ghandi ...finally we can laugh at the vulgarity, without vulgarity.

Then there is the blatantly erotic, which has nothing to do with Dante other than a title. In the Tabu series of mini comics based on literary classics from around the 1960s/70s we find Dante and Virgil happily caper through an enjoyably hellish landscape of sex and more sex, full of large breasted beauties and muscular heroes and varmints chasing each other and generally getting up to no good.[14] Dante is reduced to limerick (and why not?) in a tribute which appeared in *The Florentine* in February 2020 – a mainly arts newspaper produced in Florence. Harry Cochrane created the limericks, based on Dante's poem, and Leonardo Cardini supplied the highly entertaining cartoons which include the demon, in Canto VIII, that Dante describes as breaking wind (figure. 8).

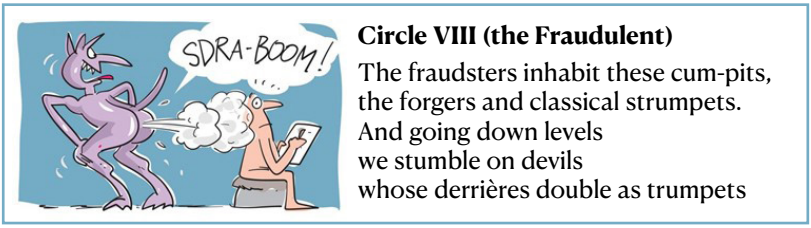


*Figure 8: Harry Cochrane, The Florentine, February 2020 (illustration by Leonardo Cardini)*

Popular culture thankfully provides the opportunity to bring Dante to young readers too and these adaptations are very welcome indeed.

John Agard's *The Young Inferno*[16] introduces a cool hooded dude, who takes Dante's place in travelling through Hell, with an equally cool, but classically consistent, Virgil. Street language is used whilst keeping to Dante descriptions, to which is added a touch of moral instruction for the teenage reader. Satoshi Kitamura's most appealing illustrations are a mix between Manga and Western style.

Still reaching out to a younger audience in *Lasciate ogni speranza, voi che taggate*[17] (*Abandon all hope you who tag*), we have the intriguing and very contemporary tale of an iPhone- and app-obsessed teenager who somehow ends up in a hell without wi-fi, without a signal and absolutely no apps. A guide comes along in the unlikeliest guise ever – of Mark Zuckerberg (!) who ironically shows the teen how to navigate a better internet highway.

## Advertising and Publicity

Most of the examples in this section come, unsurprisingly, from Italy and if the reader should visit the links (provided in the endnotes), even if they don't understand Italian the gist will be generally obvious and my translation is provided where possible and appropriate.

I'm particularly grateful here to Delio de Martino who wrote the excellent book, *Dante e la Pubblicitá*.[18] I couldn't get hold of this even from Italian bookstores. So I contacted him and he so generously sent it to me digitally, in addition to another most useful article. I got much information from these – especially the TV and poster campaigns.

Dante is iconic, everyone in Italy would recognise him, he's taught in schools as Shakespeare is in the UK; his presence, his word (as the Father of the Italian Language) will put a stamp of approval, of credibility, of gravitas on whatever is intended to be promoted – and that face could certainly sink a thousand ships, but may also help to sell thousands of products. Who wouldn't trust Dante?

Hard sell and advertising are not mid-20th century phenomena. At the end of the 19th century, for instance, Italian immigrants in America and Australia mainly, had no access to olive oil for cooking – the fats of those countries were mainly animal fats and margarine. So in 1898 the oil manufacturing company of the day in Italy, Costa (unrelated to the coffee chain!), decided to introduce an oil for export that would be unmistakeably Italian and would celebrate the infant nation after Unification.[19] Olio Dante thus employed not only Botticelli's universal profile of Dante, but the Supreme Poet would himself be seen as embodying Italians everywhere.[20] It's still widely available today.

This was the first notable instance of Dante appropriation for commercial marketing, which thenceforth appeared thick and fast.

The ad campaigns for a San Pellegrino purgative (like Andrews Liver Salts) – used Dante to testify to the efficacy of the product on their posters. One such, appearing in the 1930s, apparently caused offence amongst academics for using a quote from Beatrice - she tells Dante, after he takes the purgative "Son Beatrice che ti faccio andare" – or, "I am Beatrice who makes you go". One complained at this indelicacy to the then Minister for Culture who, in real Neapolitan tradition, responded "You'll have to take the complaint to the Department of Sanitation ..."[21].

Irreverence was not uncommon when it came to using Dante to promote products and a poster promotion for Om, the Italian car and truck manufacturer[22] in the 1930s shows Francesca speaking to Dante whilst Paolo looks lovingly on one of their sporty numbers. Instead of recounting the doomed love between herself and Paolo, Francesca complains that he's more interested in the car than in her.

Dante even promotes the best sports shoe in a poster promoting the Nike Odyssey Terra trainer – particularly for those simonists, thrown head down into a pit of fire, shaking their Nike-clad feet whilst Dante looks on reciting his poem – suggesting that Nike trainers make you feel like you're on fire perhaps?

In 1912 Venetian artist, Wolf Ferrari, designed the first poster for the Olivetti M1 typewriter,[23] – a simple but effective design that showcases the icon of the best Italian literature pointing directly towards another icon of writing – the Olivetti. It's a poster that, to this day, is often shown in exhibitions of Dante's influence, but also of general design excellence. In 1929 Dante appears again on an Olivetti poster – this time with other icons of Italian literature such as Boccaccio and Petrarca, all forming a pyramid that emulates an old master painting, expressing shock at how easy their writing would have been if they'd only had an Olivetti M20! This, again, was reaching out to art, literature and an understanding of Italian culture and heritage.[24]

Staying with the act of writing, Dante is an unsurprisingly good choice to promote related products – and the Stiassi poster shows how useful it would have been to the poet if he'd had the Stiassi autocopy paper – doing away with the messy carbon paper[25] (that many of us may well remember around a mere two decades ago).

DIY also gets in on the Dante act. The quality of the illustration (Fig 9) by Manlio Truscia is particularly impressive and said to have been inspired by Gustave Doré's Dante designs. Truscia's 2013 poster for the global brand, Petronas Lubricants, shows Svitol, (a WD40 equivalent), as *Bricolage's Hell,*[26] 'bricolage' referring here to DIY. The threads represent the circles, with DIYers being given a hard time by the demonic tools. The message ("Without Svitol life is Hell") is to avoid the hard work of DIY and use Svitol. Much going on in a very finely executed piece of work.[27]

TV ads have made use of the great Dante too. A very brief but amusing commercial for Fonseca slippers shows Dante misquoting the ubiquitous opening to Inferno – "I found myself in a dark wood, where the wrong path had been lost" –ends, instead, with "where the slipper was lost" and discovers the slippers that led him in comfort to see the stars again!

Rather than a cute Labrador puppy to advertise its long and strong toilet tissue, Dante was perfect for the ad for Foxy Toilet Tissue which shows him reeling off his poem on a full roll with Beatrice saying to him after reading it, "It's lovely this poem. Divine! But isn't it a bit too long?" And Dante replies, shocked, "Not even one roll!"[29].

In 2012, mobile communication company, TIM, launched a series of very entertaining TV ads using Italian literary and classical heroes – with Dante as a frequent star of the ads to promote the best mobile package of the day.[30] The campaign started with the Supreme Poet – as he's often referred to – uttering these slightly altered first lines from *Inferno*

> Nel mezzo del cammin di nostra vita
> mi ritrovai per una selva oscura
> ché la diritta via era smarrita -
> e senza credito per chiedere aiuto
>
> In the mid-path of our lives
> I found myself in a dark wood
> where the right path was lost -
> and without credit to call for help

As Virgil appears at his side he tells Dante that he can speak to Beatrice anytime with TIM's unlimited minutes. Joyfully Dante then speaks to his beloved who responds that they can talk every day


*Figure 9: Inferno di bricolage, Svitol, for Petronas Lubricants*

– to which he replies, "Yes, but not on Tuesdays –football is on...."[31] Other locations included a disco in Hell, on Charon's boat and a crossword chat between Lucifer and Virgil! All ideal opportunities to take advantage of TIM's offer!

Bringing us up to date and how even Dante pierces the Coronavirus pandemic. An inspired window dressing competition in Rimini required the poet in a Covid-related scenario with a €1,000 prize. Slightly more seriously, however, one image that was doing the social media rounds went as far as showing Beatrice giving Dante the Covid jab - if the Divine Poet thinks it's OK to have the Covid vaccine, then it must be alright! Dante obviously trusts Beatrice implicitly. A pretty good message to send out at a difficult time!

Finally, we conclude our journey through Dante and Popular Culture by taking a very brief stroll on the catwalk. Dante's incursion into the fashion industry has generally been either irrelevant or even crazier than the whole concept of the *Divine Comedy*. But Marco Brancato's designs for a trio of silk scarves really stands out. For the Dante 700 celebrations throughout 2021 Milanese luxury fashion house, Orequo, launched Brancato's unique and eye-catching creations in their accessories department. These represent all three of Dante's canticles. The designer's boldness and 'folk art' style interprets each canticle by colour – the burning red of Inferno, the hopeful green of Purgatorio and the sky blue of Paradiso.[32]

From *Divine Comedy* inspired Tarot cards to board games and Inferno-themed sand sculptures to body painting competitions we can find Dante in pretty much any area of popular culture. Paolo Venti – who produced an excellent online exhibition, *Dante Pop*[33] – says, "Dante endures everything because his work has an indestructible conceptual structure, a visual, linguistic, poetic richness capable of being reborn in every generation. And he knows how to play the game ..." (my translation). I would say that Venti is right on point.

*Fig 10. Marco Brancato, Silk scarves designed for Orequo fashion house, Milan –*
*L-R: Inferno, Purgatorio, Paradiso; by kind permission of Marco Brancato and Orequo S.r.l*

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*Emma Marigliano was the Librarian of the Portico Library in Manchester since 1996 until her retirement at the end of 2017. Within that time she strove to make the library and its collection accessible to as many people as possible and ensured that all were welcome in this formerly exclusive proprietary establishment, building on its events programme and exhibitions as well as promoting a collection that entirely reflected the society of Boomtown Manchester.*

*By the time of her retirement the Library had succeeded in achieving charity status providing it with opportunities for funding its ambitions for the next chapter of its development built on its public facing achievements thus far. The library's mainly 19th century collection stoked Emma's passion for illustrated books which led to her personal and substantial collection of illustrated editions of Dante's* Divine Comedy *and* La Vita Nuova *which is further supplemented by a rich database of illustrators and artists and any visual representation of Dante's work. Emma has given talks on this subject as well as other illustrated literature. She is an independent researcher and consultant and, since 2014, chairwoman of the Independent Libraries Association, established in 1986 and supporting independent libraries in the UK, Ireland and the Channel Islands.*

*All translations from the Italian are the author's own*

# The Future of the High Street

JOHN TIMPSON

*3 March 2022*

I have reached the age, like many of you, when I can look back at a life that didn't go according to plan. I was born into a business that started when my great-grandfather opened a shoe shop in Manchester. At the age of 27, I was a director (far too young) but just in time to be part of a boardroom bust-up when an uncle persuaded the other directors to fire my father as chairman by seven votes to two. That vote triggered a bizarre series of events. Most of the family sold their shares and Timpson became part of UDS (United Drapery Stores).

I worked for a subsidiary, John Collier, putting a trial range of shoes into 20 shops but spending most of my time gardening and playing golf. I went to London to hand in my notice, but before doing so was called into the office of the Chairman, Bernard Lyons, who asked me an odd question: "Do you live anywhere near Liverpool?" After I admitted that Wilmslow isn't that far away, he told me they had a 60-shop business based in Bold Street Liverpool. "I've just fired the Finance and Buying Directors and the Chief Executive, will you go and run it until we find someone decent?" I ran their 60 shops - fur and leather retailer Swears and Wells - for nearly two years, before being brought back to Timpson to replace the uncle who had fired my father.

I quickly learned, as a chief executive within a conglomerate, how important it is to make sure that some other subsidiaries are performing worse than your bit. Fortunately UDS was full of poor performers and I was still in the job eight years later when UDS was acquired by Hanson Trust. The previous year, my wife Alex and I went to one of those charity dinners where you would prefer to hand over the tickets price to the charity and stay at home. That was the night when a lawyer called Roger sat next to my wife and talked most of the night about a management buyout. She didn't understand what he was on about, but thought it was important enough for Roger to come to my office, which he did the following

Tuesday. Five months after we became part of Hanson; I led a buyout that brought a big slice of luck. Due to a misunderstanding over inter-company balances the deal differed by £4m from what we thought we had agreed. £4m in our favour, so we got 80% for the management and remembering the boardroom row, over 50% for myself.

My life was back on track, running the family shoe shop business, but things seldom work out as they should. After a traumatic four years struggling to make any money I sold the shoe shops and kept the shoe repair shops for something to do. That was 35 years ago and since then a lot has changed on the high street - the growth of out-of-town shopping, particularly in supermarkets, and the replacement of mail order by the internet has reduced the footfall in our town centres.

It took until the financial crash of 2008 for the landlords to realise that they could no longer expect upwards-only rent reviews, but the government has yet to get the message on business rates. As a result, in some shopping areas, up to 20% of the retail premises are boarded up. Many of these holes on the high street were due to some spectacular closures of big retailers that didn't keep up to date. Woolworths, British Home Stores, Radio Rentals, Dolcis, Saxone, Freeman Hardy & Willis, Habitat, John Collier, Top Shop, Littlewoods, C & A, Debenhams and Austin Reed are just a small number of the names that you no longer see on a high street fascia. Those retail failures and the change in our shopping habits shouldn't have come as a big surprise.

My great-grandfather's first shoe shop was in Oldham Street, Manchester. In 1869 it was a busy street, the hub of value family shopping in Manchester. Go there today and the footfall has all but gone - indeed it's a miracle that our original shop traded for over 100 years. I finally closed the doors in 1975. By then, Deansgate had seen better days and the best business was being done on Market Street, which would soon face competition from The Arndale Centre.

Shops and shopping have always been on the move. Initially, my great-grandfather expanded his business by opening outlets on the routes that led out of the City Centre, including Ashton Old Road, Bury New Road, Stretford Road and Oxford Road. When I started as a shop assistant in 1960 we still had branches in Harpurhey, Droylsden, Levenshulme and Miles Platting. My grandfather, the

founder's sixth child and eldest son, who became managing director at the tender age of 23, was more ambitious. He saw opportunities in the centre of industrial towns and cities and opened in Liverpool, Bolton, Bury, Sheffield and Leeds, before advancing to the North East, Scotland and Birmingham. We were one of many family multiple retailers who, in the first half of the 20th century, were able to build a profitable business with a valuable freehold property portfolio.

The shopping landscape changed after the Second World War. Major victims of the blitz like Plymouth, Coventry and Bristol had to be rebuilt and suburbs like Gorton and Patricroft could no longer support a retail street. New shopping centres, such as Stretford Arndale, were built all over the country and most of the units were rented by prosperous multiple retailers (a strength that became a weakness 50 years later).

Supermarkets started appearing in the 1950s but only became a major force when Resale Price Maintenance was abolished in 1963 - giving the green light to price competition and allowing the big new out-of-town stores to take advantage of their economies of scale. They were followed by out-of-town shopping development projects - massive centres like Meadowhall, Bluewater and The Trafford Centre, and Retail Parks that were home for B&Q, Halfords, Currys, Harris Queensway and MFI.

Mail order became an important part of retail between the wars, when Littlewoods, Grattan, Freeman's and Kays of Worcester all gained a significant market share, so when internet shopping gained ground in the 1990s, physical retailers were not particularly perturbed - it was simply a replacement for the catalogues. The efficiency of Amazon changed all that, however, and front-runners like Next and John Lewis saw the need to develop an online business. Very recently, Covid and the lockdowns gave digital retail a massive boost. With the majority of shops forced to shut, even the oldest of shoppers had to learn how to buy online.

The last twenty years have coincided with a period when several significant retailers ran out of steam. Most were originally family businesses. Burton the tailors were founded by Sir Montague Burton in 1903 and nearly disappeared in the late 1970s, when made-to-measure suits went out of fashion. The business was revived by new

chief executive, Ralph Halpern, who turned their Peter Robinson store into Top Shop and Top Man, added Dorothy Perkins and created the business that eventually became known as Arcadia and disappeared during the stewardship of Philip Green, who also had a big hand in the demise of BHS. Philip Green was a sharp trader but didn't prove to be a great retailer and never saw the need for an online business.

Perhaps the most spectacular fall from grace happened at Sears, the retail group built by Charles Clore - in particular his biggest subsidiary The British Shoe Corporation, which had close to 30% of the retail footwear market. In the 1970s they were brilliantly managed by Harry Levison, who led a highly talented team of fashion footwear buyers. Their buying power brought with it the chance to obtain substantial backhanders from their suppliers. Levison's successful successor, Harry Harrison, died within two years and their next leader, David Roberts, was a tough men's shoe buyer but never a great leader. As often happens, the start of the end came when they appointed a professional manager from elsewhere. In this case Liam Strong from British Airways became the Sears Chief Executive and, having found evidence of fraud, a few buyers were fired and the shoe shops lost their biggest asset.

Most business decline because they lose touch with the inspired talent that created the company; Jack Cohen, Simon Marks, Stanley Kalms of Dixons and Ken Morrison were all hard acts to follow, but decline can also be accelerated by the financial burden brought by venture capitalists. This was the case at Debenhams, Peacocks, Edinburgh Woollen Mills, Jessops and Mothercare. The high street hasn't only suffered from out-of-town and internet competition, it has also been host to a lot of multiple businesses that simply ran out of road.

Many of the well-known high street names were started by an inspirational entrepreneur. Jesse Boot built Boots the Chemists in the late 19th century, helped by his wife Florence, who developed Boots Booklovers Lending Libraries, which was still flourishing in the Boots on Railway Street, Altrincham next to the Timpson shop where I started work in 1960. William Henry Smith built WH Smith from his news-stand in Euston to become a nationwide network of newsagents. John Spedan Lewis was the inspiration behind the John

Lewis Partnership. Jack Cohen started Tesco, Marcus Sieff was the genius who built Marks and Spencer. Anita Roddick created Body Shop and John Moores, who had an amazing talent for spotting opportunities, created Littlewoods Pools, Littlewoods Mail Order and Littlewoods Stores.

When control ultimately passes on from inspirational founders, the professional managers that take over find it difficult to follow the leadership and vision of their predecessors, a feature that became particularly apparent at Marks and Spencer. All this explains why our high streets have changed so much during our lifetime and why they need to change a lot more over the next 20 years. But physical shopping does not face the prospect of total extinction. With every week that goes by, it becomes clearer that the pandemic prophets of doom got it wrong about the High Street. Our sales and footfall are almost back to pre-lockdown levels and life is returning to the city centres as commuters return to the office.

There is no doubt that town centres will play an important part in the future of society.

There are a lot of vacant shop units throughout the UK, mainly in places where we developed far too many retail premises over the last 40 years. Northampton, which is currently near the top of the empty shop premises league, is a good example. In 1970 our shoe shop on The Drapery, Northampton traded successfully, as did most of the other retailers in the town. Most of the properties there then, are still standing, but the occupants face extra competition from The Grosvenor Centre and Weston Favel, both built in the 1970s. Nearby, at least three busy retail parks have opened, together with several supermarkets. Rushden Lakes is a successful shopping development with 40 shops that includes Primark and M&S, 15 miles down the road. It's hardly surprising there are so many vacant units in Northampton.

Northampton is not alone: too many shops have been built in many other towns, including Wrexham, Dartford, Northwich and on the outskirts of Rotherham. Every shopping centre in the country has suffered due to out-of-town supermarkets. So the rash of empty shops in Northampton is only partly due to an increase in internet shopping; it is also caused by the desire of property developers to develop new property. I have good news for developers,: plenty

more construction is needed, but now the emphasis is on creating a new type of town centre. Originally most towns had a thriving agricultural market that attracted people from the surrounding countryside. Enterprising retailers opened shops to serve a captive audience (have you wondered why so many towns have a Market Street?). As a boy I remember livestock being auctioned in the centre of Kettering - that market has gone but the shops remain.

Today's towns have a different community purpose, a collection of things that you can only do face-to-face - entertainment, coffee shops, medical services, hairdressers, leisure facilities, advice centres and, of course, a key cutting shop. These essential services will create an active social hub, especially if some former shops are converted to residential use. This vibrant activity will attract more retailers, put the buzz back into our town centres and provide the perfect environment for new, innovative and enterprising shopkeepers.

That's my dream for towns from Pontypool to Paisley and Nantwich to Northampton, but it requires enlightened local authorities and inspirational local leaders to create a town centre of the future. Some of the old shopping developments need to be knocked down and be replaced by more town houses and a range of community services.

Thankfully the Government appears to have got the message and is making funds available to help Local Authorities develop forward-thinking plans and plant the seeds for a future high street. The £830m High Street Fund (prompted by the expert panel I chaired for the Government in 2018) and Boris Johnson's £3.6bn Towns Fund will only provide a fraction of the money needed to put our community centres back on track. We only need a small number (no more than six) of local authorities to hit the spot and set a trend for others to follow

Councillors from Northampton would benefit from a visit to Altrincham, a town that hit the headlines 20 years ago for having a high percentage of vacant units. Developers in Altrincham transformed the historic market (Altrincham was a market town in 1290 AD) into a popular food court, which lit a new development fire that is starting to spread through the town. Lots of other towns like Accrington, Hereford and Swansea have a similar opportunity

There is a danger that a period of high inflation, economic instability and short-term local politics will get in the way. Rate payers look for a quick fix, but this is a long-term project that needs to look 10 or 20 years ahead. A lot of money must be spent before local voters can see and enjoy the benefits of their new town. Councils need the support of inspired leaders who have vision to appreciate the art of the possible and councillors will need the courage to invest long-term money, while demolishing those parts of their town that stand in the way of progress.

The regeneration of town centres is a challenge that isn't going to disappear. Councils that think they can sit on their hands and wait until the internet wipes out traditional shopping should dismiss the idea from their minds. Town centres are here to stay - it's time we made them fit for the 21st Century.

If it hadn't been for a few pieces of luck and the odd light bulb moment, Timpson would have been another of the businesses that disappeared from the high street many years ago. Shoe repairing is based on a fundamental financial formula - if you do a quality job and charge no more than a third of the price that the customer paid for their shoes, there is a good chance you will make money, It worked in 1961, which was about the time when, as a trainee, I ruined a few shoes working in our shoe repair shop in Sale. In those days everyone wore all-leather shoes, mostly made in the UK. It got even better when winkle-pickers became the big fashion with women wearing ultra-thin stiletto heels that needed repairing almost every week.

Within five years, however, the winkle-picker fashion faded and shoe shops were full of imports and much cheaper non-leather footwear. Suddenly, the shoe repair market fell by 15% for three years running -15% then -15% and another -15% demand for shoe repairs has declined during almost every year since then. During my career it has fallen by over 90%, but I have seen the benefits of being a major player in a declining market. As the demand for our core cobbling skills crumbled, we had to find something else to fill the gap and fortunately found key cutting. That's why cobblers cut keys. We were lucky, we started cutting keys in 1969 at the very moment that the ironmongers, who, up to then, had cut most of the keys, started to disappear from the high street. It wasn't long before we realised that the way to survive as a shoe repairer was

to do something else. It took over twenty-five years for key cutting to become the biggest part of our business, by then we had added engraving and watch repairs.

While most competitors were still concentrating on cobbling, we became a multi-service retailer, not realising, at the time, how lucky we were to be developing services that would be hard to sell through the internet. We bought a few rivals and profits grew to £3m, but I couldn't persuade the biggest chain to sell.

Mister Minit UK was part of a 3,500 shop global business independently owned by an American based in Switzerland who refused to discuss the sale of his UK business, despite its poor performance. Eventually, he did sell, but not to us. In 1997 the Swiss bank UBS bought the whole of the Mister Minit business, worldwide. I saw this as my big opportunity and went to the UBS office in London to make an offer for their UK shops, but my approach was met with a blunt reply: "We specialise in buying family businesses and putting in professional management," said the merchant banker before adding, "and you are the next one on my list".

That conversation made me think. Suddenly I had a competitor with enough money to cut our prices, open next-door to our best shops and poach our star colleagues. All we could do was to provide a better job and look after our customers. It was only then, after running the business for 20 years, that I discovered the secret behind great customer service. It is embarrassing that it took me so long, because the secret is simple and quite obvious. You can't create great service by laying down a set of rules or running customer care courses that teach colleagues to look customers in the eye and use some well-chosen words. A notice in the back stockroom saying 'Smile, you're on stage' doesn't make much difference. The only way to give truly great service is to trust the colleagues who serve your customers to do it the way they know best.

I should have discovered the secret three years earlier, when I read a book about Nordstrom, a chain of department stores in the United States with a reputation for amazing their customers, employing sales clerks who literally went the extra mile, because they were given the freedom to do their best. In the middle of that book was a copy of the Nordstrom management chart, which was upside down. The sales clerks at the top doing the most important job in

the business and everyone else, right down to the chief executive, there to help and support the colleagues who served the customers.

Once I understood the concept, it seemed so obvious. From then on I was keen to give our branch colleagues total freedom, so we scrapped most of our rules and kept just two:

> Rule 1. Look the part - wear our uniform, turn up on time and keep the shop tidy.
>
> Rule 2. Put the money in the till.

At the same time I copied the Nordstrom way and turned our management chart upside down, setting out on a crusade to promote 'Upside Down Management'

At first, few colleagues took any notice: they simply didn't believe that anyone would run a business by letting employees do their own thing. So to encourage their freedom, I introduced some guidelines. I said that everyone - even those who only joined the company that week - could spend up to £500 to settle a complaint without referring to anyone else. I also declared that the price list should just be used as a guide: if a customer deserved a discount, the colleague had my authority to charge a lower price.

It took nearly five years to get my upside down management to work - the first problem was middle management, who said they shouldn't be held responsible for their performance if they couldn't tell their team what to do. They were also nervous that by handing over all control there wouldn't be a job left for them to do. We had to teach them a different and better way to be a boss. The role changed: instead of issuing orders, they did whatever they could to help team members do a great job by giving support and clearing obstacles.

We learnt a big lesson. Upside Down Management only works if you have the right people. We need positive personalities who are popular with their colleagues and pleasant with our customers. But instead of recruiting impressive characters we were looking for shoe repairers and key cutters. You can usually teach a positive personality to cut keys, but it's pretty well impossible to put personality into a grumpy cobbler.

To make sure we were picking the right people, we introduced a new interview form. It showed a number of caricatures of characters - Mr Keen, Mrs Helpful, Miss Happy and Mr Punctual - there were

also some less positive pictures - of Mr Dull, Mrs Jobsworth, Miss Scruffy and Mr Grumpy. There is an empty box under each picture. All the interviewer has to do is to get the candidates to talk about themselves and tick the boxes under those pictures that most fit the person in front of them. We don't bother with psychometric testing and Jobsworth and have little interest in the candidate's qualifications or what they have written on the application form. If a candidate ticks enough of the right boxes, we ask them to work in one of shops for a day, with an existing colleague who really gets it - that tells us all we need to know.

Almost half our new recruits are introduced by an existing colleague, so we are full of families and friends. At 10%, the second biggest source of our new recruits is from prison. This is something that started 16 years ago when James, my eldest son and chief executive, visited Thorn Cross, a prison near Warrington, to arrange a conference to be held in the prison the following week. Matt, the inmate who showed James round, impressed him so much James handed over a business card saying, "When you get out get in touch and I will find you a job". Matt is still with us, a very successful senior branch manager. Meeting him made us learn a bit more about ex-offenders. We discovered that over 60% of people leaving prison re-offend within two years, a figure that drops below 20% for those that have a job. We also found out there were about 85,000 people serving sentences but, despite that population including many talented people, no employer was actively recruiting from prison.

Initially we made a few mistakes, by picking the wrong people and quickly learned that we can't perform miracles. About a third of the prison population are hardened criminals who are not for us. Another third have drug addiction or mental health problems that we aren't equipped to deal with. But at least a third have the potential to be great future Timpson colleagues. Over 500 of our current colleagues joined us directly from prison. Some have been in one of our five prison workshops, learning the job while they are still inside, others start working in our shops before they leave prison. They are part of a scheme called ROTL (released on temporary licence). This morning, about 40 people will have left prison to spend the day working in one of our shops, returning into custody at the end of the working day. This can work for up to four

months before their release date, giving many ex-offenders enough time to be promoted to branch management while they are still in prison. I told you earlier that over 60% of people leaving prison re-offend within two years, a figure that drops to under 20% if they have a job. With us, the re-offending rate is less than 3%.

The key people that make our upside down management method really work are the 50 area teams that support our branches colleagues out in the field. Typically each team looks after about 50 shops and 85 colleagues. Their most important job is to recruit the right people by finding personalities that anyone would rate 9 or 10 out of 10. Their next most important task is to say goodbye to colleagues who don't come up to the mark. You can't create a great workplace if colleagues are expected to work alongside people who don't love the job as much as they do. Too many organisations fail to tackle the problem of poor performers. Due to HR rules and a lack of determination, sub-standard staff are allowed to hang on, doing more harm than good. Honest conversations are much better than warning letters and performance improvement programmes. We prefer a 'leave as friends' discussion that helps the poor performer find their happiness elsewhere as nicely, as generously and as quickly as a possible.

Our bosses aren't allowed to issue orders; they do their job by supporting the members of their team, helping them to become the best they can possibly be. That means the boss does a lot of listening. If a star performer runs into a poor patch, almost certainly something will be going wrong in the rest of their life - family problems, divorce, bereavement, an addiction or debt. It's the bosses' job to give support and advice - some area managers tell me that they spend over half their time being a kind of social worker, giving sympathy and sorting out personal problems. When it comes to debt, as long as it isn't an enormous amount, we have a simple solution - we just lend them the money - it helps to make sure that they don't break Rule 2, which is, if you remember, to put the money in the till!

It is not just a question of sorting out problems, we also think it's important to find imaginative ways to say 'thank you' and 'well done' that's why everyone who works for us gets their birthday off and we have 19 holiday homes where colleagues and their families can

stay for free. We have the usual long service awards and recognise special birthdays and weddings (our driver Martin becomes the wedding car about 40 times a year). We also like to spring surprises: the best praise comes out of the blue. Every month we promise to make at least one colleague's dream come true, which often involves a trip to the other side of the world to meet a long-lost relative, a romantic trip to Las Vegas or funding an expensive course of dental treatment. We have even paid for two divorces.

Upside down management doesn't just give freedom to those colleagues who serve customers. Everyone, throughout our business, can do their job the way they want, as long as they give that freedom to every member of their team. That is why our managers can use their initiative to hand out praise, like the area manager who arrived at his best performing shop to spring a surprise - two tickets for a weekend in Paris - with the manager's partner waiting outside in their car all packed and ready to go straight to the airport. We like breaking the rules to amaze our colleagues.

Too few executives realise that colleagues are the vital ingredient of every business. They mistakenly think that an organisation should be run by administrators, sitting in Head Office, driven by a computer. The central team must set the strategy and create the culture, but day-to-day decisions should be made by the experts - the colleagues who serve customers, drive trucks, and raise invoices. Sadly, most head office executives believe they know better and devote much of their time to developing polices and writing procedures that tell the operators what to do, rather than trust them to use their talent and experience.

Consequently Head Offices are full of rule makers who get in the way of real success. It gets worse: they not only lay down the way every job should be done, but also measure performance and check that everyone is following their official process. No wonder we are so inefficient in the UK.

I want executives to trust frontline colleagues to do their jobs in the way they know best - Head Office is there to help, not to hinder. Good managers never issue an order, they help their team members to be the best they can possibly be, by providing training, support and encouragement. Instead of inventing rules they should be sweeping any obstacles out of the way.

It is what I call 'Upside Down Management'. I am on a mission to help every senior manager 'get it'. Upside Down Management can't work without the enthusiastic support of the Chief Executive. Sadly most organisations follow what they believe to be 'Best Practice' and fill their day with data, appraisals, dashboards, mission statements and 'deep dives' in the search for more policies and processes. Consequently our offices blocks are full of busy middle managers doing the wrong job.

Many organisations talk about empowerment when they really mean consultation. They simply ask colleagues what the company should do, but continue to keep control of policy and process and make sure every colleague sticks to the rules. To improve their business, executives must turn their thinking upside down, by trusting frontline colleagues with the freedom to choose how their job is done and giving them the authority to make decisions. That is true empowerment. Think about it: suddenly you have a company full of positive colleagues who are free to use their initiative and improve the business.

I guarantee it works as long as your organisation is full of positive personalities who rate 10/10. If you have great people, look after them with plenty of praise, kindness and recognition. We ended 2019 by taking 182 great frontline colleagues on an amazing trip to Iceland - it's the sort of wow factor that puts a big buzz into upside down management and shows that everyone is of equal importance.

My challenge is to prove that upside down management isn't just for cobblers. "It's alright for you" say some CEOs in big offices, "but it won't work in financial services / FTSE100 companies / or a sector controlled by a regulator". I disagree, it is true that when we introduced upside down management we only had just over 1,000 colleagues, but now we have over 4,000 and it works even better. I reckon the way we look after our frontline colleagues puts an extra 40% on our turnover and by cutting out the policy and process we save loads of overheads that can be spent on making our colleagues feel special. In my view, the bigger the organisation the bigger the benefits brought by upside down management, so the biggest potential gains to be made should be in the NHS. Bigger and bigger budgets, mushrooming management teams and the rigid central development of policies, regulations and pathways need to be replaced by a huge dose of common sense.

During lockdown there has been a significant shift from private to public sector. In spring 2020, like many other companies, Timpson was fighting for survival. We carried out a dramatic cost-cutting exercise with a sizeable (22%) reduction in our workforce. It was tough, but we now have much higher proportion of 9s and 10s and the company is much more efficient as lockdown ends. While we were developing a new business model a large chunk of the Civil Service simply carried on as before. While the private sector was saying goodbye to the poorest performers, public sector employees kept their jobs and started working from home (perhaps out of sight and out of mind!).

It gets worse. Covid gave our Government the chance to tell us how to run our lives - stay at home, one hour of exercise a day, the rule of six, mandatory masks and Covid passports. It established a move to more central control, with Whitehall making personal decisions on our behalf and stimulating the economy with multi-billion pound infrastructure projects with more regulations and more regulators. This now requires more civil servants with inflation-proof pensions. The Government should go on a diet.

To finish, I would like to make a desperate plea on behalf of those children and families who need better support from children's social workers. It's a pressing topic following the two very distressing cases of child cruelty that surfaced before Christmas. There will be enquiries, as there were into the deaths of Victoria Climbie and Baby P, in Haringey, but I hope the investigations look beyond individual circumstances and take a proper look at the social workers' role. If so, they will discover that less than 20% of a social worker's time is spent talking to children and families, while 80% is devoted to administration. Every enquiry leads to another layer of safeguarding and more guidelines for social workers to follow. Leaving even less time to do the job. The administrators may be safeguarding themselves but in covering their own backs they are putting more children at risk.

People who sit in offices or work from home can do more harm than good by creating policies and laying down procedures. Rather than issuing orders, their job should be to support the social workers to become the best they can possibly be. If fully-trained social workers can spend most of their time talking to families and

are trusted to use their initiative, the change to our children's social service would be transformational. Four times as many families would get help at no extra cost. Morale would go sky-high, making a massive difference to the recruitment and retention of social workers. Overheads would plummet as government departments and local authorities stop writing rules, niggly processes are scrapped, fewer boxes are ticked and all eyes are concentrated on the outcomes achieved for the children and their families.

## Conclusion

When I produced my High Street Report in 2018 I used the phrase 'Upside Down Government', in the belief that government is there to support the people on the frontline who make things happen. We would be so much better off if our Government realised that they don't run the country - they are there to make things easy for those that do. Our Children's Social Services and the NHS would be much more effective if the nurses, doctors, teachers and social workers were trusted to do the job they went into the profession to do.

The high street will survive and town centres will flourish if decision makers use common sense and provide every community with a local hub. The biggest danger is that government, big business and local authorities think they are in charge, running affairs from head office. We need inspired locals leaders who have the vision to create town centres that provide a true service for their community

*Sir John Timpson CBE was educated at Oundle and at Nottingham University. In 1987 he sold the shoe shops which were part of the family business established by his great-grandfather to concentrate on the shoe repairing and key-cutting business which has diversified into engraving, watch repairing , dry cleaning and photo-processing. The company now has over 2,000 branches. In 2018 Sir John chaired an expert panel that made recommendations to government on future planning for town centres. Sir John and his late wife Alex, by whom he has five children, also fostered 90 children over 31 years. In 2000 he wrote* Dear James, *which passes on the lessons he learned in 25 years as a Chief Executive to his son James. A management maverick, he describes his business philosophy in* How to Ride a Giraffe, Upside Down Management *and* Ask John. High Street Heroes *was published in 2015 and* Under Orders *is the diary of a racehorse owner's husband. His latest book* Keys to Success *gives 50 tips from a management maverick. He has a weekly column in the* Daily Telegraph. *His CBE was awarded in 2004 for Services to the Retail Sector and in 2017 he was knighted for Services to Business and Fostering.*
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# ‘Always on’ – Lessons Learned from Research into Problematic Social Media Use

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A prisoner in the United States has recently been released after spending 44 years in prison for attempted murder. Walking around a now very different New York City, the 70-year-old found himself bewildered by the world in front of him. Watching people talking to themselves with headphones dangling from their ears, he was reminded of CIA agents. People barely paid attention to their surroundings and instead studied their smartphones while crossing the street, engrossed in their own personal bubbles. In 40 years, technology has dramatically changed the way we live and the way we relate to one another[1].

Today, internet use on the go has become the norm. With their computational power, smartphones allow us to have a wealth of information and communication opportunities at our fingertips, anytime, anywhere, especially with the use of social networking sites. Online social networking sites are social media where people connect to others who share similar interests. Social networking sites include the very popular ones like Facebook, Instagram and Twitter. But they also include other, more niche sites, such as online games – where people share an interest in gaming – and online dating apps such as Tinder – where people share an interest in dating[2]. Most of us use several social networking sites. Today, the average person has eight social media accounts[3]. We are indeed very well connected with the world online. Social networking is a way of connecting with people.

In our technophilic society where images and idealised representations of the self matter, capturing an experience on social networking sites is like authenticating the experience. If the experience was not on social networks, it might not exist. I research this[4]. Participants in my studies have said that taking photos and sharing experiences on social networks makes the experiences

more "real" or authentic. Also, they said that relationships are not recognized by their social community unless they were "officially" stated on social networks. This is why being "Facebook official" is a big step in relationships these days. It is an unwritten code of conduct – once a relationship becomes serious, it is time to make it Facebook official.

In the present day, we are living increasingly mediated lives. Nowadays, social networking does not only refer to what we do, but who we are and how we relate to one another. Social networking is a way of being and relating. This is supported by empirical research. A younger generation of scholars has grown up in a world that has been reliant on technology as integral part of their lives. This makes it impossible to imagine life without being connected. This has been referred to as an 'always on' lifestyle by Danah Boyd, one of my favourite media scholars who is a partner at Microsoft Research and leads the Data and Society Research Institute. She says the following: "It's no longer about on or off really. It's about living in a world where being networked to people and information wherever and whenever you need it is just assumed"[5].

This means two things. First, being 'on' is the status quo. In my research, my participants told me that they are online most of the time[4]. Instant communication and social interactions are central to their social networking and their smartphone use. Social networking allows immediate contact in many forms: by call, text, or using social networks. This gives my participants the impression that they are never alone. For several participants, social networking helped to combat periods of loneliness. They were able to keep in touch with family and friends, irrespective of their geographical location. This is what is referred to as the phenomenon of space-time compression which we find online: There are no boundaries to time and space. You can connect anytime, anywhere. There are no geographical or temporal restrictions. Social networking allows us to connect anytime, anywhere.

Second, there's an unwritten rule in today's technology-loving culture that you must engage in online social networking so as not to miss out on what is going on, to stay up to date, and to connect. Danah Boyd herself says that she needs to go on a "digital sabbatical" so that she can be offline, to take a holiday from connecting. The

caveat for her is that even when she is on holiday, she still engages with social networking, but decides which messages to respond to[5]. She may decide to reply to a message on Facebook Messenger, but may not respond to a comment on Twitter. Social networking is the status quo.

I wonder why people engage with their technology when they are in a social context, out for dinner with friends, for example? I have researched this and today we know that engaging in social networking a lot is partially due to the 'fear of missing out' (FOMO). FOMO is "a pervasive apprehension that others might be having rewarding experiences from which one is absent"[6]. Higher levels of FOMO have been associated with more Facebook use, lower mood, lower wellbeing, and lower life satisfaction, as well as inappropriate and dangerous Social Networking Site (SNS) use (i.e., in university lectures, or whilst driving). In my studies on technology use, I have talked to many psychotherapists and clinicians who were looking after clients who have problems with their technology use. They have told me that especially their young clients "fear the sort of relentlessness of on-going messaging ( . . . ). But concurrently with that is an absolute terror of exclusion"[7]. Being temporarily excluded from your physical social group appears to be better than being temporarily excluded from your online social groups. Experiences want to be authenticated on social networks.

Messaging on social networks is relentless as there seems to be an expectation of immediate responses. If you do not respond to a message straight away, you might miss out on something important. You might be excluded from your peer groups, which is something that we all want to avoid. We are social animals and need our social groups on a very basic level – to fulfil our need for belonging. Over the years, I have talked to many technology users. One put it very bluntly saying that when he is at home watching Netflix, he has his phone in his hand just in case there is a message coming through so he can respond straight away[4]. This is taking the idea of technology being the extension of man very literally!

In the 1960s, the Canadian media scholar Marshall McLuhan wrote about media as the extension of man[8]. This holds true today more so than ever! Our social networks, mostly accessed via our smartphones, have become extensions of ourselves, extensions of

our physical bodies, extensions of our minds. Just walk the streets of Nottingham, Barcelona or New York, and you will find the same thing: People walk through the streets and are engrossed in their phones because they are engaging in social networking. Social networking is a way of being.

Adolescents especially have subscribed to the cultural norm of continuous social networking. They create virtual spaces which serve their need to belong, as there are now limited options of similar physical spaces because of the safety concerns of their parents. Being online is viewed as safer than roaming the streets. One of the psychotherapists I've spoken to said the following: "Use of digital media is the culture of the household and kids are growing up that way more and more"[7].

Socialisation is a key motivation for using social networking sites, but it isn't the only one. There are a number of reasons for why we use social networks. From a uses and gratifications perspective, we use social networks to find information, to form identities, and as a way to present ourselves online, ideally in a flattering way. We also use social networking to be entertained and to pass time. Other reasons for using social networking are voyeurism, and to getting a glimpse into other people's lives from afar. And there's also cyberstalking, where people stalk others online, sometimes with bad intentions and possible detrimental impacts on individuals' health and wellbeing as well as their relationships. Social networking changes the way we relate to each other.

I advocate using social networking to connect with others, especially in a time where physical get-togethers are very limited. I want to embrace the opportunities social networking brings along for all of us, the ways in which it can foster a sense of belonging and the creation and maintenance of communities across geographical and temporal boundaries. Social networking allows us to feel connected and to be part of our communities, and this is a core function. Social networking is a way of being. However, the downside is that high engagement and being always "on" or engaged with social networking has been considered problematic and potentially addictive, but if being 'always on' can be considered the status quo and most people are 'on' most of the time, where does this leave problematic use? For some individuals, social networking can be

problematic to the extent that they may experience symptoms traditionally associated with substance-related addictions, namely salience, mood modification, withdrawal, conflict and relapse[2].

So what can be done to ensure that we use social networks in a healthy manner and avoid possible problems along the way? Social networks are with us to stay, so not using them is not a realistic option. Instead, I advocate beneficial use where people have an increased awareness of the possible drawbacks of social networking. There is a time and place for social networking.

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# Aviation, Shipping and the Climate Change Challenge

ALICE LARKIN & ABHILASHA FULLONTON

*23 March 2022*

**Summary**

The rapidly growing $CO_2$ concentration in the atmosphere illustrates the anthropogenic influence on our atmosphere, which is driving up global mean temperatures. Whilst the rising temperatures, increased number of extreme weather events and sea level rise are all stark reminders of how the combustion of fossil fuels in particular leads to climate change, it is also an empowering thought. Over time, we have influenced the climate, which means that we can continue to influence, and hopefully minimise, the amount of climate change we will all need to adapt to in the future. The question is, will we step up to the mark?

This article lays out the scale of the climate change challenge, illustrating why urgent action is needed to curb emissions of greenhouse gases in the near term. It then focuses on aviation and shipping – two sectors that are large and growing sources of greenhouse gases. Options for cutting emissions across technology, operations and behaviour change are discussed to paint a picture of how to mitigate emissions from these sectors before it is too late for the ambitions laid out in the Paris Climate Agreement.

## 1. Our influence

It is essential to recognise that many people have agency to create change and influence future climate impacts and, in turn, climate change adaptations. In particular, those of us who are wealthy in wealthy nations have many choices open to us. We can choose activities we partake in, we can make decisions within organisations and in community groups, and we can make use of our democracy to

influence the decisions of others. What this also means, is that many of us are also choosing the amount of climate change that others will experience. The poor, and especially the poor in poor nations, have little influence over future climate change because their per capita energy consumption and greenhouse gas emissions will typically be much lower than those of the wealthy. Those less fortunate are not in a position where they can reduce flying and, in some cases, even car transport emissions, because the majority in poor nations do not fly or are car owners. Hence, it is essential that we recognise our responsibility to others when making decisions about all our futures. Every choice we make affects levels of emissions and future climate change impacts. This is an empowering thought. We can choose our future, but we are also choosing others' futures too.

To limit anthropogenic climate impacts, measures – both top-down and bottom-up – to limit the cumulative emissions of greenhouse gases are needed as a matter of urgency. Simply put, the more interventions put in place to cut greenhouse gases in the near term, the less we and others will need to adapt to climate change. But of course, the converse is also true, the less effort put into mitigating emissions now, the more we and everyone else around the world will need to adapt. The choice we no longer have is one where the climate will not change, but what we can do, is minimise the damage.

Yet despite this being a clear message from the Intergovernmental Panel on Climate Change (IPCC) since the 1990s, what we observe in practice is an ongoing rise in greenhouse gases emissions. And although the upward trajectory of emissions has the occasional dip, these dips are yet to be significantly influenced by climate policy when considering the global picture. Rather, major global economic downturns, and indeed more recently the changes in activity due to the COVID-19 pandemic, are notable times when global $CO_2$ emissions fall due to a reduction in Gross Domestic Product (GDP), rather than in response to climate change mitigation interventions. So, the challenge faced remains an uphill struggle.

The result of decades of inadequate response to the climate challenge is a rise in global mean temperature of 1.1°C relative to the 1850 to 1900 average (IPCC, 2021). While this does not sound so significant when people think about it in the context of their daily

weather experiences, the impacts resulting from this rise have already been profound. The additional energy within the climate system from an average of 1°C of warming creates a wide range of climate impacts from increased extreme weather events such as droughts and floods, increasing risks of wildfires, strengthened intensity of storms, and a rise in sea levels, which itself then amplifies the damage done when a storm hits a coastline. These and other climate-related changes can result in severe damage to infrastructure such as roads and railway lines, major falls in agricultural yields and of course lead to deaths, injuries and other negative health-related outcomes for people. Fortunately, the amount of future damage to be caused is in our gift to influence.

## 2. The scale of the challenge

In Paris in 2015, nations came together to agree to

> hold the increase in global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C,

as well as to deliver

> rapid reductions in accordance with the best science.... and on the basis of equity and efforts to eradicate poverty.

Significant elements in this statement that influence the framing of the scale of the climate change challenge addressed within this paper relate to the specific wording of 'well below 2°C' and '1.5°C', which underpins the quantitative interpretation of the limits to greenhouse gas emissions over time. Specifically, in many analyses done prior to, and some after, the Paris Climate Agreement, the probability of not exceeding 2°C assumed was a 50% chance at best – far removed from what 'well below' would imply. An available carbon budget is increasingly constrained the higher the probability of not exceeding 2°C is. This is further constrained by targeting a smaller 1.5°C temperature rise, with a similarly high probability, although mathematically there is cross-over between a high probability of not exceeding 2°C and a low probability of not exceeding 1.5°C, given the uncertainties within the climate models (Table 1, overleaf).

Other important elements for the framing in this paper within the Paris Climate Agreement statement relate to a need for the

| Approximate global warming relative to 1850-1900 until temperature limit (°C) | Estimated remaining carbon budgets from the beginning of 2020 ($GtCO_2$) Likelihood of limiting global warming to temperature limit | |
|---|---|---|
| | 17% | 83% |
| 1.5 | 900 | 300 |
| 1.7 | 1450 | 550 |
| 2.0 | 2300 | 900 |

*Table 1: Estimates of remaining carbon budgets for different temperature limits and different probabilities of limiting warming to those temperatures to illustrate the cross-over in budgets (Table SPM. 2, IPCC, 2021).*

"best science" and the term "equity". It is essential that in terms of quantifying the scale of the challenge, the latest understanding of carbon budgets and climate science are used for the underpinning quantification at a global scale. While this science does result in budgets shifting over time to an extent, re-estimating the scale of the challenge using the most up-to-date budgets is a relatively straightforward exercise. What is more subjective and open to a much greater level of interpretation and debate is the term 'equity'. Within the United Nations Framework Convention on Climate Change (UNFCCC), there is recognition of 'common but differentiated responsibilities (CBDR)'. In other words, not all nations are equally responsible for climate change, or equally able to respond, and therefore some will require significant financial support to both decarbonise their economies and adapt to increasing impacts from climate change. If this differentiation is applied to carbon budgets, on top of the existing disparities between nations in terms of per capita emissions, then very different national carbon budgets and pathways to decarbonisation emerge (Larkin et al., 2018). 1.5°C constraints on global carbon budgets, while allowing for poorer nations space to develop their economies, leads to a much greater degree of carbon reduction in wealthier nations, like the UK, than some analyses portray (Anderson et al., 2020)

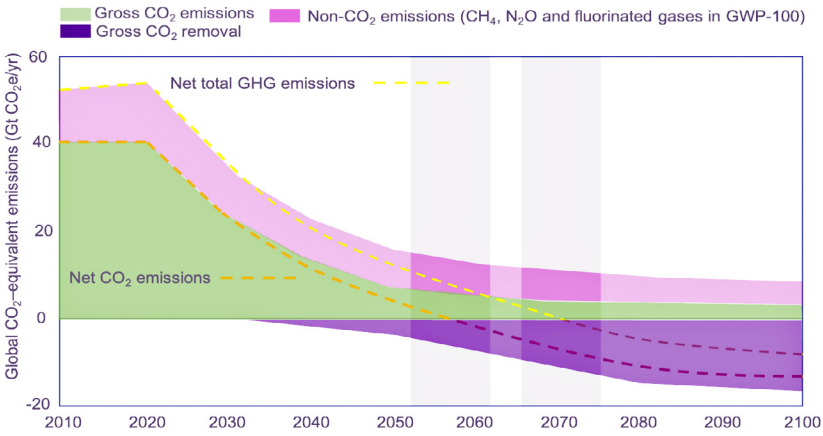


*Figure 1: Schematic of the global emissions budget, detailing pathways passing through 'net zero', based on Figure 3.1a Source: United Nations Environment Programme (2021). The line limiting the pink shaded area is the total gross greenhouse gas emission amount. The line limiting the green shaded area is the total carbon dioxide amount. The purple area shows negative emissions of carbon dioxide. The yellow dotted line takes account of these negative emissions to illustrate where total greenhouse gases pass through zero emissions. Likewise the orange dotted line shows the same thing but for the carbon dioxide emissions, so 'net zero carbon dioxide' in this diagram is around 2058.*

To translate the Paris Climate Agreement into targets and pathways, carbon budgets are often used. This limits the amount of greenhouse gases that can be released into the atmosphere over a particular timeframe, according to the probability of avoiding temperatures rising by a particular amount – say 66% chance of not going beyond 1.5°C. Carbon budgets are used because greenhouse gases are long-lived in the atmosphere, and so accumulate. Figure 1 illustrates a global budget for both carbon dioxide and other greenhouse gases, assuming that in time, emissions can fall below zero using mechanisms such as afforestation, reforestation, or by technologies such as combusting biomass in power-stations then using carbon capture and storage technology (BECCS). The rise in future temperatures is dictated by the area under the curve, rather

than some 'endpoint' carbon reduction target in future. This also means that if emissions can become net-negative, where sources of emissions are offset by sinks in carbon dioxide, through for example, using BECCS, then emission reductions in earlier years can be less severe to fit within the same budget. The need for negative emissions technologies has stemmed from a concern that some sectors, such as aviation, shipping but more critical in our view, agriculture, will not be able to reduce their emissions to zero. However, given that technologies to remove carbon dioxide from the atmosphere are not operational currently at scale (Larkin et al., 2018), it is a huge risk to assume that emissions will in practice fall below zero in the coming decades. If this does not happen, then emission reductions will need to be much deeper and more rapid than typically assumed in climate change scenarios if the same temperature target is to be realised (Anderson and Peters, 2016).

According to the latest science from the IPCC, for a 50% chance of not exceeding 1.5°C, there is a carbon budget of less than 335 $GtCO_2$ from 2022 available for all sectors in the global economy.[1] To put this into context, given global annual $CO_2$ emissions were around 35$GtCO_2$ in 2021, continuing at current levels will use the existing 50% 1.5°C budget up within 10 years. On the other hand, if emission reductions could continue on the 'COVID-19' 5% reduction path that happened in 2020, even for a short time, then the emissions could be kept within the budget assuming cuts by 10% per year until 2045. This assumes that negative emissions technologies are not playing a role, contrast to some interpretations of the scale of the climate challenge, yet it is arguably a lower risk strategy than one relying so heavily on unproven solutions to the climate problem.

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1. Chapter 2 of the IPCC 1.5 report (Rogelj et al., 2018) sets out a global carbon budget of 580 $GtCO_2$ from 2018 for a 50% chance of keeping warming below 1.5°C. 100 $GtCO_2$ are subtracted to account for earth-system feedbacks (Rogelj et al., 2019). 107 $GtCO_2$ are removed to account for emissions from 2018-2020, assuming a 7% COVID-related reduction in 2020 $CO_2$ emissions compared with 2019 (Le Quéré et al., 2020) plus the latest 2021 emissions. This leaves a remaining global carbon budget of 335 $GtCO_2$ from the start of 2022. This is for fossil and energy.

Critically, using this framing of the problem, mitigation policies need to be delivering change in the short-term because of the emissions accumulation problem. The less done early on to tackle emissions, the more will be needed later – and it may then be too late to deliver at the scale and pace needed for many people around the world to avoid the catastrophic impacts of climate change. Reframing climate change as a short-term and urgent challenge has implications for all sectors, but here we will focus on what it means for aviation and shipping – two sectors arguably so hard to reduce emissions in the near term, that negative emissions technologies will be needed (Sharmina et al., 2021).

## 3. Planes, ships and cutting $CO_2$

In recent years, the scale of $CO_2$ emissions attributable to aviation and shipping combined is around 5% of the global total. Even taking just shipping alone, its $CO_2$ contribution would rank somewhere between Japan and Germany as the 5th and 6th largest nations in terms of contributions to global annual $CO_2$ emissions. Another concern, aside from the scale of emissions, is how rapidly they are growing.

It is expected that $CO_2$ emissions will be growing more rapidly in developing nations compared with developed countries in general, however even in richer nations in the global north, aviation activity continues to grow rapidly, albeit on a bumpier road at present due to the COVID-19 pandemic. This is particularly problematic if improvements to efficiency or the move to alternative fuels to reduce the carbon intensity of the activity is not outrunning growth. In other words, if growth is faster than carbon intensity improvements, then absolute $CO_2$ emissions from these sectors will continue to grow.

Both aviation and shipping are treated differently to most other sectors when it comes to decarbonisation policies at a national scale, and within the Kyoto and Paris Climate Agreements, because a large proportion of their emissions are released in international airspace or international waters. This means that responsibility falls outside of national jurisdictions when it comes to mitigating their emissions. Instead, the International Maritime Organisation (IMO) for shipping and the International Civil Aviation Organisation

(ICAO) for aviation, were charged with developing policies and plans to mitigate these 'international' emissions by the UNFCCC. However, given the slow progress made by both sectors in mitigating their emissions, there has been an ongoing discussion regarding complementary policies at national and regional scales, including the EU's Emissions Trading Scheme (Bows-Larkin, 2015).

Research shows that the current decarbonisation pathway is lagging in terms of what is needed for shipping emissions to align with the Paris Agreement goal (Traut et al., 2018; Gray et al., 2021). A recent analysis shows that the current IMO ambition of cutting emissions by 50% by 2050 is vastly out of step with what the sector needs to meet to be Paris-compatible – zero $CO_2$ emissions by 2050 (Bullock, Mason and Larkin, 2021). As such, the sector will be pressured to address cumulative emissions with each successive year of inaction (Gilbert, Bows and Starkey, 2010). This means that aligning emissions with Paris goals depends on the sector's efforts to make deeper cuts within a shorter period of time than currently aimed for.

The slower uptick in policy decisions within the shipping sector compared with many others, means that there are questions regarding whether or not the industry will even meet its mandated energy efficiency goals i.e. the Energy Efficiency Design Index (EEDI) by 2040 (Gray et al., 2021). Moreover, to be Paris compliant, the IMO must double its 2050 ambitions and have an interim goal of a 34% reduction in emissions by 2030 from 2008 levels (Bullock, Mason and Larkin, 2021).

For aviation, decarbonisation scenarios rely on a combination of different initiatives – some more on market-based measures, and others on innovation and demand management. According to the aviation industry, a large portion of emissions reduction is expected to rely on emissions trading and the Carbon Offsetting and Reduction Scheme for Aviation (CORSIA) (ICAO, 2022). Both have received criticism – especially the latter, with questions around the permanence of $CO_2$ emissions reductions through offset projects (Pan et. al., 2022). The other shortfall of any scheme using a market-based measure, is the timing. Implementing regulatory measures in this decade will be insufficient to meet Paris Agreement targets (Bows-Larkin, 2015) given the scale and urgency of the challenge

as laid out in Section 2. The pathway also envisages using carbon dioxide removal (CDR) at scale from 2035 onwards – a technology that has a lot of uncertainties around cost and capacity factors (Fuss et al., 2014; Sharmina et al., 2021). Similarly, at a UK national scale for example, the UK's sixth carbon budget stresses the use of carbon capture and storage in sustainable aviation fuel plants, along with expected societal behaviour change (a factor that is neglected in industry scenarios) and alternative fuel use to if aviation is to even align with the UK's own net-zero trajectory – a pathway arguably still falling short of an equitable interpretation of what is needed for delivering on Paris goals (Anderson et al., 2020).

Although in terms of Kyoto and the Paris Agreement, the aviation and shipping sectors share a similar position, in terms of options for decarbonisation, and in terms of the markets they serve, they are wholly different. This is important, as policies and approaches to cutting emissions in aviation and shipping need to focus on the specifics if they are to be effective. There is also a debate to be had, regarding their relative importance to society. For example, the shipping industry is predominantly focused on the trade of goods and materials, including food, fuel and consumer goods. Throughout the world, citizens rely on shipping often without even thinking about it. Of course, within island nations this will be more in the public mind – particularly for people who live by the sea. Yet in areas with limited or no coastline, shipping will often be playing a huge role in terms of sustaining critical supply chains. In short, if shipping activity ceased, there would be a global crisis impacting on basic needs.

In contrast, the aviation sector largely serves the leisure industry, although other activities such as education, visiting family and friends as well as business flying are also significantly served by air travel. It is also the case that the use of air travel is very significantly skewed towards a small proportion of the population (Gossling & Humpe, 2020). Even in wealthy nations, the majority of people do not take a flight each year and flying is likely to be the most carbon intensity activity that most people will participate in. For example, a short-haul economy flight is over four times as carbon intensive as travelling by train, and the figures are even more extreme if comparing with business flights or long-haul (Larkin, 2022).

## 4. Port, airports, and infrastructure

When it comes to technologies to decarbonise the aviation and shipping sectors, they are some similarities, although ways forward are very different. Both are locked into infrastructure that is long-lived compared with many other sectors, such as car transport or domestic appliances. Planes and ships will typically be designed to last for decades, and although a plane may be taken out of passenger service from an established airline after twenty years, it can be sold second hand to an airline in a less wealthy country, and then later on be used for freight only – so in practice be in service for 30 years or more.

Likewise airports and ports are very long-lived infrastructures, that to some degree constrain the development of new designs of aircraft or ship, although this is particularly the case for aircraft. For example, if a new blended wing body design of aircraft, which is known to be much more efficient, were to be rolled out globally, airports would need a redesign in terms of loading passengers. For these reasons, even when new technologies become available, it can take many years, if not decades, for them to be deployed fleetwide, as new aircraft and ships are built and old ones retired. Referring back to the timescale outlined in section 2, the Paris Climate Agreement goal requires significant cuts in emission within the coming two decades, so waiting for full fleet renewal will take too long.

Aircraft are already incredibly efficient in terms of fuel consumption largely due to the large quantity and cost of dense fossil fuel in the form of kerosene, needed to get them off the ground. The design is well honed as a result. So, although incremental changes such as a reduction in the weight of material used to build aircraft, the use of wing tips, and further small refinements in terms of aerodynamics, only marginal gains in efficiency are on offer without a step-change in design.

One advantage that shipping has over aviation is that there are many more options in terms of technology to improve the fuel efficiency of ships, even existing ones. Only in recent years have policies been implemented by the IMO to regulate ship efficiency, and as a ship's weight is much less of a constraint on fuel efficiency, given they do not need to leave the ground, adding technologies to improve combustion efficiency for instance, that would have a fuel

penalty on a plane, does not impact on the efficiency of the ship in a negative way. A number of other interventions in recent years have cut fuel consumption of ships, including the use of microbubbles to minimise friction, propeller optimisation and waste heat recovery, nevertheless, cutting $CO_2$ with the urgency and scale required needs to move beyond incremental change (Gilbert et al., 2015).

In this regard, retrofit can play a role for shipping. Flettner rotors are just one wind-propulsion technology that has potential to reduce fuel consumption, with an advantage that wind-propulsion can be installed after a ship has been sailing for some years. Kites and sophisticated sail technologies are also retrofit options, and if combined with slow steaming – where a ship reduces the speed that it is travelling at – cuts in $CO_2$ can be significant (Bows-Larkin, 2015), although operational considerations would need to be made if this were the norm. Research on retrofitted engines is also underway, with MAN engines expecting to have ammonia-ready engines (for shipping) in the market by 2024. Meanwhile, on-going research and discussion of the potential adoption of green ammonia in the maritime sector has established shipping as a likely early adopter of the fuel. As a carbon and sulphur-free fuel, green ammonia can help the sector accelerate its decarbonisation efforts over the coming decades, but upscaling its deployment will need policy support if shipping is to comply with Paris goals. Critically, if emissions are to be cut in the short term, then technologies and other measures that can do so need to focus on existing ships, given that they will be sailing for decades to come (Bullock et al., 2020).

With major constraints on efficiency improvements for aircraft, attention has more recently turned in earnest to the role of sustainable aviation fuels. These would be fuels that can replace fossil fuel derived kerosene in terms of performance and safety, but that do not require a redesign of the aircraft – a so called 'drop-in fuel'. There are a number of contenders that are being researched, from biomass resources converted through the Fischer-Tropsch process into kerosene, hydroprocessed esters and fatty acids converted into fuels, synthetic fuels, alcohols that are converted into jet fuels and then a system where $CO_2$ is captured from the air and combined with renewably produced hydrogen to create fuel. In all cases, the life-cycle emissions of such processes at the moment

still remain high, and it is not clear what the best solution to this will be. While waste residues that are converted into fuel using the Fischer-Tropsch process seem to have the lowest emissions in terms of their life cycle, there is a big question mark regarding the availability of a sufficient and sustainable supply of the wastes (Abrantes, et al., 2021). Moreover, others consider that only a step-change shift to hydrogen-fuelled aircraft will be a truly sustainable solution for low-carbon air travel, but experts consider that this is still many decades away (Santos and Delina, 2021).

## 5. UK climate ambition in the context of shipping and aviation

In writing about the need for wealthier nations to step up, we provide a brief overview of the current picture in one such nation – the UK – in relation to its decarbonisation efforts in the shipping and aviation sectors. As noted, it is enshrined within the UNFCCC that countries that have contributed to climate change disproportionately should step up to take on a larger share of the responsibility and abide by 'Common but Differentiated Responsibilities (CBDR) (Epstein, 2015). Yet the UK, as a national of high development and wealth, has decarbonisation pathways that are deemed by some to be insufficient to align with the Paris Agreement goals (Anderson et al., 2020). The UK has a carbon budgeting framework, where five-year budgets are set by the UK's Climate Change Committee (CCC) to hold the UK government to account on its legally binding climate change policies (Climate Change Committee, n.d.). These budgets are premised on the basis of estimates of the UK's 'highest possible ambition' and no longer align explicitly with the global temperature goal of 1.5°C. As such, Anderson et al. (2020) concludes that the UK would need to at least double its rate of mitigation to be Paris-compliant in practice. The Climate Action Tracker (CAT) takes a different view, labelling the UK's current climate policies as 'almost sufficient', falling short only in their climate finance commitments to 'build back greener' initiative (Climate Action Tracker, 2021). This UK debate regarding the sufficiency of mitigation policies is indicative of a broader global concern that even where policies are in place, they are falling short of the terms of the Paris Climate Agreement in relation to limiting temperatures to 1.5°C, aligning with the 'best science' or addressing the issue of 'equity'.

The global COVID-19 pandemic has impacted on all areas of life, and in driving an economic downturn, led to a temporary fall in global $CO_2$ emissions (Le Quere et al. 2020). Despite this, emissions levels in many parts of the world, including the UK, have already rebounded to a degree, which means that limiting emissions in line the UK's dwindling carbon budget continues to be a huge challenge. In terms of aviation-specific actions – the current UK approach is keen to focus on maintaining and reviving aviation demand, whilst relying on market-based measures and new fuels to manage the emissions burden (DfT and BEIS, 2022). It explicitly states that it would like people to be able 'to fly guilt free'. Such an approach overlooks the importance of timing – if technological change delivers emissions cuts in decades to come, emissions will have continued to accumulate and likely breaching 1.5°C carbon budgets. As a result of its stance, the UK government has recently approved airport expansion, assuming that COVID-19 impacts on air travel demand will be short-lived. Yet it is perhaps overlooking that costs to the aviation industry are set to increase as climate change policies such as emissions trading ramp up, so continuing the growth trajectories of the past may not over the longer term make economic sense in any case (Chapman and Postle, 2021).

The aviation industry has received significant support from the UK Government in an attempt to revive the sector's growth, and when it comes to shipping decarbonisation, despite inclusion of international aviation and shipping emissions within the UK's carbon budgeting framework, UK shipping policies continue to principally target domestic shipping, whilst keeping pressure on the IMO to move forward with global measures to mitigate $CO_2$. This means that UK policies aimed at decarbonising shipping are, just like those targeting aviation, not currently matching the scale of change enshrined in the Paris Agreement (Teusch and Ribansky, 2021; Bullock, Mason and Larkin, 2021). So in the UK at least, demand management must form part of the policy portfolio given delays to technological deployment (Sharmina et al., 2021).

In short, the outlook for cutting $CO_2$ emissions from air travel ad shipping does not look promising in a timeframe consistent with the Paris Climate Agreement, which instead points to a need for other sectors to cut their emissions even more to compensate,

or for the world to adapt to greater climate change impacts. For shipping, there are a plethora of potential solutions, but as an industry largely governed globally, with numerous stakeholders, the shift to embrace new technologies, even if retrofitted, will need a portfolio of new incentives. For the aviation industry, governments in wealthy nations must seriously consider demand-side management. Without reducing the number of flights taken, other sectors will be required to reduce their emissions to an even greater extent to accommodate a rise in aviation emissions. This itself has economic implications for the wider economy, requiring investment to accelerate the low carbon transition elsewhere at an even faster rate. The issue of demand-management in aviation is controversial, and tends to be difficult to gain engagement on, although in recent years, conversations led through citizens assemblies concluded that policy measures to tackle demand, such as a frequent flier levy, might appeal – particularly given that this would target frequent fliers rather than the majority of the population. There appears to be some way to go however, for demand management in aviation to be considered in specific terms by governments within nations like the UK. Moreover, aviation emissions should not be considered in isolation, because if economies expand post-pandemic, emissions increase from other sectors are also likely, reducing the available budgets that align with the Paris Climate Agreement.

## 6. Conclusions

Unprecedented change is required across all sectors to deliver on the Paris Climate Agreement, with emission reductions of the order of 10% per year required globally as a matter of urgency. All sectors' emissions are limited by an overarching global carbon budget that aligns with the Paris Climate Agreement. Aviation and shipping are no exception to this, yet tend to be overlooked when it comes to policies and measures stemming from nations that could influence their emissions. Unfortunately, the timeframes within which a move away from the use of fossil fuels for transport fuels are so short, that incremental efficiency improvements to ships, planes and their associated infrastructures will be too little too late.

While sustainable aviation fuels will likely have a role to play, the scale of change required in the near term draws attention to the

need for an open debate about the controversial topic of demand management. For shipping, there are multiple potential options on the table, including some that are operational in the short-term, such as slow steaming or retrofitting wind-propulsion, but incentives are needed to stimulate deployment. Writing this in July 2022 as the UK experiences the hottest temperature ever recorded, hammers home the importance of urgently tackling emissions. We need to ask ourselves what we are prepared to do differently or accept to address this emergency – would you change your flying habits to tackle climate change?

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# Rabindranath Tagore and his Works

BASHABI FRASER

**A Poem**

With a grand plan in mind
I toil day and night,
till something large is built at last,
truth and illusion mixed.

But my tiny hopes wait long, the joys that are frail
in the vision of which mingle
some stray notes of a song, a breath of hidden flower,
the whisper in the shade of a familiar tree,
And a leisure brimming over with dream bubbles.

When God's will to create shook the sky
into fiery whirls,
His power in the beginning of years,
built up its triumph in towering hills.
but, His dream waited millions of barren nights
before He smiled on his first shy flower.

Rabindranath Tagore (18 March 1925) published on 6.6.1925.

In the poem by Rabindranath Tagore published in the *Manchester Guardian* on 6 June 1925, the poet sums up his mission to see the triumph of truth in the world and his vision to devote his time to creativity, finding joy in the beauty of nature, in the most insignificant flower. This poem was published at the end of a report on Rabindranath's health, as his travels across three continents had affected his heart, which was a cause for worry for his many admirers who followed his international journeys.

Rabindranath Tagore's life and work traversed two centuries - the Victorian and the modern. He not only reflected his times, but reflected on them and as a true modern, he evolved. His output was phenomenal. The internationalism of Tagore's thought and

work found global recognition with the award of the Nobel Prize for Literature in 1913, after which he took on the role of a cultural ambassador in a one-man mission to bring the East and West closer through mutual understanding and respect. He became a global figure and was a phenomenon. William Radice, the renowned Bengali scholar has said of him, 'He wrote so much, he did so much, he created so much. He was truly global.' (2012) What is remarkable about what he achieved and what he left behind is its richness, diversity and staggering volume. It is difficult to do full justice to Tagore's multi-faceted accomplishments in one article, but this study will trace the work of a nation builder and an internationalist to whom India and the world owe a great debt. Rabindranath's multi-faceted work as a polymath – a writer, artist, composer, painter, activist and pragmatist - will be covered in this study. It is not easy to do justice to this colossus of a man, but for a fuller understanding of the man and his work, it is necessary to consider his upbringing and his familial influence at a time when Bengal/India was witnessing a reawakening. This study will also look at Rabindranath's work as an educationist and environmentalist, evident in the institutions he established at Santiniketan and Sriniketan. This is where he built a 'nest' where the world could meet - a metaphor for intellectual and cultural exchange and cooperation which embody Tagore's philosophy and work.

Rabindranath Tagore was the fourteenth child of Maharshi Debendranath Tagore and Sarala Debi and the youngest surviving son, as the fifteenth son died in his infancy. He was born in 1861, four years after the Indian Revolt, once the British crown had taken over the governance of India. He says the year of his birth was an unimportant one, but concedes that he was born into a family that was 'remarkable' at 'a great period in our history in Bengal', playing a pivotal role during the Bengal Renaissance which saw India entering the modern era. His birthplace, Jorasanko, the Tagore grand family home, popularly known as Thakurbari in Calcutta, was the epicentre of the Bengal Renaissance, the metropolis of British India. At a public lecture in China, Rabindranath describes his upbringing in his hugely talented and creative family:

> I was born and brought up in an atmosphere of the confluence of three movements, all of which were

> revolutionary. I was born in a family which had to live its own life, which led me from my young days to seek guidance for my own self-expression in my own inner standard of judgement.'[1]

This is the freedom of spirit that would mark all of Rabindranath's ventures.

Rabindranath proposed 'It is cooperation and love, mutual trust and mutual aid which make for strength and real progress in civilization.'[2] Rabindranath points out that places of pilgrimage in India are at the confluence of rivers, 'the symbols of life in nature, and which in their meeting present emblems of the meeting of spirits, the meeting of ideals.'[3]His life would be spent in an endeavour to create this confluence of spirit and ideals.

In Rabindranath, we witness a confluence – of the past and present, of a knowledge of history and tradition and an espousal of modernity, the spiritual and the pragmatic, of the East and the West, of home and the world. But coming as he did from a family which had challenged orthodoxy, questioned ritual worship, turned away from idolatry, revolutionised literature and challenged socio-cultural norms, he would remain a radical at various levels, going against the grain of popular beliefs and trends and what were considered acceptable, and thus often be isolated, a lonely and often misunderstood voice both at home and abroad. As such, he had to turn to his inner sense of truth and justice, of what was good for the nation at large, for its future and for its place and relationship with the world.

At Jorasanko Rabindranath encountered a creative 'nest' where several cultures met. The admixture of Muslim, Hindu and Western styles in the Thakurbari found expression through the generations in the furniture, dress, artefacts that were purchased, designed and created at Jorasanko, and literary and cultural experiments where East and West met in this nest, signifying a confluence - a syncretism that propelled the Tagores, a leading family of Bengal, into the modern era.

So, the metaphors of a confluence and a nest, effected and nurtured by mutual respect and the spirit of cooperation, are the threads that flow through this brief study which will consider Rabindranath's legacy as we look at his life and work.

Rabindranath began his schooling in the leading schools of Calcutta, the Oriental Seminary, Normal School, Dr Cruz's Bengal Academy and St Xavier's School, but none of these institutions caught his imagination, so his attendance was irregular and his progress desultory. He was terrified of bullying and caning and shied away from the attention of seniors. At home his lessons continued and his writing flowered and he was encouraged to recite and sing by his older siblings. His most reliable sounding board was his sister-in-law, Kadambari, his Bouthan, who was his muse and exacting literary critic. She was married to his fifth brother, the talented and energetic Jyotirindranath, his affectionate Jyotidada. Jyotirindranath, Akshay Chaudhuri, his talented friend and Rabi, formed a creative trio, as Akshay introduced Rabi to Western music, while Jyotidada played the piano, imbibing traditional tunes. Rabi composed music to his lyrics, letting eastern and western tunes seep into his creative consciousness. Kadambari was the watchful, nurturing, but sharp critic as the trio sang and practised in their upper apartment at Jorasanko.

But Rabindranath's eldest brother, Satyendranath, the first Indian ICS, must have felt that Rabi needed to stop frittering his life away in dreamy eyed creativity and proposed to their father, Debendranath that he would take Rabi to England to study law. But before his travel to England, Satyendranath arranged for him to stay with his friend, Dr Atmaram Pandurang Turkhud's family in Bombay, whose three daughters, Ana, Durga and Manik had been educated in England. Here Rabi was to be acquainted with English etiquette and the charming Ana, who was a little older than him, was responsible for Rabi's Anglicization. Rabi gave Ana a name on her request, and he chose Nalini, a name that would appear in many of his songs and other writing.

Rabi's first visit to the West was in 1878, when he came to stay with his sister-in-law, Jnanadanandini and his niece, Indira and nephew, Surendranath in Brighton. This is where Rabi encountered many English melodies. His carefree days as Rabi Kaka/Uncle Rabi stopped once he moved to London where, as a live-in student in Dr Scott's home he encountered western hospitality in the affectionate mother and talented sisters. He sang Thomas Moore's Irish and Scottish melodies with the Scott daughters, melodies which he would later adapt in his own brand of songs, Rabindrasangeet.

On the request of the third Scott daughter, Lucy, he proceeded to teach her Bengali, a language he had believed had set, rational rules, unlike English, but he was soon thrown by its complexity. He went on to study the Bengali language at the London University Library, making prodigious notes which he took back with him in a briefcase. However, one little girl in the Tagore household threw out the notes and made the case a repository of her doll's wedding trousseau. But the research stayed with Rabindranath, who would use it for his own educational texts and his work on modernising the Bengali language in his own writing. His belief that school education should be in the mother tongue, stayed with him right through his life, something he set in practice in his school at Santiniketan founded in 1901.

In London, where he was enrolled at the University College in the Faculty of Arts and Law, he was very impressed by Henry Morley's lectures on English Literature and his method of teaching which encouraged academic debates through critical thinking and anonymously submitted reflective essays which Morley discussed in class. It was here that Rabindranath renewed his love of Shakespeare which he had started reading as a boy at Jorasnako; and now he read the Clarendon Press editions and Thomas Browne's *Religio Medici*.

But in his letters home in *Letters from an Expatriate from Europe*, amongst other observations, Rabindranath commented on the freedom English women had, which made them better companions of men and assured their contribution to society. This attraction of English women must have alarmed his father, the patriarch, who hurriedly dispatched a missive asking for Rabi's return to Calcutta. But this belief in the woman needing to cross the threshold from the home into the world for a more dynamic society, would stay with Rabindranath, finding a voice in his short stories, novels and verse libre.

His sister-in-law, Kadambari, had been suffering from depression and committed suicide soon after Rabindranath's return. Her death was to plunge the entire Jorasanko household into a deep gloom. Her critical inspiration had been the impetus behind the Tagore journal, *Bharati* in which Rabindranath's earlier work was published. *Bharati* was now discontinued. Jyotidada's earlier enthusiasm for creative work and nationalist production enterprises dissipated, and Rabi

found himself questioning nature's continuity when one who was so much part of its sensitivity had left this world. Rabindranath lived till he was 80, and in his long life he was to suffer the deaths of many close relatives and friends, but his outlet was his work – his writing and practical projects of nation building which continued like an unstoppable stream.

Before Kadambari's death, Rabindranath's marriage was arranged by Jnandanandini, the wife of Satyendranath, to Bhabatarini, the daughter of an employee of the Tagore household which Debendranath blessed. Rabindranath renamed his child bride Mrinalini, who spent a year being educated at Loreto Convent School under Jnandanandini's tutelage. Around the same time, Debendranath entrusted the supervision of his landed estates in and around Shelidah in what is now Bangladesh, to Rabi. It was a perceptive move on the part of the Jorasanko patriarch who must have noted a reliability and responsibility in his youngest dreaming poet son under whose creative, constructive landlordship, the estates continued to thrive.

The family home and headquarters in Shelidah took some time to build. Rabindranath made his home on his grandfather's budgerow which he named the *Padma* after Bengal's turbulent eastern river. He inspected and developed these estates from this boat, which was also his uninterrupted space to write in and his pen continued to flow. It was here that he was shocked to encounter the hopelessness and despondency of village folk and set about building cooperatives, implementing schools and roads and various programmes for rural resuscitation and uplift to dissipate the sense of apathy, bring back some hope and instil self-reliance to restore dignity amongst his people. The experience of his Sheildah days would lead to his writing of many short stories which reflected the lives of common folk in the many forgotten villages of Bengal, using conversational Bengali. During this time, he also encountered the Bauls, the wandering minstrels of Bengal, whom he invited and had their lyrics written down. The Baul repertoire and philosophy of universal love, of freedom and their concept of maner manush, of the being inside each of us, influenced Rabindranath profoundly. Later, at Santiniketan's Poush Mela in winter, the Bauls were given a special platform for expression.

Rabindranath taught his children himself, but he knew this wasn't enough. His experience of the mind-numbing rote method in the schools he had attended had convinced him that learning needed to be in the Mother Tongue - creative, imaginative and inspirational, encouraging curiosity and debate. So in 1901, he moved with his family to Santiniketan, the Abode of Peace, and started his school on 7 Poush (December) with 5 boys, one of them being his son, Rathindranath. Initially the school was named Bramhacharya Ashram, following the Upanishadic tradition, but true to Rabindranath's own ideal of freedom, it was imbued with what became known as the Rabindric spirit, free from orthodoxy and religious constraints. Rabindranath's imagination had been fired by the concept of the tapovan, the forest hermitage of ancient India which became the nucleus of the idea of a campus university, was revived in his modern version in Santiniketan's school and later his university, in the guru-shishya tradition which offered a holistic education. In 'A Poet's School' (1926) Rabindranath describes how his students 'take great pleasure in cooking, weaving, gardening, improving their surroundings, and in rendering services to other boys, very often secretly, lest they should feel embarrassed.'[4] He says, 'Their classwork has not been separated from their normal activities but forms a part of their daily current of life.'[5] Rathindranath speaks of the sense of camaraderie that existed as 'joys and sorrows' were shared by teachers and pupils, an 'essentially happy lot'[6]. He speaks of his father's presence and participation when he was there, as he never tired of composing songs and poems and singing/reciting them, rehearsing and directing his plays, recounting stories from the *Mahabharata*, taking classes and playing indoor games with the boys.[7]

The school at Santiniketan began with meagre resources. Weather permitting, the classes were held under the trees where student and teacher were close to nature in these classrooms without walls. The love of nature, the close association with one's environment were nurtured here, where simplicity (not the virtue of poverty) was adopted as a way of life for building character, without the appurtenances of modern living and equipment which Rabindranath felt cluttered education where the role of the teacher and the importance of the student were minimized, as he epitomized

later in his delightful fantasy, 'Tota Kahini' ('The Parrots Learning', 1918). He remembered his own experience of schooldays which had 'tortured' him with 'the fact that they did not have the completeness of the world...But children are in love with life, and it is their first love'.[8] This was the nest he built first for boys, and then girls from all sorts of backgrounds to come and study in a residential school, which became the precursor for his campus university.

Debendranath, Rabindranath's father, died on 19 January 1905 at the grand old age of eighty-seven. He had been Rabindranath's banyan tree and unwavering support. He made Rabindranath the sole executor of his will and the family estates were divided up. The death of the Maharshi was a great blow to Rabindranath who had consulted him and sought his blessings for his various projects. The Maharshi left Rabindranath with a monthly income of Rs 1,250-1,500, a handsome sum for a poet, but inadequate to run a school. The Santiniketan experiment would prove a financial burden in the years to come.

But matters affecting the Bengal Province soon called Rabindranath away from his abode of peace, Santiniketan. In January 1904, when the idea of the first Partition of the Bengal Province was proposed by Lord Curzon, the Swadeshi (homegrown/indigenous) movement resisting foreign domination gathered strength. In this year Rabindranath gave his lecture on 'Swadeshi *Samaj*'[9] to a packed audience at Minerva Theatre, Calcutta where he pointed out that most of India's population lived in villages. This was the *samaj*/society/community that signified India. In his lecture he laid out a comprehensive programme for the rural reconstruction of Bengal based on developing self-reliance, a proposal which was marked by his distinctive brand of constructive nationalism. In a letter written later to Charles Freer Andrews, Rabindranath pointed out that there is no word in Bengali for 'nation', and as it is a term borrowed 'from other people, it never fits us'[10], because what comprised India was *samaj*, an inter-linked, inter-related community of social interchange. When the official announcement of the imminent partition of Bengal was made on 19 July 1905, which would become effective on 16 October 1905, Rabindranath was vociferous in his protest. Ostensibly the idea of the 1905 Bengal partition was to make the administration of an unwieldy province more manageable as the

Bengal Province included Bengal, Bihar and Orissa, with Calcutta as the capital of the British Raj. The underlying reason was to curb the growing national consciousness of the Hindu Bengalis and their dominance in various spheres of life. It was seen as a projection of the government's divide and rule policy and the protest on the ground of all communities was tremendous.

Rabindranath gave lectures and his poetry and other writing voiced his resistance to the idea of partition. It was during this period in a surge of patriotism, that he composed twenty-three patriotic songs some of which he sang himself as he led protest processions. These moving songs which evoked the fertile landscape, the many rivers and the spirit of Bengal would prompt Ezra Pound to say that Rabindranath sang Bengal into a nation.

The Swadeshi Movement attracted enthusiastic youths, many of whom left their schools and colleges to join the activities of the nationalists. Some youths believed that they should boycott all government institutions. A group came to meet Rabindranath at his house called Bichitra in Santiniketan. They told Rabindranath that if he so desired, they would leave their studies to dedicate themselves to the cause of the freedom struggle. Rabindranath not only refused to grant them permission to leave school, but advised them to refrain from doing so. They went away angry at what they saw as his lack of patriotism. Years later, in a letter to Andrews in March 1921, Rabindranath recalled this incident and explained:

> the anarchy of emptiness never tempts me, even when it is resorted to as a temporary measure. I am frightened at an abstraction which is ready to ignore living reality.'[11]

Rabindranath was not an advocate of narrow nationalism, and as the Swadeshi Movement turned to boycott and burning of foreign goods and violence, he pulled himself back from the nationalist politics and retreated to Santiniketan to pour his energies into education, creativity and rural reconstruction, causing much misunderstanding and criticism amongst the public who saw his abandonment of the Swadeshi Movement as unpatriotic. He worked to free young minds in his own institution through freedom of thought and creative activity, adopting an interdisciplinary system. This was his contribution in nation building through character building.

Later he explained his stand in his novel, *Ghare Baire* (1916, *The Home and the World*) in Nikhilish, the liberal, philanthropic landlord who sees the dangers of communal divisiveness and violence under the leadership of the shortsighted, self-serving firebrand, Sandip. The book however was met with an onslaught of criticism by Rabindranath's detractors. Bengal was reunited in 1911.

Rabindranath had drawn up a plan and engaged some volunteers to work on improving the economy of the villages around Santiniketan in an effort to replenish them with new life and hope. It was at this stage that he felt he needed trained agriculturalists to take forward his rural reconstruction programme. With this in mind, he sent Rathindranath, Rathi's friend Santosh and Rabindranath's son-in-law, Nagendranath Ganguly, his daughter, Mira's husband, abroad to study, not at Oxford or Cambridge or Harvard as was the norm with enlightened Indian families, but to the University of Illinois in Urbana, USA to study agriculture and animal husbandry. Earlier Rabindranath had deliberately taken Rathindranath away from city life to 'allow him the freedom of primeval nature'[12], and feel the same kind of freedom his father let him experience on his earlier visits to Santiniketan as a child.

But 1912/13 proved a turning point in Rabindranath's career. He handed his English translation of *Gitanjali* to the painter, William Rothenstein of the Bloomsbury Group, who read and passed he poems on to W. B. Yeats. Yeats, like Rothenstein, was deeply moved by the verse. The limited edition of the book, published by the India Society, was circulated, read and appreciated by some leading figures amongst London's literary elite, including Ezra Pound.

From England, Rabindranath went to Urbana, Illinois to be near his son's university and have a quiet holiday. Here in these quiet backwaters of a university campus in the Mid-West, Professor Arthur Seymour and his wife, Mayce were his warm hosts. Here Rabindranath met several academic staff and church ministers. It was perhaps in Urbana that the idea of a campus university took root in his mind. His peaceful holiday was interrupted by several invitations to deliver lectures, including some at Harvard and T.S. Eliot sat in on one of them.

In November 1913, Rabindranath was awarded the Nobel Prize for Literature, nominated by Thomas Sturge Moore of the India Society, the first non-white to receive it when he was still the subject

of a subject nation. The award was for Tagore's body of writing (and not just his *Gitanjali* as is erroneously assumed), his educational work and in appreciation of the socio-cultural and religious reforms his family had led and Rabindranath had continued to implement and practise. The award pushed Rabindranath, to his and his contemporaries' surprise, on to the world stage. Invitations poured in from intellectuals, artists, political leaders and Rabindranath henceforth took a conscious decision to address his audiences and like-minded individuals across the world in English in his lectures and letters. He travelled to arguably 34 countries, some several times and took on the role of a cultural ambassador, to bring the world closer together through mutual understanding and exchange. While boycott, picketing and non-cooperation marked Gandhi's campaign for Swaraj, Home Rule, Rabindranath wrote to Andrews in May 1921:

> 'I am a poet, not a fighter....What irony of fate is this that I should be preaching cooperation of cultures between East and West on this side of the sea just at the moment when the doctrine of non-cooperation is preached on the other?'[13]

Gandhi and Tagore would debate on issues of cooperation, passive resistance and the spinning of the charkha in the public arena in written exchanges, where their major differences and some agreements were published in essays like 'The Call of Truth' and 'The Great Sentinel'. But the mutual regard was evident and Gandhi publicly sought Rabindranath's blessings before every nationalist campaign. But curiously, whenever Gandhiji was arrested and jailed, Tagore's pen and protests fell silent.

In the field of education, as early as 1916 Rabindranath had written to Rathindranath from Japan:

> The Santiniketan School must be the thread linking India with the world. We must establish there a centre for humanistic research concerned with all the world's peoples. The age of narrow chauvinism is coming to an end. For the sake of the future the first step towards this great meeting of world humanity will take place in these very fields of Bolpur. The task of my last years is to free the world from the coils of national chauvinism.'

This reference to national chauvinism can be interpreted as narrow nationalism which Rabindranath actively resisted right through his life in his work and writing.

On 22 December 1918, at a special meeting at Santiniketan, he explained his idea of a university, Visva-Bharati to his students, teachers and invited guests. It was to be an institution where differences of religion, caste, race and class would be smoothened through people from all backgrounds coming to study together to teach and learn. It would be a cultural learning centre promoting cooperation and coordination between the East and the West and engaging in collaborative research. Its motto, *yatra visham bhavati ekanidam* – where the world meets in one nest – embodies Rabindranath's ideal of social imclusion, universal understanding and acceptance. It was formally established three years later on the same date, 22 December,1921.

In 'An Eastern University', Rabindranath says, 'I have formed the nucleus of an International University in India, as one of the best means of promoting mutual understanding between the East and the West. The Institution, according to the plan I have in mind, invites students from the West and the Far East to study the systems of Indian philosophy, literature, art music in their proper environment, encouraging them to carry on research work in collaboration with the scholars engaged in this task.'[14] He sought to bring the humanities, social sciences and sciences together in a holistic education, in an international university where he initiated and fostered knowledge exchange.

From 1922, work began in earnest at the rural reconstruction centre at Surul that Rabindranath named Sriniketan, the Abode of Wellbeing, with the objective of inculcating self-dependency through participation in a revitalisation programme that encouraged and thrived on interdependency and interchange between the institution and the surrounding villages under the impetus of the agricultural scientist, Leonard Elmhurst and in his absence, the geographer, Arthur Geddes.

Rabindranath wanted his university to be not only in touch with its surroundings, but a continuation of it, practising agriculture, gardening, weaving and dairy keeping, with students and teachers working with and learning from ordinary people in the neighbouring villages in an atmosphere of mutual appreciation and

learning and exchange. In fact, 'exchange' could be the keyword for Rabindranath's 'nest.' He wanted his university to be, in the Indian tradition, a place which offered hospitality to guests and cultures from elsewhere, making it clear that, 'my guests from the West must be made welcome here'.[15] His university would 'invite students from the West and the Far East to study the systems of Indian philosophy, literature, art and music in their proper environment.' He felt that India, who had given much in the past and had become isolated through recurrent conquests and through her own internal constructs of social exclusion, could now, in the 'New Age', offer something to the world, in the aftermath of the 'wreckage' wrought by World War I, from the depths of her forest abodes, a message of peace through cooperation. Rabindranath continued his journeys across the globe in the inter-war years on his internationalist bridge building mission.

The *Manchester Guardian* continued to publish articles on and by Rabindranath. One famous article relates to Rabindranath's second visit to Italy on Mussolini's invitation. The Duce saw Rabindranath, 'a symbol of peace and human liberty'[16] as a powerful propaganda tool for his international reputation. Like many leading intellectuals in his time, Winston Churchill, Ezra Pound and WB Yeats, Rabindranath was charmed by Mussolini. His statement that Italy was safe under Mussolini's rule, his poetic lines quoted in a fascist newspaper: "Let me dream that from the fire-bath the immortal soul of Italy will come out clothed in quenchless light."[17] and quoted widely in other papers, disturbed the liberal left thinkers in the West, like Romain Rolland, Signora Salvadori, the wife of the poet in exile and Mr Modigliani, the attorney of the Matteoti Trial. They met Rabindranath in Switzerland and apprised him of the facts of torture, violence and repression under Mussolini's fascist rule. Rabindranath was upset. True to his intellectual and moral integrity, he sent a detailed letter from Vienna to Andrews, revising his opinion on Mussolini's rule, acknowledging his lack of Italian allowing for misinterpretations of his message and affirming he had never supported fascism. The conversation with Signora Salvadori was later published in the *Manchester Guardian* in October 1926.

However, till the end, even when he wrote 'Crisis in Civilisation' in 1941, Rabindranath did not lose his faith in humanity. He continued to believe in India's resilience and India's position as a nation which

could give much to the world, especially as World War II ruptured the world after the two tentative decades of a tenuous peace in the West. India's image was enhanced, her dignity salvaged by his genius during colonial rule. Rabindranath's persona and work continue to sustain India which thrives on the powerful appeal of his work, and as Atulchandra Gupta says, his compatriots have used his literary talents as the fortress of their dignity, which has provided them with a life breath.[18]

Rabindranath's output was phenomenal. India's debt to Rabindranath is immense. His legacy remains in his school, international university, his rural reconstruction centre, his ideas on the environment, his primers, Sahaj Path, his philosophy, writings in history, science, novels, short stories, poetry, paintings, songs, plays, essays, sermons, lectures, letters, his modernizing of the Bengali language and literature, his endorsement of feminine freedoms, giving recognition to the arts and dignity to the artist, through knowledge exchange between university and the hinterland, the rural and the urban, India and the global context, the home and the world. Rabindranath's work and ideas remain globally relevant today - in his creative teaching methods, the importance of interdisciplinarity in the curriculum, the place of literature, dance, drama, art and music for a holistic education, a deep environmental consciousness and the building of an institution and society on the values of hospitality which welcome the guest in its midst in an atmosphere of inclusion.

Interestingly, Rabindranath described his institution as a place of pilgrimage in the new age, where there would be a confluence, 'a meeting of truths'. Today Santiniketan, the school and the university and Sriniketan, his nest where the whole world meets, remain a place of cultural pilgrimage in India where many Indians and foreigners make it their sought-out destination, some drawn to it from curiosity and many with the sense of paying homage to India's myriad-minded man.

## Endnotes

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10. See Sabyasachi Bhattacharya, *The Mahatma and the Poet* (1997, New Delhi: National Books Trust, India, rpt., 1999), p. 55, published earlier in *The Modern Review* in May 1921.
11. Quoted by Rathindranath Tagore, 1981, p. 62
12. Rabindranath Tagore, 'My School', in Das, Ed., 1996, Vol 2, pp. 389-403, p. 394; Fraser et al, Ed., 2017, p. 37.
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14. Rabindranath Tagore, 'An Eastern University', Santiniketan, *Visva-Bharati Bulletin*, Number 6, 1927, p. 3.

15. To Kshitimohan Sen on 30 November 1920, see Uma Das Gupta, Selected and Ed. *Rabindranath Tagore, My Life in My Words*, New Delhi: Penguin Books, 2010, p. 197.
16. Kalyan Kundu, 'Mussolini and Tagore' in Parabas, Issue 9, Available at https://www.parabaas.com/rabindranath/articles/pKalyan.html; Accessed 25 August 2022.
17. See Smaraka Grantha, 'Rabindranath and Mussolini' in 'Sesquicentennial(150th) birth anniversary of Rabindranath Tagore', Tuesday, January 29, 2013. Available at http://sesquicentinnial.blogspot.com/2013/01/rabindranath-and-mussolini.html. Accessed 25 August 2022.
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# The Right to the City, Public Space and Free Speech*

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## Introduction

In January 2022, Salford Council in Greater Manchester granted permission to the property and investment business, Legal and General Investment Management, to build a new hotel and offices at Ralli Quays in Salford. Controversially, the plans involved closing a 300-year-old riverside public footpath. Pedestrians would instead be diverted through a new walkway through the hotel site, but which would also be shut to the public between dawn and dusk (Richardson 2022). Campaigners soon mobilised to oppose the plans and to argue that people had a 'fundamental right' to walk along the river, which 'should not be sacrificed for private gain' (Pidd 2022). Their tactics included successfully canvassing for a public inquiry into the potential removal of Public Rights of Way along this section of the river by Ralli Quays.

This example exemplifies conflicts that often arise between residents, local authorities and business organisations around the changing nature of public space in cities and, in particular, about rights attached to public space. In particular, it highlights how public space owned and controlled by a local authority can be transformed into what some have termed as semi- or pseudo-public space, which is then owned and controlled by a private organisation. When this transformation occurs, other changes often follow in the public space under scrutiny, which can then cause concern for some living in nearby communities. Access to semi-public space might suddenly become more restricted than it used to be, and residents entering semi-public space will be subject to sometimes opaque rules of private surveillance installed by a business that now owns

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* *I would like to thank the external referee for comments and feedback.*

and controls the semi-public space in question (Roberts 2014).

The example of the riverside footpath at Ralli Quays also illustrates a wider set of debates over how people's changing rights in urban spaces are subject to ongoing debates and conflicts between different groups over how we might live our lives in cities. One prominent school of thought in this area has emerged from critical and radical approaches to human and social geography. Named as the 'right to the city' approach, this school argues that at an initial and basic level of understanding one can divide public space into its exchange-value element and its use-value element. Public space in cities will of course be judged as being of worth by some depending on its commercial exchange-value. Public officials and business, for instance, are aware of the income to be generated from housing projects located in or near public parks (see Crompton 2005: 216). Use-value of public space refers to how public space is employed by ordinary people to enrich their everyday lives. Use-value can of course focus on how people might invest in, say, housing projects in order to enrich their income streams, but use-value also points towards other activities that go beyond commercial interests. Indeed, everyday social life in cities, such as musical events, heritage, social networks, leisure, play, sport, romantic relationships, and political activities, frequently conflict with pure commercial and profit-making interests (Mitchell 2020: 100).

Right to the city scholars have also focused on conflicts over democratic rights in urban space. After all, ordinary public spaces in cities, like parks and other green spaces, or well-known public squares, can often not only serve as places of leisure but also of places of protest and places to exercise free speech. While the right to enter such places to practise and perform democracy is rarely legally enshrined as such, people nevertheless regularly believe they have a 'customary' right to do so, or that a particular city place, like a park, is a 'common' space for the popular entitlement to meet and protest in. To give one simple illustration of this point, there is no actual legal right for people to use Hyde Park in London as a place for demonstrations even if many do believe they nonetheless enjoy a customary right to do so (Barendt 2005: 277).

The 'right to the city' school of thought therefore explores these conflicts in urban public space, particularly conflicts and struggles around everyday and popular rights, such as popular expressions

of free speech in urban spaces and urban parks, and how these conflicts are often against both commercial ventures in cities and what are perceived to be the excessive regulation for the popular entitlement for protest and demonstration. I will discuss in more detail some of these issues below through a number of historical and contemporary examples. First, though, I start by explaining in a little more detail what might be meant by 'publicness' in the term, 'public space'.

## The Publicness of Public Space

According to Mehta (2014), public space 'refers to the access and use of space rather its ownership' (Mehta 2014: 54). On this understanding, space might be privately owned, but publicly available, while space might be publicly owned but with access denied to the general public. In terms of the first type of public space, a private business or corporation might own a shopping centre in a city borough, but naturally allow the public to enter the space in question. In respect to the second type of public space, a local authority might own and control spaces that the public are not allow to enter, such as a local authority owning land rented out to first-time farmers (Shrubsole 2020). Importantly, therefore, various degrees of publicness in a city, town or community can be identified depending on different laws (for example, state laws and by-laws), the arrangement of space (for example, the architectural design of space in a city), official and unofficial borders and territories of space (for example, the fences that designate a park or the unofficial territory of a community group), and the rights of different interests and groups to access, own and control urban space (Akkar 2005).

A related observation follows on from the points made above. Just because public space is owned and control by a private organisation, it does not follow that negative consequences will arise in how the public space in question is used by ordinary people. Similarly, it does not necessarily follow that harmful results will emerge if a public authority sells some of its public assets and spaces to the private sector. Sometimes, for example, there is a local need to adapt and develop policies to ensure land is available for new housing projects to cater for community needs around housing shortages (Christophers 2017: 70-71).

Still, the different types of publicness in public space have knock-on effects in how people might gather in public spaces to take part in events of demonstrations, protests, or other types of democracy and participation. As Mitchell and Staeheli (2005) observe, law is both geographically and jurisdictionally complex in how it regulates these democratic practices, 'with nested and sometimes overlapping hierarchies of territorial authority' (Mitchell and Staeheli 2005: 800) over different spaces in one place. For instance, and as was indicated in the Introduction, some areas in a specific urban place can be owned and controlled by a public authority, while another area might be owned by a private business. Areas in the same place are, then, 'accountable to different political constituencies and bound by different rules and norms' (Mitchell and Staeheli 2005: 800). Indeed, Mitchell and Staeheli note that in America the authorities have since the 1950s attempted to shape dissent in cities into manageable spatial forms (Mitchell and Staeheli 2005: 799). To expound upon these points in more detail, we will now look in little more historical detail at the example of the right to assembly and free speech in public spaces. Following this discussion, we will then explore these matters in more contemporary times.

## Examples of the Historical Right to Assembly, Public Space and Free Speech

The right to the city school of thought has applied these and other insights to explore historical spatial conflicts around free speech. According to Mitchell, for example, a new liberal approach to free speech in the USA emerged just after the First World War through the landmark case, *Abrams vs. United States* (1919). This case was brought against five Russian immigrants who had thrown leaflets from a New York window denouncing the American invention in Russia after the Russian Revolution. They also called for a national strike and the cessation of munitions production. One of the men, Abrams, was convicted under the Espionage Act 1917 and sentenced to 20 years in jail and a $1,000 fine. The case went to the Supreme Court, which upheld the decision. However, one Supreme Court judge, Justice Oliver Wendell Holmes, dissented from the majority opinion. Famously, he claimed:

> (W)hen men have realized that time has upset many fighting faiths, they may come to believe even more than

> they believe the very foundations of their own conduct that the ultimate good desired is better reached by free trade in ideas – that the best test of truth is the power of the thought to get itself accepted in the competition of the market, and that truth is the only ground upon which their wishes safely can be carried out...I think that we should be eternally vigilant against attempts to check the expression of opinions that we loathe and believe to be fraught with death, unless they so imminently threaten immediate interference with the lawful and pressing purposes of the law that an immediate check is required to save the country...
>
> (*Abrams vs. United States* 1919)

At its simplest, Holmes's approach suggests that free speech is similar to property insofar that a person's opinion is their individual property that they freely throw into a discursive marketplace in order to engage in a free trade in ideas through which truth can then be discovered. This type of free speech also caters for people's individual expressive self-fulfilment and sense of autonomy because it encourages people to articulate and voice their opinions and, in so doing, publicly convey elements of their subjectivity to others.

For Don Mitchell, however, Holmes also personified a new liberal take on public and political speech, and it was one that emerged in response to popular struggles for the right to use public space in American cities for democratic purposes. After all, the US had already encountered organised and militant actions during from 1906 to 1917 by organised anarcho-communist trade union the International Workers of the World (IWW) – otherwise known as the Wobblies – to appropriate public spaces in towns and cities for public speaking rallies as part of their recruitment and activist campaigns. So-called 'free speech' struggles would often ensue between the Wobblies and local officials over whether activists could have permits to set up these rallies in the first place (Rabban 1994). Holmes's judgement was therefore clearly aimed at giving individuals, not organised socio-political groups such as the Wobblies, the right to free speech. By invoking the rights of individuals, Holmes and subsequent American legal cases treated ideas as stand-alone commodities to be traded freely between

people. But such an approach did not take seriously 'the relations of power that may govern entrance into the market in the first place' (Mitchell 2003: 63). Groups like the Wobblies did, though, base their free speech practices in a broader set of debates about unequal power relations in America. Holmes, on the other hand, suggested that for the 'marketplace of ideas' to operate, beliefs, ideologies and practices that 'threaten immediate interference with the lawful and pressing purposes of the law' should, if need be, be subject to state regulation. If socio-political groups like the Wobblies gain vivid listeners to a radical cause, then they might be perceived by the courts to be acting in a 'threatening' and uncivil manner in 'the marketplace of ideas'.

A similar way of tackling popular expressions of free speech was evident in the UK, although it was arguably noticeable a number of years before Holmes. In fact, Holmes's phrase, 'free trade in ideas', had its roots in John Stuart Mill's famous essay, 'On Liberty'. According to Mill, the 'liberty of thought and expression' should be founded on four principles: (i) the recognition that an opinion could be fallible; (ii) the necessity for the collision of different opinions to establish truth; (iii) that prejudice should be eliminated; (iv) and that dogma should also be eliminated. For Mill, this approach suggests that free speech is similar to property insofar that a person's opinion is their individual property that they freely throw into a discursive marketplace in order to engage in a free trade in ideas through which truth can then be discovered. This type of free speech also caters for people's individual expressive self-fulfilment and sense of autonomy because it encourages people to articulate and voice their opinions and, in so doing, publicly convey elements of their subjectivity to others.

On closer inspection, however, Mill has a more discriminating theory of free speech. According to Mill, one should strive to enhance one's 'higher pleasures' when engaged in the liberty of thought and discussion. Ideally, this is a person who is educated to standards to achieve personal autonomy to reflect upon their 'self-regarding' actions. Such a person will then be able to avoid those 'lower pleasures' associated with custom and a 'herd' mentality. Those unfortunate to wallow in custom and lower pleasures are more likely to ask themselves: 'what is suitable to my position? what is usually done by persons of my station and pecuniary circumstances?' Mill

shuns these 'herd-like' questions in favour of those associated with pursuing higher pleasures: 'what do I prefer? or, what would suit my character and disposition? or, what would allow the best and highest in me to have fair play, and enable it to grow and thrive?' (Mill 1998: 68). Problematically, though, Mill appears to be suggesting that one should not reflect on their social environment when debating and discussing ideas, but, instead, should reflect on what might develop one's own individual character. Of course, and reading between the lines, what Mill is really getting at is that those from the 'lower classes' will not have the necessary educational resources to engage in the sort of debate and discussion that Mill favours. Such types will therefore almost always only be concerned with furthering their 'lower pleasures'.

Interestingly, Mill wrote these words a few years after the decline of the Chartist movement, which, as noted, was the largest left-wing political movement in the UK. In 1836, the London Working Men's Association (LWMA) was formed and by early 1837 they had drafted an address to Parliament known as the 'The People's Charter'. Six points – universal suffrage, no property qualifications to stand for Parliament, annual parliaments, equal representation, payment of MPs, and vote by ballot – provided the content for the charter. But in their actual activism across the UK, Chartists would speak publicly in city and town spaces and at mass demonstrations for the need to build not only political equality but also economic equality. For Chartists, then, free speech was an instrument for ordinary people to discuss their whole social environment and social life. Chartists were able to elicit such discussions not only through their command of public space, but also through their own creative media outputs. Chartist newspapers, such as The Star, had sales into their thousands. Yet, Mill was dismissive of these types of working-class expressions of free speech. Elsewhere, for example, Mill observed:

> The institutions for lectures and discussion, the collective deliberations on questions of common interest, the trades unions, the political agitation, all serve to awaken public spirit, to diffuse variety of ideas among the mass, and to excite thought and reflection in the more intelligent (Mill 1985: 124).

But the opposition that Mill nurtures between seemingly 'neutral' higher pleasures and common lower pleasures was in fact a common one among many 'enlightened' thinkers during this time.

Unlike other countries, English modern law did not have legally binding constitutional statements protecting free speech principles like freedom of the press. Common law codes did however arise based on individual legal cases and rulings made by judges (Barendt 2005: 39-40). It is important of course to underline the point that these rulings were often made in response to conflicts and struggles around free speech issues in cities.

Speakers' Corner in Hyde Park, London, is an interesting illustration of these observations. The north-east corner of Hyde Park had from the twelfth-century up until 1783 been a place of public execution. Tyburn hanging tree attracted hundreds of spectators to its execution days. By the seventeenth and eighteenth centuries, however, there are reports stating that many in the crowd were sympathetic towards the condemned, believing felons were about to be strung up for petty crimes against private property. Often, a criminal's 'last dying speech' would be the spark that led the crowd to riot in favour of the condemned (Linebaugh 1991). After 1783, Hyde Park was still known as a place where people could regularly meet to discuss, campaign and demonstrate for greater social and political rights. In 1821, for example, radical agitators rioted in Hyde Park for greater political rights, while in 1855 a huge demonstration in Hyde Park by the left-wing political movement, the Chartists, included debates and discussions on the need for greater political and economic rights for ordinary people. Between 1866 and 1867, the Reform League held a number of highly charged demonstrations in Hyde Park on the question of extending the franchise to greater numbers of the British population. By 1872, then, regular meetings were being held across London's parks, but with the most sustained and largest assemblies being in Hyde Park, with the explicit aim to gain the right to practise 'free speech' within its boundaries (Roberts 2000).

In response to this activism, the government passed the 1872 Parks Regulation Act, which gave ordinary people the 'right' to exercise 'public address' in the Royal Parks of London. It is possible to gain a sense of what was meant by 'public address' through Regulation 14 of the First Schedule of the 1872 Act, which stated: 'No person

shall commit any act in violation of public decency, or use profane, indecent, or obscene language to the annoyance of other persons using a park'. Each royal park also now had an associated set of Rules, which set out how the 1872 Act would be interpreted within a particular Royal Park. Rule 15 of the Hyde Park Rules was particularly notable here because it reinforced this image of being 'decent' by stating: 'No idle or disorderly person, rogue of vagabond, or person in an unclean or verminous condition, shall loiter or remain in the Park or lie upon or occupy the ground or any of the seats thereof, and it shall remain lawful for any park keeper to exclude or remove from the Park any person committing any breach of this Rule'.

The image encapsulated within these Regulations and Rules is thereby one that constructs an image of an ever-present threat of 'indecent' and 'verminous' people contaminating Hyde Park and using 'obscene language', particularly for the purposes of giving a 'public address'. The way that the 1872 Act potentially and negatively framed people entering Hyde Park for the purposes of public discussion did not go unnoticed by politicians of the day. One MP, Vernon Harcourt, attacked the implicit division embedded in the 1872 Act between 'respectable' and 'unrespectable' people entering Hyde Park. Harcourt in particular mocked the Bill's 'fear of roughs' from entering Hyde Park. Sarcastically, he asked if a 'rough' was somebody who 'habitually broke the law or was disposed to break it'. If this indeed was the case, then there were plenty of 'roughs' in the higher classes who habitually broke the law (Hansard, 22 February, 1872). After 1872, successive speakers and regulars continued to expand the rights and entitlements of free speech at Hyde Park. Speakers' Corner therefore usefully highlights how struggles over the right to use this specific public park as a place for free speech eventually became recognised as a common democratic practice. But how has the relationship between urban space and free speech changed in our more contemporary times?

## Examples of the Contemporary Right to Assembly, Public Space and Free Speech

Mitchell notes that in the case of America, regulating spaces of free speech, and not just the speech itself, became the focus of attention of American authorities. Indeed, and as we shall see shortly, this is also true of UK authorities as well. But what does Mitchell mean

here? From 1945 onwards, as Mitchell explains elsewhere, US courts began to spatially regulate political discussions by mapping out what were seen by the authorities and courts to be 'legitimate' forums for the time, place and manner in which people might exercise free speech. Town halls, for example, were often thought by authorities to be acceptable venues to exercise free speech in cities rather than the more 'unconstrained' spaces in urban streets and parks (Mitchell and Staeheli 2007: 799). By 1983, the US Supreme Court divided public space into three distinct forums for assembly and speech. 'Traditional' forums such as highways and parks were still recognised as places for people to assembly within and exercise free speech rights. But the Supreme Court also now said there were 'limited' and 'non-traditional forums' like schools, which the government and authorities might sometimes open up for people to exercise their free speech rights within. Finally, the Supreme Court claimed there were and are also non-public forums' based mainly on government property such as airports, prisons and military bases in which people had no rights for assembly and free speech (McCarthy and McPhail 2006).

There have been challenges in the US to this definition of public space – for example, some protestors have challenged the Supreme Court ruling that one cannot exercise certain democratic rights at an airport (on which see Barendt 2005: 282-3) – but the basic idea that there are some public spaces in cities that one no longer has a right to assemble within is notable in a roundabout way in Britain. Certainly, there is a right enshrined at least since 1998 through a legal ruling, *DPP vs. Jones*, that certain activities on public highways like talking, playing, collecting donations, handing out leaflets, singing, listening, queuing, taking a photograph, and freedom of expression are protected as long as they do not cause a nuisance. Yet, they are not automatically granted once land is privately owned (Layard 2010). If you carry out such an activity without permission from the property owner then you could be liable to be charged with trespass. Those people and companies that privately own and control public space are not legally bound by Articles 10 and 11 – freedom of expression and freedom of assembly – under the 1998 Human Rights Act. So, if a private landlord refused to grant permission to protest on privately owned land, this cannot be

challenged under the Human Rights Act (Drucker and Gumpert 2015).

It is here that we return to the point made in the Introduction concerning the commercialisation and privatisation of public space. One estimation suggests that since 1979 around 2 million hectares of public land worth about £400 billion, and which equates to about 10 percent of Britain, has been sold off (Christophers 2018: 249). Major cities have therefore increasingly privatized their public space through the likes of new shopping centres and private housing schemes. These mass consumer-driven places transform what was once public space into quasi-public space, operated by private companies along profit driven motives. Manchester's Piccadilly Gardens, for example, is a well-known place in the city for demonstrators to gather during marches and protests. This public square has now however been transferred over to Legal and General. With the blessing of Manchester's city council, Legal and General have a 150-year lease to redevelop the shopping area of Piccadilly Gardens (Gimson 2017). Such developments can, in turn, limit people's ability to gain access to these local public spaces for social or political activity, debate and discussion. In 2003 case, *Appleby and Others vs. UK*, a local man in Washington, Tyne and Wear, set up a stall in a shopping centre to collect petitions against developments on surrounding green spaces. The shopping centre had been privatized in 1987 and security removed the man. He took his case to the European Court to argue he had lost hist free assembly in this semi-public space. But his case was not upheld (Bottomley and Moore 2007).

Again, it should be reiterated that just because a distinctive public space has been privatised, it does follow that there will automatically be negative consequences to one's rights. There are many examples of ordinary people in their communities working productively with both public and private bodies to embolden a sense of inclusivity (see Jones 2019, Part 4). Anyhow, commercialisation of public space also often opens up opportunities for ordinary people to redefine what the 'public' is, or at least should be for them. Campaigns against commercialisation always have the potential to mobilise people into new protest groups who can then 'resist', or at least 'dissent' against, business, state or local authority conceptions of publicness (see Parson 2015).

It should also be borne in mind that there are of course numerous other ways and means that public space is regulated today. Different pieces of public order and anti-terrorism legislation in recent years have for example both changed the nature of how the police and authorities can regulate public space and given extra powers to the authorities to 'zone' public spaces and behaviour therein for the purposes of detecting crime. The Terrorism Act 2000, for instance, gave police new powers to zone areas in cities and towns in order to conduct stop and search policies (see Roberts 2008). Different anti-social behaviour acts have also been passed, which once again have ramifications on governing and policing public space. The 2003 Anti-Social Behaviour Act empowered the police to legally remove a 'public assembly' of two people from a place if it appears that the two people in question are likely to cause 'serious public disorder, serious damage to property or serious disruption to the life of the community'. More recently, the Anti-social Behaviour, Crime and Policing Act 2014 introduced a new policy initiative called 'Public Spaces Protection Orders' (PSPOs). Simply stated, PSPOs can be introduced in a public area if a local authority has reasonable grounds to suspect that anti-social behaviour in the respective public area is having a detrimental impact on the quality of local life. PSPOs can then target, through appropriate restrictions, certain behaviour which is thought to having detrimental impact (see Local Government Association 2018). Since their inception, however, PSPOs have been subject to various criticisms. For instance, local authorities now require far less evidence than under previous legislation to show that harm is being caused to individuals or to the 'quality of life' of a community by the behaviour of others. Yet, 'quality of life' is not defined, nor does the 2014 Act clearly explain many of its other terms to justify the imposition of PSPOs, such as specific 'anti-social behaviour' is 'likely' to be 'persistent'. Overall, so critics continue, 'the legal test for a PSPO permits the criminalisation of behaviour in cases where traditional thresholds for criminalisation have not been established' (Brown 2017: 549).

Controversies around the legal regulation of public space also occurred during the pandemic. The Conservative Party under Boris Johnson introduced the Coronavirus Act 2020 to help the authorities tackle various social issues associated with the virus. But like many

previous pieces of legislation that legally altered notions of public space, critics argued that the 2020 Act gave police new powers of discretion to detain those they suspected of being infectious and to force people to be tested for the virus. Problematically, evidence suggested that people of colour were more likely to be detained under the Act (Runswick 2020).

## Conclusion

The famous French social geographer, Henri Lefebvre, once said that those who wish to expand rights for all in city spaces often seek to critique 'centres of decision-making, wealth, power, of information and knowledge' in order to campaign for and facilitate a number of concrete rights such as, 'the right to meetings and gathering' in urban spaces...The right to the city therefore signifies a gathering together instead of a fragmentation. It does not abolish confrontations and struggles' (Lefebvre 1996: 195). For Lefebvre, the right to the city is thus built on the emergence of a plethora of rights and entitlements that go beyond abstract liberal rights as embodied in generic statements like 'the rights of man'. Instead, the right to the city emerges from popular culture and popular experiences of living in the city and takes account of the daily realities that people endure in urban life, such as social divisions, poverty, racism, and exclusions from forms of housing. But the right to the city' approach also focuses on how different people come together not only to socialise in their communities through social and cultural events, but also how they come together politically to advocate and campaign for greater urban rights. Accordingly, as David Harvey argues, to transform our lives in cities for the better therefore implies working with others and 'exercising collective power to reshape the processes of urbanization' (Harvey 2008: 23).

In my opinion, 'the right to the city' approach is useful because it immediately draws attention to the contested nature of free speech and how it is used and fought over by different social groups in urban public spaces. It also alerts us to the point that what at first appears to be an inclusive definition of free speech, such as the marketplace of ideas approach, often, on closer inspection, is in fact founded on a set of exclusionary practices that even if only implicitly denigrate the contribution and practice of free speech from ordinary people.

But if the 'right to the city' also points towards people gaining the necessary resources to work collectively to change how cities are made and remade, 'and to do so in a fundamental and radical way' (Harvey 2012: 5), to what extent can this be achieved in cities parcelled into distinct spaces for commercialised purposes? After all, and at least since the 1980s, we have seen the rise 'of fortified fragments, gated communities and privatized public spaces kept under constant surveillance' (Harvey 2008: 32). Under these circumstances, is it the case that we can all enter as equals programmes and schemes of government-sponsored community participation? Or is it the case that social divisions in cities will lead to new calls for the 'right to the city'?

Undoubtedly, recent years have seen new social movements emerge that have occupied public spaces in our cities in order to engage in protest, demonstrations and free speech about social ills of the day. One need only think of the worldwide Occupy movement in 2011 campaigning against global inequalities, or relatively recent popular political movements across Europe such as Syriza in Greece and Podemos in Spain, or the Extinction Rebellion in 2019 campaigning most notably in London for environmental issues. Many of these groups gather and meet in well-known urban parks and urban public squares. For example, the Occupy movement began life in Zuccotti Park in New York, while groups attached to Syriza in Greece and Podemos in Spain would debate, discuss and demonstrate in urban public squares, while Extinction Rebellion chose to hold an assembly at Speakers' Corner, Hyde Park. Such examples demonstrate that the relationship between the right to the city, public space and free speech is very much alive today.

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# Annals of Manchester, 2020

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 available on the internet. It is fully searchable, yielding far more references than can be identified using the printed index, which is heavily weighted towards the names of individuals.

The entries below cover the period from the beginning of January to the end of December 2020.

- JANUARY -

**Saturday 4 January** Single sentence news item in *Manchester Evening News* refers to a new viral pneumonia identified in a food market in central China.

**Monday 6 January** Serial rapist Reynhard Sinaga, 36, found guilty of 159 offences of drugging and sexually assaulting young men in Manchester had his sentence increased to 30 years. In December it was further increased to 40 years.

Binman Bangladesh Airlines announced thrice-weekly service between Manchester and Dhaka and Sylhet.

**Wednesday 15 January** Andy Burnham, Greater Manchester mayor, to ask Attorney General to reopen case of Victoria Agoglia, 15, who died in 2003.

**Monday 20 January** Plans announced to demolish part of Tadao Ando's concrete wall in Piccadilly Gardens.

**Sunday 26 January** Large crowds watched Chinese New Year celebrations, including dragon parade starting in St Peter's Square.

Police launched murder inquiry following death of Emanuel Simon in a brawl outside Dubai café, Wilmslow Road, Rusholme. Nojan Kfi of Moston arrested and charged.

**Wednesday 29 January** British Airways suspends all flights to mainland China. Health checks introduced on passengers arriving at Manchester Airport, scanning for 'flu-like virus' detected in China.

**Thursday 30 January** Hallé Orchestra, Hallé Choir and RNCM Chamber Choir conducted by Sir Mark Elder performed Beethoven's Ninth Symphony at Bridgewater Hall, part of programme marking 250th anniversary of composer's birth.

**Friday 31 January** First two cases of coronavirus in United Kingdom confirmed in York. Workers at Manchester Airport raised concerns over lack of protective equipment against coronavirus.

- FEBRUARY -

**Monday 3 February** Greater Manchester Police distributed knife bins as part of new amnesty. In Manchester knife crime was highest in Fallowfield, Longsight, Moss Side, Harpurhey, Collyhurst and the city centre.

**Monday 10 February** Two people stabbed outside supermarket in Piccadilly Gardens. Declan Connolly arrested and subsequently sentenced to 10 years imprisonment.

**Friday 14 February** UEFA Club Financial Control Body banned Manchester City for two years and fined the club 30 million euros for committing 'serious breaches' of its Financial Fair Play regulations between 2012 and 2016.

**Saturday 16 February** Harry Gregg, goalkeeper, died, aged 87. Born in Tobermore, Northern Ireland. Gregg played for Manchester United 210 times from 1957 to 1966. He survived the Munich air crash in 1958, helping to rescue many of his team mates.

**Sunday 23 February** Wythenshawe-born Tyson Fury defeated Deontay Wilder to win WBC heavyweight championship.

**Tuesday 25 February** Patients and staff at Cheetham Hill Medical Centre locked in following presence of patient with suspected coronavirus.

**Wednesday 26 February** Additional medical staff sent to Manchester Airport to help screen passengers.

**Thursday 27 February** David Regan, Manchester Director of Public Health, announces establishment of local planning group comprising city council, city's hospitals and GP practices to co-ordinate response to coronavirus. Covid-19 quarantine pods installed in Greater Manchester hospitals.

- MARCH -

**Sunday 1 March** Patient in Bury tested positive for coronavirus, first case in Greater Manchester.

**Monday 2 March** MIPIM international property convention in Cannes, at which Manchester was regular exhibitor, cancelled due to pandemic.

**Wednesday 4 March** Future of Intu Properties, owner of Trafford Centre, in doubt as it struggles to finance £4.7 billion of debts at a time when shopping centre valuations in decline. Peel Holdings, controlled by the billionaire John Whittaker, is the largest shareholder.

**Thursday 5 March** Mapletree, part of Singapore's state investment fund, on shortlist of bidders to build a £1.5 billion innovation district for University of Manchester following withdrawal of two Chinese companies.

**Saturday 7 March** Death reported of Dave Rainford, age 51. Raised in Chorlton and educated at Manchester Grammar School, 'Tremendous Knowledge Dave' appeared on a number of TV quiz shows, including Eggheads.

**Sunday 8 March** Unnamed man who had recently visited Italy died of Covid-19 in the Infectious Diseases Unit, North Manchester General Hospital. He was believed to be the third person to die of the virus in England.

**Wednesday 11 March** WHO designates Covid-19 as a pandemic following rapid increase in cases outside China.

Police seized £7.5 million of suspected counterfeit goods in Ducie Street, Cheetham Hill. Eleven people arrested for counterfeit goods offences and four for immigration offences.

**Friday 13 March** Council elections and election for Greater Manchester mayor postponed until 2021 due to coronavirus.

Concert by Stereophonics at Manchester Arena.

**Monday 16 March** Centre for Thriving Places identified Salford as the greenest place to live in England and Wales out of 363 local authorities.

Patricia Morris Jones, oncologist, died. Born in Oswestry, 1933. She joined Manchester Children's Hospital in 1966 and became a pioneer in treatment of children's cancers.

**Tuesday 17 March** Hashem Abedi, 23, younger brother of the Manchester Arena suicide bomber, found guilty on 22 charges of murder, one charge of attempted murder and charge of conspiring with his brother Salman to cause explosions. Abedi who was born and brought up in Manchester, fled to Libya before the bombing but was extradited to face trial. He received a life sentence with a minimum of 55 years – the longest in British legal history – for assisting his brother in bomb attack in May 2017.

**Thursday 19 March** Hallé Orchestra concert featuring Vaughan Williams Symphony No 9 cancelled due to coronavirus. Mid-day Concerts Society series also cancelled.

**Friday 20 March** All schools in city ordered to close, except for children of essential workers and vulnerable children, due to pandemic.

**Sunday 22 March** Gary Neville and Ryan Giggs closed their hotels (Stock Exchange Hotel, Norfolk Street and Hotel Football, Old Trafford), but offered rooms free of charge to NHS staff.

**Monday 23 March** National coronavirus lockdown begins. Manchester city centre almost deserted as people instructed to remain at home unless 'absolutely necessary'. Churches, theatres and cinemas closed. Furlough scheme introduced to assist unemployed. Regulations become law on 26 March.

**Wednesday 25 March** Manchester Airport closes Terminals 2 and 3 due to reduced passenger numbers.

**Thursday 26 March** Plans announced to convert Manchester Central Convention Complex into field hospital to treat coronavirus patients. Plans for temporary mortuary building in Trafford Park.

**Monday 30 March** Glen Stevens died, aged 74. He had been suffering from Covid-19. Raised in Blackley, he was a flamboyant figure in Manchester's Gay Village owning a number of venues including Samantha's.

Police carrying out checks on people travelling into Manchester city centre during lockdown.

- APRIL -

**Wednesday 1 April** Coronavirus deaths continue to rise in Greater Manchester region. Reported deaths at GM hospital trusts:

Salford Royal NHS Foundation Trust - 28
Pennine Acute Hospitals NHS Trust - 22
Manchester University Foundation Trust - 18
Tameside and Glossop NHS Foundation Trust - 15
Bolton NHS Foundation Trust - 7
Stockport NHS Foundation Trust - 7
Christie NHS Foundation Trust - 1.

Hospitals banned visitors to reduce risk of virus spreading.

**Sunday 5 April** Manchester City takes disciplinary action against Kyle Walker for breaking lockdown rules. Manchester marathon postponed due to pandemic. Prime minster Boris Johnson admitted to hospital with Covid-19.

**Monday 6 April** Manchester South Central Foodbank closed to visitors, arrangements made to deliver food parcels.

**Tuesday 7 April** Councillor Sue Murphy, Deputy Leader of Manchester City Council died, aged 59.

**Monday 13 April** More people in hospital with coronavirus in the north-west than in London. Greater Manchester hospitals struggle to obtain PPE supplies. Office for National Statistics data shows Salford has one of highest coronavirus death rates in the country: 174 deaths (93 for every 100,000 people). Higher Broughton and Broughton Park record high mortality rates.

**Friday 17 April** NHS Nightingale Hospital North West opened in Manchester Central Convention Centre. It will treat up to 750 Covid-19 patients when fully operational. Large increase in Covid-19 deaths in local care homes.

**Thursday 23 April** Sir Richard Leese, leader of Manchester City Council, warned of catastrophic impact of pandemic on city's and region's services. University of Manchester warns of redundancies because of projected fall in income from international and home-EU students.

Gunman opened fire at mourners attending funeral of Clive Pinnock at Gorton Cemetery.

**Friday 24 April** Trafford-based Kellogg's pledges to give 500,000 meals to NHS staff and other key workers fighting the pandemic.

**Tuesday 28 April** Emotional scenes at Manchester hospitals as national one-minute silence held at 11.00am to remember front-line workers who have died in pandemic.

**Wednesday 29 April** Eamonn O'Neal installed as High Sheriff of Greater Manchester in on-line ceremony.

**Thursday 30 April** Coronavirus deaths in local hospitals and care homes remain high.
Coronavirus deaths at Greater Manchester hospitals:

Pennine Acute Hospitals NHS Trust - 340
Manchester University NHS Foundation Trust - 276
Bolton NHS Foundation Trust - 163
Wrightington, Wigan and Leigh NHS Foundation Trust - 160
Salford Royal NHS Foundation Trust - 141
Tameside and Glossop NHS Foundation Trust - 106
Stockport NHS Foundation Trust - 102
Greater Manchester Mental Health NHS Foundation Trust - 8
The Christie NHS Foundation Trust - 8
Greater Manchester Mental Health NHS Foundation Trust - 8
Pennine Care NHS Foundation Trust - 3

- MAY -

**Monday 4 May** Temperature scanners installed at Manchester Airport, part of a trial to screen for coronavirus cases. Passengers requested to wear face coverings and gloves.

**Wednesday 6 May** Problems providing safe accommodation for homeless in city.

**Monday 11 May** Easing of lockdown restrictions. Hardy's pub in Rusholme severely damaged in fire.

**Tuesday 12 May** Stephen Fay, journalist, died, aged 81. He was born in Littleborough in 1938, son of the journalist, Gerald Fay. Respected journalist who worked on *The Sunday Times* and *Independent*. His books included *Measure for Measure: Reforming the Trade Unions* (1970), *The Death of Venice* (1976), *The Collapse of Barings* (1997) and *Arlott, Swanton and the Soul of English Cricket* (2018).

**Wednesday 13 May** Andy Burnham, mayor of Greater Manchester, called on government to publish the R number (reproductive rate of virus) by local areas.

**Saturday 16 May** Part of Deansgate pedestrianised, one of a number of footway-widening schemes in city centre to help people socially distance and increase economic activity.

**Tuesday 26 May** Manchester Metropolitan University's plan to sell 10 acres of land bordering Longford Park in Chorlton for housing development stalled when asbestos found.

**Wednesday 27 May** High Sheriff of Greater Manchester presented Manchester United striker, Marcus Rashford, with special recognition award for his work with Fareshare charity in helping to feed children during pandemic.

**Thursday 28 May** Centre for Cities analysis of official data showing that Manchester and other northern cities rank high on unemployment created by Covid-19. A total of 107,385 people claiming unemployment benefits in April (6.7% of Manchester's population aged16-64).

- JUNE -

**Monday 1 June** Schools re-opened for Reception, Year 1 and Year 6 pupils.

**Friday 5 June** Brian Robson, emeritus professor University of Manchester, died, aged 81. Appointed Professor of Geography at University of Manchester in 1977 he made important contributions to the field of urban geography, establishing Centre for Urban Policy Studies. He was also active in wider community including Manchester Council for Voluntary Services and Manchester Settlement.

**Saturday 6 June** Black Lives Matter demonstration in Piccadilly Gardens following the death of George Floyd in Minneapolis. Mural tribute painted in Stevenson Square. Protests in other towns including Bolton.

**Monday 8 June** Tony Dunne, footballer, died, aged 78. Dublin-born Dunne played 535 matches for Manchester United between 1960 and 1973, including in the 1968 European Cup winning side.

**Wednesday 10 June** Manchester City Council undertakes historical assessment of its public statues in light of Black Lives Matter movement which saw the pulling down of statue of Edward Colston (work of the Manchester sculptor John Cassidy) in Bristol.

**Friday 12 June** Care Quality Commission data shows 1,115 coronavirus deaths in region's care homes from March 6 to June 12, deaths peaking (205) in week of April 17. Stockport care homes recorded highest number of deaths.

**Saturday 13 June** Some 6,000 people attended illegal raves in Daisy Nook, Failsworth and Carrington, Trafford.

**Monday 15 June** Lockdown rules eased. Re-opening of some non-essential shops in Manchester.

**Tuesday 16 June** Government changes policy on free school meals over summer following campaign in which the Manchester United footballer Marcus Rashford was prominent. It agrees to finance a £120m summer food fund for 1.3m pupils.

**Wednesday 17 June** Manchester Dogs' Home in Harpurhey re-opened having been closed in March.

**Sunday 21 June** Manchester Day celebrations postponed due to pandemic.

Cheriff Tall, 21, and Abayomi Ajose, 36, shot dead at party in car park on Caythorpe Street, Moss Side.

**Monday 22 June** Plane with a banner reading 'White Lives Matter Burnley' flew over the Etihad Stadium as Manchester City and Burnley players knelt in support of Black Lives Matter protests before televised football match.

Graffiti daubed on Oliver Cromwell statue in Wythenshawe Park included reference to his invasion of Ireland.

**Thursday 25 June** Concerns raised over city council planning decisions taken in private sessions.

Police officer injured and vehicles damaged as police dispersed illegal gathering in St Stephen's Close, Longsight.

**Friday 26 June** Intu Properties, owner of 17 shopping centres including the Trafford Centre, entered administration having been unable to arrange repayments with creditors on £4.5 billion debts.

**Monday 29 June** Black Lives Matter petition calling for removal of statue of Sir Robert Peel in Piccadilly because of family's connections to slave trade. A counter petition also organised.

**Tuesday 30 June** Coronavirus deaths in region continue to fall. Coronavirus deaths at Greater Manchester's NHS trusts:

Pennine Acute Hospitals NHS Trust - 540
Manchester University NHS Foundation Trust - 422
Wrightington, Wigan and Leigh NHS Foundation Trust - 251
Bolton NHS Foundation Trust - 221
Stockport NHS Foundation Trust - 213
Tameside and Glossop NHS Foundation Trust - 205
Salford Royal NHS Foundation Trust - 177
Christie NHS Foundation Trust - 13
Greater Manchester Mental Health NHS Foundation Trust - 9
Pennine Care NHS Foundation Trust - 6
NHS Nightingale North West - 6

- JULY -

**Friday 3 July** Royal Exchange Theatre entrance wrapped in tape to highlight problems facing theatres during pandemic. Manchester theatres forced to make redundancies.

**Saturday 4 July** Lockdown measures further eased. Churches, mosques, pubs, restaurants, museums and libraries re-open but observing strict social distancing.

**Sunday 5 July** Manchester Cathedral re-opened for public worship. Services limited to 70 persons, worshippers register on-line before attending.

**Monday 6 July** Andy Burnham, mayor of Greater Manchester, called for government to supply local authorities with real-time data on track and tracing coronavirus cases.

**Tuesday 7 July** Reach (formerly Trinity Mirror) announced plans to reduce staff on its national and regional newspapers, including *Manchester Evening News*. Sales and advertising revenue declined during pandemic.

**Monday 13 July** Court of Arbitration for Sport cleared Manchester City of having committed 'serious breaches' of Financial Fair Play regulations. Fine reduced from 30m to 10m euros.

**Monday 20 July** National Audit Office report questioned process of selecting 101 towns for £3.6 billion Towns Fund. Oldham, Rochdale and Bolton received funds having been identified as high-priority communities in North West with significant deprivation but surprise that Cheadle, Leyland and Southport also received support.

**Friday 24 July** Police cordoned off roads to stop people attending rave at Dovestone, Greenfield.

Unemployment rising in Greater Manchester due to pandemic. Almost 1,000 people applied for vacancy as a receptionist at a Manchester restaurant.

**Saturday 25 July** C. P. Lee, musician and writer, died, aged 70. Born 19 January 1950 in Didsbury. Lee founded and played in a number of groups including the punk rock band Alberto y Los Trios Paranoias. His books on music included *Like the Night (Revisited)* (1998) about

Bob Dylan 1966 concert at Free Trade Hall, and *Shake Rattle and Rain: Popular Music Making in Manchester 1955-1995* (2002). He was a founder of MADA (Manchester and District Music Archive).

Group of teenagers, mainly girls, attacked a young couple on tram travelling from East Didsbury to Chorlton.

**Sunday 26 July** Hulme-born singer Denise Johnson died, age 56. She was a self-taught singer who provided backing vocals for Manchester groups including Primal Scream and New Order.

**Friday 31 July** Rising number of coronavirus cases in Greater Manchester led to new lockdown restrictions. Government introduced new restrictions on people meeting in each other homes. In Manchester the increase included cases in 18-25 years age group. Covid-19 deaths in NHS region's hospitals total 2,139:

Pennine Acute Hospitals NHS Trust - 557
Manchester University NHS Foundation Trust - 445
Wrightington, Wigan and Leigh NHS Foundation Trust - 253
Bolton NHS Foundation Trust - 226
Stockport NHS Foundation Trust - 226
Tameside and Glossop NHS Foundation Trust - 215
Salford Royal NHS Foundation Trust - 180
Christie NHS Foundation Trust - 13
Greater Manchester Mental Health NHS Foundation Trust - 9
Pennine Care NHS Foundation Trust - 6
NHS Nightingale Hospital North West - 6

- AUGUST -

**Saturday 1 August** Tony Morris died, aged 57. He presented *Granada Reports*, ITV's regional news programme in the North West, for 17 years.

Traditional end of Eid celebrations curbed by lockdown restrictions.

**Sunday 2 August** 'Major incident' declared in Greater Manchester in response to rapid increase in coronavirus cases.

**Monday 3 August** New community park opened in West Gorton funded by European Commission's Horizon 2020 programme.

**Wednesday 5 August** Andy Burnham points to urgent need to improve NHS 'Test and Trace' system in Greater Manchester.

**Thursday 6 August** Glyn Ellis, died, age 74. Born in Levenshulme in 1945, Ellis found fame in the mid-1960s as the pop singer Wayne Fontana. The group Wayne Fontana and the Mindbenders had a number of hits records before he left the group in 1965 to continue career as a solo singer.

Manchester organised on-line commemoration of the 75th anniversary of atomic bombing of Hiroshima and Nagasaki.

**Thursday 13 August** Manchester City Council ordered Viadux in Albion Street to close following failure to follow social distancing rules.

**Friday 14 August** Akbar's restaurant, Liverpool Road, closed for breaching social distancing measures.

Final sections of 40m high Tower of Light installed, part of the Manchester Civic Quarter Heat Network project.

**Saturday 15 August** Police attacked when breaking up illegal gathering in Gorton.

**Thursday 20 August** Manchester Central Library and Art Gallery re-opened.

**Monday 24 August** Greater Manchester Police closed down over 100 illegal gatherings in previous days.

**Sunday 30 August** Coronavirus deaths in region continue to fall. Coronavirus GM hospital deaths now 2180:

Pennine Acute Hospitals NHS Trust - 570
Manchester University NHS Foundation Trust - 452
Wrightington, Wigan and Leigh NHS Foundation Trust - 253
Bolton NHS Foundation Trust - 231
Stockport NHS Foundation Trust - 227
Tameside and Glossop NHS Foundation Trust - 230
Salford Royal NHS Foundation Trust - 183
Christie NHS Foundation Trust - 13
Greater Manchester Mental Health NHS Foundation Trust - 9
Pennine Care NHS Foundation Trust - 6
NHS Nightingale North West - 6

- SEPTEMBER -

**Tuesday 1 September** Dame Nancy Rothwell, president and vice-chancellor of Manchester University, appointed chair of Russell Group elite universities.

Wythenshawe-born Manchester United footballer Marcus Rashford announced establishment of a taskforce involving prominent supermarkets to fight child food poverty in Britain.

**Friday 4 September** Manchester Histories Festival opened as digifest due to pandemic.

**Monday 7 September** Public inquiry opened into the Manchester Arena terrorist bomb attack which killed 22 people. Inquiry is chaired by Sir John Saunders and held in Manchester Magistrates' Court.

**Wednesday 9 September** Bolton introduced special measures following rapid increase in coronavirus infections. Infection rate rises to 184.3 cases per 100,000 people. Coronavirus outbreak among crews at Rochdale fire station.

**Monday 14 September** An 'engineering issue' necessitated demolition of part of luxury 10-storey tower block near Trinity Way.

**Wednesday 23 September** Harold Evans, journalist and newspaper editor died, age 92. Evans was born in Eccles, 28 June 1928. He began his career working on *Ashton-under-Lyne Reporter*, *Gorton and Openshaw Reporter* and *Manchester Evening News*. Editor of *Sunday Times* (1967-81), establishing the paper's reputation for investigative journalism. He later moved to United States where he continued to edit magazines. Knighted for services to journalism in 2004. Author of many books on newspaper industry and autobiography, *My Paper Chase: True Stories of Vanished Times* (2009).

Police chase resulted in crash in Frederick Street, Salford in which two people died and three others seriously injured.

**Thursday 24 September** New Covid-19 track and trace app launched.

Manchester City Council approved plans for new indoor entertainment arena (Co-op Live) located next to Etihad Stadium, East Manchester, accommodating 23,500 persons.

**Friday 25 September** Covid-19 cases in city increasing. Manchester Metropolitan University students living in Cambridge and Birley halls of residence placed in self-isolation for 14 days. Students filmed holding party outside Owens Park halls of residence, Fallowfield.

**Monday 28 September** *The Light*, a self-proclaimed 'truthpaper' edited by Darren Smith is published and circulated in Manchester. It repeats disinformation about the pandemic.

Hundreds of people breached restrictions to attend funeral at Denehurst Cemetery in Rochdale.

- OCTOBER -

**Thursday 1 October** 370 University of Manchester students and 12 staff tested positive for coronavirus between 21 and 30 September.

**Friday 2 October** Manchester recorded highest coronavirus infection rate in England (529.5 cases per 100,000) in week ending 2 October, increase driven by returning university students. Highest rates were in Fallowfield and Hulme. Stockport was only borough in Greater Manchester with an infection rate under 200.

**Monday 5 October** Windrush Generations Manchester Voices exhibition opened at Manchester Central Library, part of Black History Month.

**Tuesday 6 October** Publication of Independent Inquiry into Child Sexual Abuse found that the Church of England failed to take action against many clergymen, including Robert Waddington, Dean of Manchester Cathedral (1984-1993), despite serious allegations having been made.

Recovery plan for Manchester theatres and cultural venues published.

Labour leaders in Manchester, Liverpool, Leeds and Newcastle (Core Cities UK) sent letter to Health Secretary Matt Hancock outlining five-point plan to improve the effectiveness of coronavirus responses at local level.

**Wednesday 7 October** Manchester Airports Group (MAG) announced 465 redundancies due to pandemic.

**Thursday 8 October** Manchester universities introduced fully online teaching in most courses in response to rising rates of coronavirus.

**Friday 9 October** Local awards in postponed Queen's Birthday Honours included Marcus Rashford, MBE for work in combating child food poverty during pandemic; Cheryl Lenney, Chief Nurse at Manchester University NHS Foundation Trust, OBE for services to nursing; Hera Hussain, BEM for work in establishing international organisation for victims of gender-based violence; Qaisra Shahraz, MBE for promoting gender equality and cultural learning.

**Sunday 11 October** Five Manchester MPs write to prime minister opposing plans to introduce three-tier system to combat coronavirus.

**Wednesday 14 October** Government introduced three-tier system of coronavirus restrictions based on incidence of disease. Manchester placed in Tier 2 lockdown, Liverpool in Tier 3 (Very High Category).

**Thursday 15 October** Greater Manchester mayor Andy Burnham, supported by local council leaders, resisted Tier 3 lockdown without provision of sufficient financial support for local businesses and workers. Heavy demand for intensive care beds, Salford Royal Hospital and Stepping Hill at full capacity. Prime minister indicated that he would impose lockdown if no agreement reached.

Marcus Rashford renews campaign for government to provide children with meals during holidays. His petition attracts over one million signatures.

PAC@75 celebrations at Manchester Metropolitan University marking the 75th anniversary of the Pan-African Congress in Manchester.

**Friday 16 October** 525 schools in Greater Manchester, including 102 in Manchester, reported coronavirus cases causing pupils and staff in particular years to self-isolate.

**Tuesday 20 October** Talks between government and Greater Manchester Combined Authority and local politicians over funding to support businesses if district moved into Tier 3 break

down. Government to pay coronavirus money direct to individual boroughs rather than GMCA.

National Portrait Gallery displayed images of helpers during the pandemic on billboards in different towns. Among the most discussed was a large hand-painted mural on building in the Northern Quarter showing a London covid-nurse, Melanie Senior, photographed by Johannah Churchill.

**Friday 23 October** Greater Manchester moved into the highest risk Tier 3 regulations.

**Thursday 29 October** Manchester's Nightingale hospital in Central Convention Centre re-opened.

**Friday 30 October** Norbert 'Nobby' Stiles, footballer, died, aged 78. Born in Collyhurst in May 1942, attended St Patrick's school. Stiles became a professional footballer playing over 300 times for Manchester United between 1960 and 1972. He was capped for England 28 times, playing in the World Cup winning team of 1966. *After the Ball: My Autobiography* was published in 2003.

Greater Manchester Spatial Framework Plan for employment, housing and environment, 2020 to 2037 presented to GMC.

**Saturday 31 October** Coronavirus deaths in region increasing rapidly. Coronavirus hospital deaths:

Pennine Acute Hospitals NHS Trust - 695
Manchester University NHS Foundation Trust - 532
Wrightington, Wigan and Leigh NHS Foundation Trust - 344
Tameside and Glossop NHS Foundation Trust - 326
Bolton NHS Foundation Trust - 287
Stockport NHS Foundation Trust - 258
Salford Royal NHS Foundation Trust - 230
Christie NHS Foundation Trust - 15
Greater Manchester Mental Health NHS Foundation Trust - 9
Pennine Care NHS Foundation Trust - 6
NHS Nightingale North West - 6

- NOVEMBER -

**Thursday 5 November** New lockdown introduced until 2 December.

Students in Manchester university-owned halls of residence compelled to self-isolate during pandemic organised rent strike. University of Manchester apologised over erection of 'lockdown fences' around student residences in Fallowfield.

**Friday 6 November** Coronavirus infection rates rising in Oldham (780.2 per 100,000) and Bury (597.9 per 100,000) but declining in other boroughs, including Manchester (463.3 per 100,000). Overall, Greater Manchester infection rate is slightly down (550.56) but far above national average (242.7). Greater Manchester hospital coronavirus death toll is 2,944. All non-urgent operations suspended in Greater Manchester hospitals.

**Sunday 8 November** No official public services in Manchester to mark Remembrance Sunday or Armistice Day.

Hundreds of people from across Greater Manchester gathered in Piccadilly Gardens to protest over lockdown. Police made four arrests. Organisers fined.

**Wednesday 11 November** Manchester Airport moved all operations to Terminal One.

**Thursday 12 November** Greater Manchester coronavirus rates declining (440.5 cases per 100,000 people) but still above England average (271.8). Manchester average (385.3). Oldham (598) and Rochdale (531). Stockport (339) has lowest infection rate. 3247 coronavirus hospital deaths in Greater Manchester since March.

**Friday 13 November** Mark ('The Iceman') Fellows received a further life sentence for attack on Aaron Williams in Salford in March 2015.

**Monday 16 November** Sean O'Callaghan, assistant chief constable of British Transport Police told Manchester Arena bomb inquiry that officers were not patrolling Arena area on the night bomb detonated. BTP deployment consisted of one officer who was still on probation and three police community support officers.

Work began on demolition of Tadao Ando's much criticised concrete wall in Piccadilly Gardens.

**Tuesday 24 November** Coronavirus rates in decline across Greater Manchester: Oldham (401.9 per 100,000) has highest infection rate; Manchester rate (265.5). Trafford (190.4) is only borough below national average.

- DECEMBER -

**Tuesday 1 December** Zak Bennett-Eko, 23, a paranoid schizophrenic, was detained indefinitely for drowning his infant son in river Irwell. Trial held in Nightingale court in Lowry Theatre, Salford.

**Wednesday 2 December** New tier system comes into operation in England. Greater Manchester placed in strengthened Tier 3 coronavirus restrictions.

**Friday 4 December** Rapid coronavirus testing for care home visitors in Greater Manchester paused due to concerns about accuracy.

**Monday 7 December** Public inquiry into Manchester Arena bombing informed that Hashem Abedi had admitted assisting his brother in the attack.

Duke and Duchess of Cambridge visited Fairshare food charity in New Smithfield Market to thank volunteers for work during pandemic.

**Tuesday 8 December** Ted Jones, 86, was first patient in Greater Manchester to receive Pfizer Covid-19 vaccine at Salford Royal.

**Wednesday 16 December** Manchester University NHS Foundation Trust designated Covid-19 vaccination hub. Monica Washington, 86, from Eccles was first person to receive vaccine.

Canada Pension Plan Investment Board (CPPIB) took control of Trafford Centre, following collapse into administration of Intu.

**Thursday 17 December** Greater Manchester to remain in Tier 3 restrictions. Decision criticised as unfair by Andy Burnham.

Drive-through Covid-19 vaccination hub opened in Hyde.

**Friday 18 December** Ian Hopkins, Chief Constable of Greater Manchester Police, resigned following publication of Inspectorate of Constabulary report (Greater Manchester Police - Victim

Service Assessment (VSA) Report) which revealed that GMP had failed to record 80,100 crimes and prematurely closed a number of investigations, including domestic abuse cases, between July 2019-June 2020. GMP placed in special measures.

**Saturday 19 December** New Tier 4 regulations to be introduced. Relaxation of coronavirus regulations during Christmas holidays originally intended for five days reduced to one day.

**Sunday 27 December** Police break up illegal rave in Hanover Street, Shudehill.

**Wednesday 30 December** Coronavirus infection rates continuing to increase. A total of 368,447 people have tested positive for Covid-19 in the North West: Manchester (35,871); Wigan (19,222); Bolton (17,149); Oldham (16,782); Salford (15,437); Rochdale (14,816); Stockport (12,633); Tameside (11,853); Bury (11,728); Trafford (10,507).

Coronavirus hospital deaths:

Pennine Acute Hospitals NHS Trust - 1166
Manchester University NHS Foundation Trust - 782
Wrightington, Wigan and Leigh NHS Foundation Trust - 590
Bolton NHS Foundation Trust - 462
Tameside and Glossop NHS Foundation Trust - 446
Salford Royal NHS Foundation Trust - 371
Stockport NHS Foundation Trust - 346
Christie NHS Foundation Trust - 20
Greater Manchester Mental Health NHS Foundation Trust - 9
Pennine Care NHS Foundation Trust - 7
NHS Nightingale North West - 6

**Thursday 31 December** Greater Manchester placed in Tier 4, highest level of coronavirus restrictions. Manchester rate (200.8 per 100,000) is less than half the national average (420.4).

Police issued 12 fixed penalty notices for breaking Covid-19 regulations to people attending party in Halebank Avenue, Didsbury.

# A Climate Report for 2021

BRIAN TYLER

In this annual report, written for the general membership of the Society, trends and changes in the main observable effects of climate change and greenhouse gas emissions (GHGs) for the calendar year 2021 are outlined. The outcomes from COP26 are reported and reviewed. A more detailed report on the global climate is available at https://www.ncdc.noaa.gov/sotc/.

## Observable climate change effects 2021

Based on six leading international datasets consolidated by WMO* the year 2021 was one of the seven warmest years on record, despite average global temperatures being temporarily cooled by successive La Niña events at either end of the year (MO). When compared with the pre-industrial global reference period, the year was 1.1 ±0.1°C above the 1850-1900 average. The WMO Global Annual Climate Update predicts that the chance of global near-surface temperature exceeding 1.5°C above pre-industrial levels for at least one year between 2022 and 2026 is about as likely as not (48%).

Sea ice cover (the area in which ice cover is at least 15%) in the Arctic dropped to 4.72 million km², the 12th-lowest in the satellite record (NASA). Satellite observations over Antarctica show there has been no significant trend in sea ice area and volume during the last 40 years, in both winter and summer: this remained so in 2021 (EUMETSAT). The loss of ice mass from the land ice sheets in both Greenland and Antarctica, as recorded by NASA, continued at the significant rates observed by satellites over the past 20 years. Accounting for both surface melting and discharge of icebergs, the Greenland ice sheet lost around 166 bn tonnes of ice over the 12-month period ending in August. 2021 was the 25th year in a row

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* The references name the organisations from whose website the data were taken. Full names are listed at the end of this paper. A Google search using that name with an appropriate subject leads to the relevant page – and much more.

where Greenland has lost more ice than it gained. This year was also notable for the first recorded rainfall at the summit of Greenland, at 3,200 metres above sea level. (CB)

Worldwide observations of glaciers (WGMS) showed continued ice loss during 2021 at a rate typical of the last decade. The annual mass change has been negative for the last 30 years with eight out of the ten most negative mass balance years recorded since 2010. Over the past five years the loss equates an annual glacier-wide ice thickness loss of about 1m per year.

In January 2022 the sea level rise since 1993 was reported (NASA) as 102 (±4.0) mm, an increase of 4mm from the previous January. The main causes are added water from melting ice sheets and glaciers together with the expansion of seawater as it warms.

2021 was also notable (BE) for new record high annual average temperatures in 25 countries, including China, South Korea, and Nigeria. Extreme weather events include

- disastrous winter weather (February 12-20) over the central U.S. bringing heavy snow, freezing rain, and severe cold to Texas and surroundings, killing 246 people;
- an all-time national temperature record on three consecutive days at Lytton, British Columbia, reaching 49.6°C on June 29 – a day before the town burned down in a ferocious wildfire fed by the extreme heat;
- Europe's deadliest flood since 1985 in western Germany and eastern Belgium (July 12-18), when a stalled low-pressure system caused torrential rains, killing 240 people and causing $22 billion in damage, making it the costliest weather disaster in European history;
- the UK Meteorological Office issuing its first ever Extreme Heat Warning covering a large part of Wales, all southwest England and parts of southern and central England;
- an extreme rainfall event in Zhengzhou, China, on July 20, which recorded 644.6 mm of rain in 24 hours - more than a year's worth of rain for that area.

Whilst it is not yet possible to demonstrate a direct link between global warming and individual events there is increasing evidence of parallel trends (MO – Climate and Extreme Weather). Sir David King, in his May 2022 talk to the Society (Climate Change: The Urgency

for Action Now), described how changes in the Arctic affect the jet stream in the upper atmosphere. The Texas and Lytton events were both related to unusual, marked changes to its usual pattern.

## Greenhouse gas emissions and causes 2021

The levels of greenhouse gases in the atmosphere continued to rise (NOAA). The Mauna Loa Observatory in Hawaii reported that the main GHG, $CO_2$, rose from a monthly average in January 2021 of 415.5 ppm to a January 2022 monthly average of 418.2 ppm. This shows a return to pre-COVID rates, which averaged an increase of 2.5 ppm/year. In December 2021 the monthly mean methane level was 1911ppb, an increase of 18ppb over the year whilst in the same period the nitrous oxide monthly mean rose from 333.8 to 335.1 ppb. The pre-industrial levels for these three GHGs were 280 ppm, 720 ppb and 275 ppb respectively. For all three gases these are the highest levels in the last 800,000 years. Other GHGs include $SF_6$, which rose by 0.40 ppt to 10.8 ppt. The latest available figure (NOAA for 2020) for the equivalent combined effect of all GHGs, including the chlorofluorocarbons, was 504 ppm $CO_2e$.*

The primary driver for these changes is the continued use of fossil fuels with land use change (LUC) and farming as important secondary sources. In 2021 global emissions from fossil fuels and cement were estimated (CB) as 36.4 $GtCO_2$, only 0.8% below their pre-pandemic high of 36.7 $GtCO_2$ in 2019. This represents an almost full recovery from the COVID related dip of 4.9% in 2020. Including

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* A carbon dioxide equivalent, abbreviated as $CO_2e$, is a metric measure used to compare the emissions from various greenhouse gases on the basis of their global-warming potential (GWP), by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential. The carbon dioxide equivalent for a gas is derived by multiplying the tonnes of the gas by the associated GWP. For example, the GWP for methane is 25 and for nitrous oxide 298. This means that emissions of 1 million metric tonnes of methane and nitrous oxide respectively is equivalent to emissions of 25 and 298 million metric tonnes of carbon dioxide.

estimates for LUC increases this to 39.4 $GtCO_2$. This is more than 900 te per second.

In 2021, total UK territorial greenhouse gas emissions were 424.5 million tonnes carbon dioxide equivalent ($MtCO_2e$), compared to 406 $MtCO_2e$ in 2020 and 435.2 $MtCO_2e$ in 2019, reflecting the impacts of the COVID-19 restrictions on emissions (BEIS). However, a consumption-based figure, allowing for emissions associated with imports and exports, would be much higher with data from previous years (OWiD) suggesting by about 40%.

During 2021 the tropics lost 11.1 million hectares of tree cover (GFW) with 3.75 million hectares of that loss occurring within tropical primary rainforests. Over the decade since 2010 it is estimated that 10 million hectares of forest were cut down each year (UN FAO). For comparison, the area of the UK is 24 million hectares.

During 2021 the world population growth rate remained close to 1% p.a. with a year-end estimate of 7.9 billion.

## Global remedial actions 2021

The cumulative total emissions of $CO_2$ since the start of the industrial revolution is estimated (GCP) as 2475 $GtCO_2$. The remaining carbon budget for 50% likelihood of limiting global warming to 1.5°C, 1.7°C and 2°C is 420 $GtCO_2$, 770 $GtCO_2$, and 1270 $GtCO_2$ respectively, equivalent to 11, 20 and 32 years from 2022.

An IEA report states that net-zero* plans make $CO_2$ removal by carbon capture, utilisation, and storage (CCUS) a necessity, not an option. The 2021 rate was unchanged at around 40 Mtpa, equivalent to a few hours of global emissions. The number of projects in advanced development or in the pipeline has risen to double the decadal average with the potential to quadruple capacity for $CO_2$ capture (IEA). Even so this is miniscule given the expected need will be on the Gtpa scale and even more so if, as Sir David King argued in his talk, the atmospheric level of $CO_2$ must be lowered to 350 ppm to achieve long-term stability (CCR).

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* Net-zero refers to the balance between the amount of greenhouse gas produced and the amount removed from the atmosphere. The need for some removal will persist indefinitely as some essential activities cannot be carbon free.

As mandated in the UK Climate Change Act (2008), the Committee on Climate Change (CCC) published a Progress Report for 2021. Again, it showed that only a minority of the 34 sectors that were assessed have shown marked progress within the last two years and noted that sustained reductions in emissions require sustained Government leadership, underpinned by a strong Net-Zero Strategy. Recommendations include

- having a Net-Zero Test that would ensure that all Government policy, including planning decisions, is compatible with UK climate targets;
- implementing an ambitious heat and buildings strategy, that works for consumers;
- delivery on the delayed plans on surface transport, aviation, hydrogen, biomass and food;
- stronger plans for the power sector, industrial decarbonisation, the North Sea, peat and energy from waste.

The major international meeting on climate change was the annual UN Conference of the Parties, COP26. Deferred from 2020 because of the Covid-19 pandemic, it was held in Glasgow in November 2021 and was presided over by the UK government minister Alok Sharma. The fortnight's discussions were based on two years of informal, preparatory discussion with over 40000 registered participants representing almost 200 countries. The outcome – set out in the Glasgow Climate Pact – had recommendations, warnings, and some commitments. These include

- alarm and utmost concern that human activities have caused around 1.1°C of warming to date, with impacts already being felt in every region;
- reaffirming the Paris Agreement goal of limiting the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit it to 1.5°C;
- stressing the urgency of action "in this critical decade," when carbon dioxide emissions must be reduced by 45 per cent to reach net-zero around mid-century;
- agreeing to a provision calling for a phase-down of coal power and a phase-out of "inefficient" fossil fuel subsidies;
- reaffirming the pledge to provide US$100 billion a year in climate finance for developing countries;

- noting with serious concern that emissions are due to rise 13.7% by 2030 compared to 2010 levels.

The UN Secretary General later commented* "The approved texts are a compromise. They reflect the interests, the conditions, the contradictions, and the state of political will in the world today. They take important steps, but unfortunately the collective political will was not enough to overcome some deep contradictions." Cuts in global greenhouse gas emissions are still far from where they need to be to preserve a liveable climate, and support for the most vulnerable countries affected by the impacts of climate change is still falling far short.

Positive elements include that the link of fossil fuels to climate change was directly mentioned for the first time in a UN document although the call in early drafts for a "phasing out of coal and subsidies for fossil fuels" was dropped from the final statement; agreement that strengthened Nationally Determined Contributions (NDCs) for 2030 should be submitted by the end of 2022; and commitment to an annual high-level meeting on pre-2030 ambition, starting at COP27.

Analysis of possible outcomes (CAT) – shown in the figure overleaf - predicts that with realistic expectations from current policies the global temperature rise by 2100 will be 2.7°C (range 3.6 to 2.0) but if all pledges and targets are fully implemented this reduces to 2.1°C (3.0 to 1.9). The very optimistic best case scenario of all announced targets being met gives 1.8°C (2.4 to 1.5).

A later report from the IPCC examining the state of the climate and likely developments, and published in early 2022, is Climate Change 2022: Impacts, Adaption and Vulnerability. The 40-page Summary for Policy Makers covers impacts and risks, adaption measures and climate resilient development. A level of confidence is given for each of the many hundreds of statements ranging from low to very high. Examples from the many hundreds of statements within the report, the very high confidence statements include that many species have shifted polewards or, on land, to higher elevations; that the cumulative scientific evidence is unequivocal that climate change is

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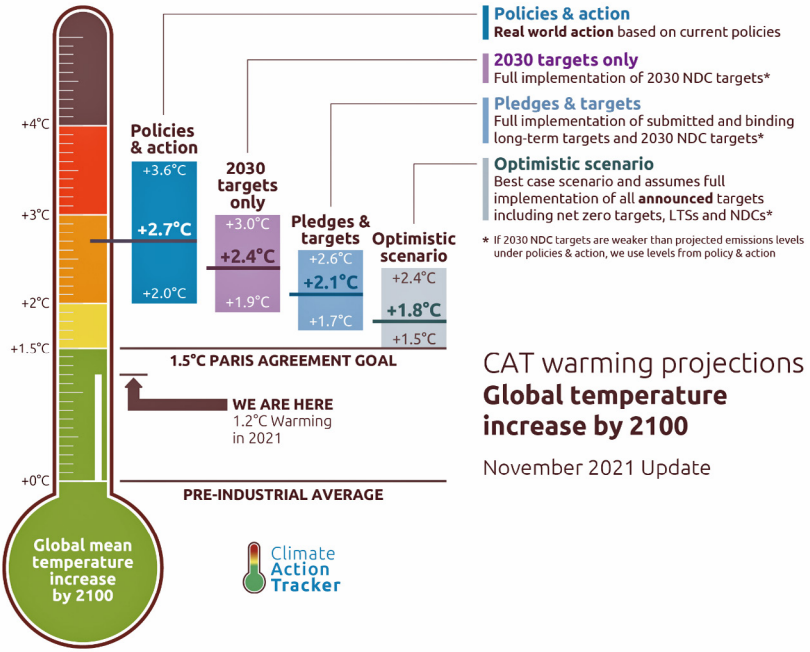
* https://www.un.org/en/climatechange/cop26




*Copyright: Climate Action Tracker and the Climate Analytics/NewClimate Institute team*

a threat to human well-being and planetary health; that any further delay in adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all.

In an excoriating statement* on this report and looking at the present and at the likely future the UN Secretary General concluded that "we are on a fast track to climate disaster".

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* https://www.un.org/press/en/2022/sgsm21228.doc.htm

## Definitions

| | |
|---|---|
| Gt | 1 Gigatonne = $10^9$ tonnes = 1 billion tonnes |
| Mt | 1 Megatonne = $10^6$ tonnes = 1 million tonnes |
| ppm | parts per million or 1 in $10^6$ |
| ppb | parts per billion or 1 in $10^9$ |
| ppt | parts per trillion or 1 in $10^{12}$ |

## Data sources include the websites of

| | |
|---|---|
| BE | Berkeley Earth |
| BEIS | Department for Business, Energy & Industrial Strategy |
| CAT | Carbon Action Tracker |
| CB | CarbonBrief |
| CCR | Centre for Climate Repair at Cambridge |
| EUMETSAT | European Organisation for the Exploitation of Meteorological Satellites |
| GCP | Global Carbon Project |
| GFW | Global Forest Watch |
| IEA | International Energy Agency |
| MO | UK Meteorological Office |
| NASA | National Aeronautics and Space Administration |
| NOAA | US National Oceanic and Atmospheric Administration |
| OWiD | Our World in Data |
| UN FAO | United Nations Food and Agriculture Organisation |
| WGMS | World Glacier Monitoring Service |
| WMO | World Meteorological Organisation |

*Brian Tyler is a member of the Science & Technology Committee.*

# Deaths occurring in the period July 1, 2020 to June 30, 2021

Mrs Barbara Rose-Innes
Mr Roger Rees, OBE
Mr Angus Yeaman
Mrs Grace Irvine
Dr John Ponsonby
Dr Peter Donnelly

# Lecture Reports

# Engineering Bubbles for Targeted Drug delivery

**A "hybrid" in-person and online BlueJeans presentation**

ELEANOR STRIDE

*10 November 2021*

Professor Eleanor Stride explained that despite massive investment in drug discovery, it was still extremely difficult to launch a new drug on the market despite increasing demand, e.g. against certain cancers. Moreover there has been little innovation in methods for drug delivery which still tend to be systemic rather than targeted. Indeed it has been estimated that typically less than 1% of an anti-cancer drug administered by injection, reaches its solid tumour target, and significantly less than this actually penetrates the tumour. This is a serious problem because most anti-cancer drugs are very toxic. If the delivery of such drugs could be made more efficient, less drug would need to be administered leading to significantly reduced side-effects. The objective of Eleanor's work using gaseous bubbles and ultrasound is to improve targeted drug delivery so that less drug has to be used.

Ultrasound with frequencies greater than 20 kHz can be used non-invasively and delivered precisely. Moreover tiny gaseous bubbles with micrometre diameters are not dangerous when injected in a controlled manner into the bloodstream. When irradiated by ultrasound they rapidly expand and contract leading to the generation of waves round the bubble. These waves can reach over 100 times the size of the bubble and provide a pumping mechanism for the delivery of drugs.

Very small bubbles have a large surface tension and are prone to rapid collapse. This can be avoided by using a suitable surfactant that provides a structure to the surface of the bubble. A drug can be attached to its inside surface and an antibody fixed to its outer surface. The antibody can then direct the bubble to its target, for example an infected or tumorous cell, and the pumping process instigated by the ultrasound can provide a mechanism for enhanced drug penetration and delivery. Eleanor illustrated her work with two examples that are progressing towards being used in the clinic.

Urinary tract infections are difficult to treat with 30% of patients experiencing recurrent infections leading to the repeated use of antibiotics. This contributes to the serious problem of increasing antibiotic resistance. Part of the problem is that infections in the urinary tract are very often embedded inside the wall of the bladder which reduces their exposure to systemic antibiotics.

Bubbles with nanoparticles in their shell, to give them more structure, have been developed to deliver antibiotics to urinary tract infections. Organoids which are three dimensional structures derived from human tissue have facilitated these experiments. It was shown that 200 times less drug was required to achieve delivery of an effective dose of an antibiotic to embedded urinary tract infections. Clinical trials of this methodology is now underway since this delivery process will lead to the use of significantly reduced drug dosage and to more effective drug delivery.

Eleanor's second example was concerned with the development of an improved chemotherapeutic treatment of pancreatic cancer since little improvement has been made in the treatment of this illness, which is usually fatal, since the 1960s.

In cancerous tumours, cell division and growth is unregulated, leading to a chaotic vessel structure and regions of tissue with little or no blood supply. Consequently, when drugs are ingested or injected into the blood stream not all parts of the tumour are treated and there is a high risk of recurrence. Compounding this, in many tumours there is a pressure gradient that resists uptake of drugs from blood vessels so that only a very small fraction is actually delivered. Delayed treatment for solid tumours, which is often the case with pancreatic cancer, leads to metastasis, i.e. the formation of secondary tumours, which are often the cause of death.

Drugs developed for photodynamic therapy, on irradiation lead to the generation of reactive oxygen species from molecular oxygen. These can attack adjacent cancerous tissues if delivered to the inside of a solid tumour. However, problems with this type of therapy include the simultaneous delivery of the drug and oxygen to the inside of tumours which are typically deprived of oxygen.

Eleanor has been using bubbles reinforced with magnetic nanoparticles to target photodynamic drugs and oxygen to pancreatic tumours. The magnetic nanoparticles were originally

incorporated into the bubbles to provide a method for directing the bubbles to cancerous tissues but it was also found that they significantly improved the stabilities of the bubbles due to the Pickering effect. Oxygen-filled bubbles with the photodynamic drug, surfactant and magnetic nanoparticles in the shell, were used in these studies with problems due to the solubility of oxygen in plasma being resolved. It was found that irradiation of these oxygen-filled bubbles using ultrasound resulted in generation of reactive oxygen species in the proximity of solid tumours. In the context of solid pancreatic cancers, even when using only one thousandth of the drug dosage usually used, this approach resulted in significant reduction in the size of the tumours. Such shrinkage of solid tumours facilities their surgical removal.

As this process was being developed, there was confusion as to how it worked because the generation of reactive oxygen species using photodynamic drugs require the use of visible light. How was the irradiation of bubbles using ultrasound generating this visible light? It transpires that visible light is generated during the contraction and expansion of microbubbles induced by ultrasound.

Using rejected transplant organs, it has been shown that this activation process can be performed even when the tumour is several centimetres inside the tissue. The treatment also appears to have a significant effect in reducing the size of secondary tumours formed by metastasis a process presently under investigation.

During the course of her lecture, Eleanor described processes for the generation of the microbubbles. She also illustrated her lecture with several very informative videos and challenged the hearing of the audience. Overall this was a fascinating lecture.

*Eleanor Stride, FREng, OBE is the Statutory Professor of Biomaterials in the Departments of Engineering Science and the Nuffield Department of Orthopaedics, Rheumatology and Musculo-skeletal Sciences at the University of Oxford. She is also a Fellow of St Catherine's College. She specialises in the fabrication of nano and microscale devices for targeted drug delivery.*

*Eleanor obtained her BEng and PhD in Mechanical Engineering from UCL where she was subsequently appointed to a Royal Academy of Engineering Research Fellowship. In 2011 she joined the Oxford Institute of Biomedical Engineering and was appointed as a full Professor in 2014.*

*She has published over 180 academic papers, 8 patents and is a director of 2 spin out companies set up to translate her research into clinical practice. Her work has been recognized through the award of a Philip Leverhulme prize, the Royal Society Interface Award, an Engineering Medal at the Parliamentary Science, Engineering & Technology for Britain awards, the Acoustical Society of America Bruce Lindsay Award (2013), IET AF Harvey prize (2015) and a Blavatnik Award for Young Scientists (2020). In 2016 and 2019 she was nominated as one of the top 100 most influential Women in Engineering. She was made a Fellow of the Royal Academy of Engineering in 2017, of the Acoustical Society of America in 2018, and an honorary Fellow of the IET in 2020. She was awarded an OBE in 2021.*

Jim Thomas, Secretary
Science & Technology Committee
November 2021.

# Artificial Intelligence: Myths and Realities

## A "hybrid" in-person and online BlueJeans presentation

GAVIN BROWN

*1 March 2022*

In this thought provoking lecture, Professor Gavin Brown described what artificial intelligence (A.I.) is, how we might use it, and whether or not we should be afraid of it.

Gavin started his lecture by giving two examples of the kind of artificial fear culture that surrounds A.I. He related the story of HAL, the Heuristically programmed Algorithmic computer that featured in the 1968 film, *2001 A Space Odyssey*. HAL refused to allow Dave, a spaceman, access back into his spacecraft, because it heard him talking about deactivating it. He also compared KINECT for Xbox, a game that is driven by players acting in front of the computer, with fearful robots in sci-fi action movies. But are robots actually going to kill us? The fear culture surrounding A.I. may be useful in selling media, but it is not based on reality.

Can a computer calculate or think? We may accept computers that can fly (planes for example), listen (some business answer phones), see, learn and adapt, but what about computers that can believe, be creative, perceive, understand, and show common sense, or even computers that love, feel, empathise or are conscious? What are we prepared to accept, what is reality and what is myth?

Alan Turing, in a lecture to the London Mathematical Society in 1947, identified that what we want is a machine that can learn from experience and then adapt. This lecture founded the field of artificial intelligence; but what is intelligence? Different facets of intelligence include seeing, listening, learning, thinking, language and moving. Scientists and engineers are trying to build computers that demonstrate analogous abilities, i.e. computer vision, speech recognition, machine learning, automated reasoning, neuro-linguistic programming (NLP) and and robotics, albeit that many of these abilities depend on each other.

When thinking about A.I. it is important to distinguish between "science" and "science fiction". So-called strong A.I. aims to build

machines whose overall intellectual states are indistinguishable from those of a human being, but this is science fiction as portrayed in the film *Ex Machina* (2015). In contrast weak A.I. is already with us, for example in smart systems, e.g. in phones, televisions, other electrical devices, and in cars.

Gavin then discussed two aspects of A.I., the first being machine learning whereby computers are mathematically programmed to recognise patterns of information. This is done using neural networks where each node is a simple function and complexity comes from the composition of functions. Human supervisors moderate the iterations eventually approving the predictive outcome of the programme. Examples of the use of such systems are found today in the targeted advertising programmes used by Amazon or Google where the previous behaviour of customers is used to predict what else they would like to buy. Recently the 50 year old problem of predicting protein folding from the amino acid sequences was solved by Deep Mind. This analysed known protein structures until it was able to predict by analogy the structures of new and even unknown proteins from their amino acid sequences. This will be a game changer in the development of personalised medicine.

Gavin then discussed computer vision, another aspect of A.I. The reflection of infra-red irradiation by a moving individual back to a detector can be analysed exceptionally rapidly, say a million times a second, to generate a moving image of the external object now in different forms, skeletal, solid etc. Apart from being used in the Xbox KINECT games, this technology has applications in modern medicine in non-invasive monitoring of critical health conditions, e.g. by following heart rates by facial observation.

So A.I. is already delivering major advances in many fields, but are robots still going to kill us?

A.I. is just mathematics. It is not A.I. that is going to kill us, but the autonomy, i.e. power and control, that we give it. For example drones are used (against the Geneva convention) to kill in battlefields, but it is the decision to use drones in this way that is dangerous, not drones in themselves. They can be used in many useful and positive ways.

So A.I. will have to be regulated in the future, just in the way guns, nuclear arms and industrial automation are already regulated. Major corporations such as Google, Facebook, Amazon, Microsoft

and Apple already have huge resources in this field, far more than is available in academia. Future developments will have to be regulated to keep control, e.g. of the use of Alexa. Self-driving cars are already here, e.g. in the UK in Milton Keynes, and the first casualty of an accident involving a self-driving car took place in Arizona in 2018, so regulation is now necessary.

Major advances in technology come in bursts, e.g. industrial automation, automobiles, the internet and now A.I., but public acceptance of such advances tends to lag behind their introduction by about a generation so A.I. has a while to go.

To conclude, Gavin pointed out that A.I. is just another technology, one involving computer science and mathematics, that permits communication across interdisciplinary areas. It already finds faces in Facebook photographs for us, and helps us choose books on Amazon. It interprets ECGs and is helping to design more effective drugs. It does weather forecasts, helps us to navigate by GPS, and will soon drive cars for us. However, like any technology, it can be misused. This is a challenge for society, but the robots in themselves are not going to kill us, unless we tell them to.

*Gavin Brown is the Professor of Machine Learning at The University of Manchester in the Department of Computer Science based in the School of Engineering. He studied for his first and second degrees at the University of Birmingham and graduated with a PhD entitled 'Diversity in Neural Network Ensembles' in 2004. He moved to Manchester as a lecturer and after promotion, Senior Lecturer, Reader, was appointed to a Chair in 2017. He has conducted research into A.I. and Machine Learning for over 20 years, working in areas such as neural networks and ensemble learning, with applications in the pharmaceutical industries and healthcare. He is author of the recent Oxford University Press book:* How to Get your PhD, A Handbook for the Journey*, and leads a team of Machine Learning PhD students and postdoctoral researchers. He is a keen public speaker and is very proud of several appearances on CBBC, explaining A.I. to children.*

Jim Thomas, Secretary
Science & Technology Committee
March 2022.

# Reading your DNA: what can it tell us?

Shankar Balasubramanian

*5 April 2022*

During his lecture Professor Sir Shankar Balasubramanian outlined the invention and the methodology of high throughput genome sequencing and how it is being applied to assist in the diagnosis of cancers, rare genetic diseases and infectious diseases.

The double helix structure of deoxyribonucleic acid (DNA), a biopolymer fundamental to all living organisms, is well known. It involves two chains held together by hydrogen bonding between four bases, A, T, C and G, with base A specifically bonding to T and base C specifically bonding to G. The sequence of these four bases along a single strand of DNA is known as its primary structure. In part this sequence follows the genetic code, and is responsible for the control of many metabolic processes in living cells, e.g. protein production.

When cells multiply, a new single strand of DNA is assembled using one building block, a nucleoside, at a time, along a pre-existing single strand to form new duplex DNA. This process is catalysed by enzymes called DNA polymerases and transfers inherited characteristics from one generation to the next. It has to be carried out with extreme accuracy to avoid errors, i.e. mutations.

Since the molecular basis for the double helix and the genetic code was elucidated by Watson, Crick and Franklin in the early 1950s, a knowledge of the sequence of the four bases, A, T, C, G, in human DNA had been an aspiration for life scientists since it would improve our understanding of human life and establish genetic differences between individuals. This, in turn, would help in the identification of the genetic causes of many diseases leading to earlier detection, diagnosis and treatment via personalised medicines. However, there are 3.2 billion (3,200,000,000) "letters", i.e. bases A, T, C, G, along the human genome, so the accurate determination of this sequence was a truly formidable task.

Nevertheless, in 1990 the international Human Genome Project (Human Genome Organisation, HUGO) was instigated to determine

the sequence of bases in human DNA. This outstanding achievement used the well-known Sanger method for DNA sequencing and involved thousands of research workers with a cost of billions of US dollars. It was declared essentially complete in 2003 although work on it continued until 2021/22. However, the development of genome-based medical care would require the knowledge of the base sequences in the DNA of many individuals so that minor differences important in the predisposition of these individuals to disease could be identified. But how was this to be achieved when the determination of just the one human genome had taken so long and had been so expensive?

Shortly after his appointment as an independent academic in Cambridge in 1994, Shankar and a physical chemistry colleague, David Klenerman, a laser spectroscopist, conceived of a "blue-skies" research project using a new technique, single molecule fluorescent imaging. Their objective was to follow the assembly of a complementary strand of DNA on a single stranded template catalysed by a DNA polymerase. This involved tagging the four building blocks, the A, T, C and G-containing nucleosides, with different fluorophores so the introduction, one at a time, of these building blocks to the growing chain could be followed.

In 1997, with the expertise they had gained in this fluorescent imaging study of the assembly of DNA, Shankar and David Klenerman considered how they could carry out the reverse process and rapidly sequence polymeric DNA. They calculated that DNA fragments from an individual's genome with more than 25 bases would be unique. Moreover, if sequenced separately, despite the differences between individuals, their sequences could be combined computationally by mapping with the sequence of a standard human genome, to provide the genome of the new individual. They envisaged a 300 x 300 array of these fragments attached to a surface. Allowing 10 seconds for each cycle, they estimated than a single human genome could be sequenced in five days!

This study would have to be carried out with a very high degree of accuracy since the objective was to elucidate the minor differences in the base sequences between different individuals. It was important to know whether the observed differences were due to actual mutations or due to mistakes in the process. The growth

of clusters of the fragments on the surface was therefore developed as the sequencing of these clusters was more reliable and less error prone.

Their technology was fully developed in a biotech company they created, called Solexa. More recently, fragments with 150 bases are sequenced, in two directions, top to bottom and bottom to the top, with improved instrumentation leading to the sequencing of any individual's human genome in less than an hour with a cost reduction of a million ($10^6$) over HUGO; indeed the cost is now down to less than $1,000 per person. This has made it possible to sequence the genomes of many individuals with an initial target in the UK of over 100,000 human genomes having already been accomplished. This allows the minor differences in the genomes of individuals to be correlated with their susceptibility to disease, particularly with genetically inherited diseases.

Cancerous cells mutate during the growth of tumours. This can lead to the development of drug resistance, the drugs becoming less effective as a cancer progresses. By repeated sequencing of the genome of cancerous cells it is possible to identify mutations that lead to an increase in drug resistance so providing for the introduction of alternative therapies. In the case of one person's skin cancer, a single point mutation that allowed the tumour to bypass the target of a drug was identified and an alternative therapy was prescribed. This wasn't a cure as such but prolonged significantly the life of the individual concerned. As these cancers are better understood, it may prove efficacious to prescribe cocktails of drugs that anticipate the likely mutations of the cancerous cells.

The early detection of cancers can lead to improved therapeutic outcomes. Cancerous cells die more frequently than healthy cells leading to the deposition of DNA from cancerous cells in the blood of patients albeit along with many other DNA fragments. The isolation and sequencing of DNA from cancerous cells found in the bloodstream of patients can lead to earlier diagnoses and to more focussed therapy, e.g. for colorectal cancer. In addition, sequencing the DNA of secondary tumours can lead to improved understanding of the evolution and metastasis of many cancers. This will enable the introduction of new therapies for these illnesses. All of this work is dependent on relatively cheap and fast genome sequencing of numerous individuals and their tumours.

Foetal DNA is found in the blood stream of mothers. Following isolation and sequencing, this DNA can lead to the early identification of genetic abnormalities in the foetus without intrusive investigation. This approach is particularly useful in the diagnosis of so-called rare genetic diseases. Despite the label "rare", 1 in 17 people suffer from such diseases worldwide. Diagnosis in early childhood by sequencing the genome of parents and their children can lead to more effective diagnosis and treatment. This is often possibly nutritionally, with the diagnosis of an illness due to a copper deficiency being a recent example of this approach.

The sequencing of bacterial and viral DNA is leading to improved monitoring and treatments for infectious diseases as exemplified during the recent SARS 2 covid pandemic. The evolution of variants was followed worldwide so that new variants with significant resistance to the vaccines being used were identified quickly and steps could be taken to mitigate against their effects. This work is on-going.

Shankar closed his lecture by commenting on three aspects of his work. This started with a "blue skies" project, so illustrating the continuing importance of pure science. Not all basic science is known, we simply don't know what is unknown, and such work must be continued. Shankar also emphasised the importance of collaborative research carried out by interdisciplinary groups, and he concluded by making the case that scientific research really does help to solve societal problems.

*Sir Shankar Balasubramanian was born in Madras (now Chennai) but soon moved to Cheshire near Runcorn. He attended Daresbury Primary School and Appleton Hall High School, then studied in Cambridge for his M.A. in Natural Sciences and his PhD. Following an SERC/NATO Fellowship at Pennsylvania State University, he returned to Cambridge where he presently holds the Herchel Smith Chair of Medicinal Chemistry and is a senior group leader at the Cambridge Institute.*

*He works on the chemistry, structure and function of nucleic acids. He is a co-inventor of the next generation DNA sequencing methodology, Solexa-Illumina sequencing, that has enabled rapid, low-cost sequencing of human genomes at scale and has had considerable impact on biology. His lab has invented chemistry to decode several modified (epigenetic) DNA bases and DNA secondary structures (G-quadruplexes) in the genome and made seminal contributions towards the understanding of their dynamics and function. His work on small molecule recognition of nucleic acids has revealed molecular mechanisms that can modulate the biology of cancer. His collective contributions span fundamental chemistry and its application to the biological and medical sciences. Sir Shankar was knighted in the Queen's New Year's Honours in 2017 for his services to science and medicine and was awarded the Royal Society's Royal Medal in 2018. In 2021, he shared the 2020 Millennium Technology Prize with David Klenerman, and also shared the 2022 Breakthrough Prize for Life Sciences with David Klenerman and Pascal Mayer, for their contributions to next generation sequencing.*

Jim Thomas, Secretary
Science & Technology Committee
May 2022.

# Through the Looking-Glass, and what Amino Acids Found There

Kirsty Penkman

Professor Penkman started her lecture by explaining how, when she was a student, she had interests in many different subjects including maths, law, archaeology and the sciences. However, when studying chemistry at Oxford, she was able to combine these interests by choosing a final year project in the Research Laboratory for Archaeology. This opportunity led her to use analytical chemistry to address questions in biomolecular archaeology.

Kirsty described how she uses the racemisation of amino acids, the building blocks of proteins, to date fossils. Most amino acids are chiral, that is they exist in two forms L-amino acids and D-amino acids. These are two non-superimposable mirror images, cf. your left and right hands. In nature, proteins in almost all organisms are assembled using L-amino acids only. However very slowly over time, L-amino acids undergo spontaneous equilibration with their D-forms leading to a thermodynamically more stable 50:50 mixture of the L- and D-amino acids. This process is called racemisation.

In the early 2000's, a question that interested Kirsty was whether the extent of racemisation could be used to estimate the age of an amino acid found in a fossil and so establish the age of the fossil. This idea had been around for a few decades but wasn't commonly used since the rate of racemisation of amino acids is very dependent on their environment. However, some early work had shown that there might be amino acids derived from proteins in isolated, intra-crystalline pockets inside the biomineral skeletons of fossilised shells. It had been hypothesised that the rate of racemisation of these isolated amino acids in such a protected environment would be consistent and could be used to date the fossil. Kirsty and her team's exhaustive work on a range of biominerals has shown this to be the case and has led to the dating of fossils that are millions of years old. This is far older than those that can be dated using carbon dating which is limited to specimens that are less than 60,000 years old.

From geological records, it is known how the temperature of the earth has varied over time. However, how can fossils of ancient animals be dated accurately and so linked to climate? One study used the calcitic opercula (doors) of fossilised snails. These are mineralogically very stable, have been collected by archaeologists over the years, and are abundant at many archaeological sites. Following oxidative digestion of the accessible proteins and amino acids in calcitic opercula, the extent of racemisation of the residual intra-crystalline amino acids allowed the shells to be dated. This technique was used to date the handaxes and other tools of early hominins and led to some interesting results; for example it would appear that despite humans being present in Britain during warm periods over the last 800,000 years, no humans returned to Britain during the last interglacial period 125,000 years ago. Large animals managed to cross, but not humans.

Across Europe there are rich fossil records but many of these are only poorly dated. At present, Kirsty is working with collaborators on building a "European Quaternary Timescale". The objective of this is to link episodes of human occupation and migration across Europe with periods of climate change. One example of her early results comes from studies of a site in northern Germany that has many fascinating fossils. Iron particles settled in the lake had linked the site to a reversal of the earth's magnetic field, and dating of fossils linked it to the Blake event which occurred during the last interglacial. This enabled this continental site to be linked directly to the global climate record from the ice and marine core records, and showed that there was a lag, potentially between 2,000 – 5,000 years between the peak of the last interglacial period, as established from marine records, and the warming of continental Europe. Indeed the peak of the warming in Germany doesn't appear to have happened until the ice-sheet on Greenland was beginning to expand again. The causes of this lag are not yet clear, but point to a complex climate dynamic, important to understand to model future climate.

Climate change events over the last 800,000 years correlate with changes in the concentration of carbon dioxide in the atmosphere. Higher concentrations of carbon dioxide in the atmosphere result in higher global temperatures and to warmer oceans. They also lead

to increased concentrations of carbon dioxide in the sea and to more acidic seawater. The bleaching of coral reefs due to symbiotic, photosynthetic, algae being expelled from the coral, has been linked with warmer, more acidic seawater.

Many coral reefs are very old and samples taken from within them have been dated using the racemisation of intra-crystalline amino acids. Surprisingly this work also showed that a bleaching event was associated with a change in the composition of the amino acids in the coral during and after the event. Moreover, studies of corals being grown under laboratory conditions in St Andrews have shown that when the carbon dioxide level in the seawater is low, the amino acid composition within the coral includes a higher percentage of acidic amino acids. When the carbon dioxide level in the seawater is high, the opposite is the case with the composition of the amino acids in the coral now including a lower percentage of acidic amino acids. It appears that the coral compensates in some way for the concentration of carbon dioxide in the sea. Perhaps the higher acidic amino acid concentrations in the coral promote calcification when the carbon dioxide concentration in the sea is low and the low acidic amino acid concentrations in the coral avoid uncontrolled calcification when the carbon dioxide concentrations in the sea are high. This work may enable us to understand better how corals have responded to climate change in the past and may lead to improved predictions and management of corals in the future.

Kirsty then discussed her work based on ostrich egg shells. They have been used by humans for hundreds of thousands of years and the proteins in these calcified biominerals have been sequenced. Apart from dating these egg shells using the intra-crystalline amino acids, Kirsty and her team have studied them using a variety of techniques. Using an olfactory port (attached to a GC-MS) she has been able to smell traces of volatile organic compounds that have been trapped in the crystalline matrix for millions of years, for example she detected the very simple compound ethanethiol (EtSH, boiling point 35 oC) that had been trapped in an ostrich eggshell for 2.1 million years. The team also isolated the oldest authenticated protein ever found that has been dated to 3.8 million years old.

They are also studying the racemisation of the amino acid serine in these eggshells which, unlike most other amino acids, can

racemise within a protein chain. This is of particular interest since such racemisation of serine has also been observed in proteins associated with degenerative illnesses such as Alzheimer's disease. And being able to date these ostrich eggshells provides a directly-dated record for the chemical information retained within them. For example, associated carbon, oxygen and strontium isotope studies have provided evidence about the vegetation eaten by the parent ostrich, the precipitation at the time, and the location of the ostrich and its eggshell influenced by changes in sea level. Wow.

Kirsty then talked about dating tooth enamel and consequently mammal (including human) remains. The key analytical problem was that tooth enamel is made out of calcium phosphate not calcium carbonate, so after demineralisation of the calcium phosphate the phosphate ions disrupted analyses using chromatography. This problem has now been solved and the racemisation of amino acids from tooth enamel has proved to be a much more accurate method of dating than the alternative methods hitherto available. For example, studies of mammoth remains have led to a better understanding of the evolution of this species in Europe. Other work has encompassed rhinos and even Homo erectus and studies of ancient wisdom teeth are providing useful dating of the evolution of mammals in Plio-Pleistocene Africa.

Finally, Kirsty described work being carried out in Manchester on microfluidic technology that will enable these dating studies to be carried out on much smaller fossil samples (< 1mg) and locally, possibly at field stations, where the fossils are discovered.

Overall this was an exciting lecture supported by excellent, and in some cases amusing, slides that described how a new dating technique was developed and how it is now being applied to many different areas of archaeology. Moreover improved understanding of these is relevant to advances in very different areas such as health care and materials.

*Kirsty Penkman completed her MChem at Oxford University and PhD at Newcastle University. She moved to York for post-doctoral work in the Archaeology and Biology Departments supported by NERC, English Heritage and then a Welcome Fellowship, and stayed in York where she is now a Professor of Analytical Chemistry in the Department of Chemistry. Kirsty applies analytical chemistry to archaeological and geological questions and is known for her research in biomolecular archaeology. A major aspect of her research is the analysis of proteins: their pathways of degradation, methods for their detection, and how these molecules can inform of an organism's life and death history. She runs the NERC-recognised amino acid dating facility, NEaar, and has been working on a dating method that covers the last three million years, a time period important for our understanding of climate change and human evolution Kirsty's work has been recognised by the Quaternary Research Association (Lewis Penny Medal), the Geological Society, the Leverhulme Trust (Philip Leverhulme Prize), the Royal Society of Chemistry (Joseph Black Award) and the New York Academy of Sciences; in 2020, Kirsty was the UK Blavatnik Chemistry Laureate.*

Jim Thomas, Secretary
Science & Technology Committee
July 2022.

# Looking Inside Volcanoes

Christopher Jackson

*A hybrid presentation by held at Cross Street Chapel, Manchester*

Volcanoes represent a global natural hazard but we know little of their internal structure or underlying 'plumbing system'. During the lecture attendees accessed previews of 3D seismic imaging techniques and learned how these methods illuminate the mysteries of the structure of volcanoes.

Prof Jackson began by acknowledging the work of his colleagues Craig Magee and Qiliang Sun. Prof Jackson used numerous diagrams to illustrate his definitions which cannot be included in this summary but will be described where appropriate. He then introduced the audience to key terms:

**Magmatism**: magma which rises up through layers of rock, cools and solidifies to form igneous rock.

**Dykes**: intrusions representing intrusions of magma that can often be detected by measuring surface deformation.

**Sills**: a tabular sheet of magma that has intruded between other layers of sedimentary rock.

**Laccolith**: a mass of igneous rock that has been intruded between rock strata causing uplift in the shape of a dome.

Why is it important to learn the structure of volcanoes? This is because of the co-location of populations and volcanoes. For example, when Popocatepetl near Mexico City erupted in December 1994, with a magnitude 6 eruption, it caused an ash cloud over Puebla, a city of more than 3 million people. When populations move into areas with volcanoes geologists need to provide a level of hazard prediction. To do this, they need to know how volcanoes work and this is determined by studying ancient volcanoes which are millions or billions of years old. They also study volcanoes which are active today. How do they do this?

First, they can sample lava, a very hazardous activity, and study it. After it has cooled, they can view it using a microscope. The 'stickiness' of the lava can be estimated giving an indication of

how fast it would flow. In addition to sampling lava, gases can also be sampled. Carbon dioxide ($CO_2$) and sulphur dioxide ($SO_2$) are sampled and the levels of these increase, relative to the baseline level, when a volcano is about to erupt.

Second, seismic reflection data is very useful to study rock layers under volcanoes. This data is collected using the principle that sound waves pass through rocks more quickly than through magma. There is an active magma conduit underneath Mount St Helens which has been studied in this way. Maps of earthquake zones can be used alongside this seismic data to get a sense of what is going on under the volcano.

Third, geodetic techniques can be used. Tilt meters measure the surface deformation caused by rising magma when a volcano starts to erupt. Tilt meters have been used for a long time but now we have InSAR (Interferometric Synthetic Aperture Radar) which gives a continuous record of the earths shape using satellites. It can see deformations as small as 2cm and therefore is a very good predictive tool.

Data from all the above can be put together to create a 3D image of igneous intrusions, how much the ground deforms, how much gas is produced and the depth of magma chambers.

Data from ancient volcanoes is also being studied using seismic reflection data. The sea bed is surveyed from a boat using, sound waves as described above, the sound waves go down to the rock layers on the sea bed and are reflected back to a recording device on the boat known as a hydrophone. The method uses the principle of acoustic impedance which shows how fast 'P' waves move through different materials. Sedimentary rocks have pores and therefore the waves travel slowly and igneous rocks are crystalline so the waves travel fast. Igneous rocks encased in sedimentary rocks give a very strong signal. Seismic reflection data from ancient volcanoes (42 million years old) in southern Australia was shown. The sills feeding the volcanoes could be seen, and also laccoliths.

All the above techniques are used for hazard prediction. Geologists can deduce what might be happening now from studying ancient volcanoes.

The audience were then shown a spectacular video of a volcanic eruption from Iceland in 2014 that was not associated with sills (as

above) but with dykes. Dykes are sub-vertical, as opposed to sills which are sub-horizontal, so seismic reflection techniques do not work well as the signal bounces off horizontal interfaces. How, therefore, do we image igneous dykes? To explain this Chris showed us some data from east Yorkshire where the cretaceous rocks (chalks) show the Cretaceous-Tertiary boundary and from the data a diagrammatic view showed horizontally layered sedimentary rocks (which look' stripey' on the diagram) with three clear (not 'stripey') vertical zones running at intervals. These clear zones have small depressions above them. The seismic data lines can be overlaid onto a map which shows us that what we are looking at is a geological fault with synclines and anticlines (synclines and anticlines are dips and ridges in rock strata). These cover a huge distance of 80 to 100 kilometres in length. The synclines have little depressions on top which are likely to equate to the ones seen above the vertical clear zones in the data. They are caused when magma rises up, reaches cool water and then flash freezes to produce craters. This example shows that we need to use indirect, rather than direct data to see dykes.

Chris then moved on to methods of looking into volcanoes. The data was from Australia and it had been gathered from a 42-million-year-old volcano. The volcano can be mapped and separated from the rocks around it. Seismic lines can again be seen as described above. If we were just looking at lava no seismic lines would be seen as the signals bounce off interfaces. As we have interfaces in this data it is thought that what we are seeing is repeated eruptions where the lava becomes covered with sediment, and then the subsequent eruption causes another lava layer similarly covered with sediment and so on for future eruptions.

He then went on to describe 'flank eruptions'. These occur when the lava comes out of the side of the volcano instead of out of the top. These are particularly dangerous as the lava flows reach populated areas sooner.

The final slide showed the summary of what we have learnt from the presentation:

1) The products of crustal magmatism are well imaged in seismic reflection data.

2) We can image and construct special and temporal relationships between individual components of fossilised magmatic systems e.g., sills, dykes and volcanoes.

3) We can directly relate the location and degree of precursor ground deformation to the size of magma bodies driving volcanic eruptions.

4) Seismic data may provide a physical framework within which we collect and analyse geochemical, petrological and petrographical observations.

*Professor Chris Jackson has recently left academia but at the time of his invitation to speak at the Lit & Phil he was Chair of Sustainable Geoscience at the University of Manchester. He led the Basins Research Group and has previously held posts in Bergen, Norway and Imperial College London. His research focused on geodynamic, structural and stratigraphic evolution of sedimentary basins. He was described by the Geographical Society of London as the 'leading and most productive interpreter of three-dimensional seismic reflection data of his generation.'*

Dianne Bamber, Chair
Science & Technology Committee
July 2022.

# Named Lectures 2020-21

A complete list of the Named Lectures prior to 2020 is given in volumes 151 to 158 of the Memoirs.

2021 May 20 **The Percival Lecture**
*Back to the Future Part 1 or Part 2? Research and Higher Education in the 21st Century*
158 pp 39-52
Professor Karl Dayson

# Proceedings of the Manchester Literary and Philosophical Society

# Annual Report of the Council 2020-21*

As in previous years the Society again enjoyed a very varied and interesting programme throughout the year. Detailed below are reports from our sections detailing the activities during the year:

## Lectures Arranged by the Council

Summary of Council Lectures and Events during 2020-21 Season, with details of the '2021 Cathedral' lectures as a separate section

**22 September 2020 6.30 pm, Society AGM, online**
The AGM was held online, and details have been included in my Annual Report. Normally this would have taken place at the Royal Northern College of Music and followed by a Council lecture. We had booked Professor Linda Merrick, Principal of the RNCM for this, but as we could not use the RNCM as a venue, her talk has been deferred, and we hope to hear her 'live' during the 2022-23 season.

**8 December 2020 at 6.30 p.m. – online – Paul Vallely – *Philanthropy – from Aristotle to Zuckerberg***
Paul is a writer and consultant on religion, international development, and business ethics. He is also a visiting professor in Public Ethics and Media at the University of Chester, and senior Honorary Fellow at the Global Development Institute at the University of Manchester. We were delighted to hear Paul, who delivered a very erudite talk on Philanthropy though the ages. He had recently published his book, which contained amazing details of the origins and trends of the subject of Philanthropy. This was a very different concept in the time of Aristotle.

**27April 2021 at 6.30 p.m. - online – Professor Barbara Sahakian – *Sex, Lies and Brain Scans***
Another fascinating talk, from Professor Sahakian, Professor of Clinical Neuropsychology at the Department of Psychiatry and

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*This is an edited version of a section of the complete Report and Accounts which is available from the Office.

Medical Research/Wellcome Trust Behavioural and Clinical Research Institute, at the University of Cambridge. She is also an Honorary Clinical Psychologist at Addenbrooke's Hospital, Cambridge. She has done extensive research into how the brain works, looking for thought processes, etc. by the use of brain scans – but reassured us that no, there is no way that our minds can be 'read' – not yet anyway! There are ethical questions around using neuroscience in the consumer marketing industry also. However, much success has been made in working with individuals in a 'vegetative' state, discovering what may be in the minds of those patients.

**20 May 2021 at 6.30 p.m. - Percival Lecture – online - Professor Karl Dayson, of the University of Salford**
**– *Back to the Future Part 1 or Part 2? Research and Higher Education in the 21st Century.***
Our annual Percival lecture, hosted in turn by the University of Salford, Manchester Metropolitan University and the University of Manchester took place on 20 May (deferred from May 2020 due to the pandemic). It was the turn of Salford, and Professor Dayson presented the lecture, on behalf of the University. He is the Pro Vice-Chancellor for Research and Enterprise at the University of Salford and is currently focussing on the role of technology in addressing financial inclusion, amongst other things. His lecture included a robust look at the funding of higher education and research, the conventions of how we admit students to further education, and the need for a fresh look at this aspect. Lockdown has intensified this need, as well as rethinking the future of research in this country. And how are we going to connect with overseas students in the future? Food for much thought.

**2 June 2021 at 6.30 p.m. - Jonathan Walton**
**– *Science, Politics and Adventure in Antarctica***
Jonathan Walton is a Geospatial Engineer and was one of the original members of the British Antarctic Survey, working as a glaciologist/surveyor in 1973 and beyond. Although now retired, he still spends five weeks a year (not this year, due to Covid) as a member of the expedition staff on a small tourist ship visiting the area. He gave a very informative and thoroughly entertaining lecture

on the three aspects of Antarctica, which showed a truly global co-operation in maintaining the continent as well as continuing with much scientific work there.

**9 June 2021 at 6.30 p.m. – Professor Christopher Griffiths**
**– *Visual History and Dermatology; From Natural History to Art History***

Professor Christopher Griffiths, OBE is currently a consultant dermatologist at Salford Royal NHS Foundation Trust and is the Foundation Chair of Dermatology at the University of Manchester. He is also Director of the Manchester Centre for Dermatology Research, and Head of the Dermatology Theme of the National Institute for Health Research (NIHR) at the Manchester Biomedical Research Centre. He also travels globally and does some work in refugee camps. He has developed a visual literacy course for dermatologists in UK and Europe, and described the close relationship between nature and art, with emphasis on observation and interpretation. This lecture covered art, medicine, natural history and social history, thereby satisfying a wide range of interests. We thank him for his patience as this lecture was postponed on 2 occasions – but it was definitely worth waiting for!

**22 June 2021 at 6.30 p.m. – Professor Helen Gleeson**
***- From cat skins to submarines – new materials that are a bit of a stretch***

Professor Helen Gleeson, OBE is currently the Cavendish Chair of Physics, at the School of Physics and Astronomy, at the University of Leeds. She took up this post in 2015, having spent her prior academic career here in Manchester, becoming the youngest professor of Physics for many decades, in 2003. She has researched widely, with a particular interest in liquid crystals (such as are used in LEDs), and has published many papers. She was awarded the OBE in 2009 for her scientific work, as well as her dedication to equality and diversity in physics. In her lecture Professor Gleeson explained, in very understandable language, liquid crystal elastomers, which have an auxetic property, and the current and potential uses of them - in optics, in new materials, in medicine, such as artificial muscles, amongst other things. Her ongoing specialist research continues

apace, with the assistance and enthusiasm of her Leeds small team.

**21 July 2021 at 10.30am– Ed Glinert – extramural event**
**–*A tour into the very heart of Manchester*** (members only)
As I write, this event is yet to take place, but is a guided tour, tailored to the interests of the Lit & Phil, around the heart of old industrial Manchester. Many residents of this great city are unaware of the rich history of the areas we shall be visiting, or may have only read about them, so the walk promises to be fascinating. Ed Glinert is a very experienced local professional guide, it will be a good chance to enjoy the freedoms of the post-lockdown era (we hope!) and meet other members face to face again.

(Covid measures permitting there may be a chance for at least one more extramural visit in August, though details have not at this moment been finalised.)

## Manchester Cathedral lectures 2021

2021 is the 600th Anniversary of the date when Henry V granted a licence to establish a collegiate church in Manchester. The Lit & Phil approached the Cathedral at the beginning of 2020 and proposed a joint lecture at the Cathedral, in celebration of the anniversary. This became a series of lectures to celebrate each century, and themes/speakers were discussed. They were all due to take place in the Cathedral. Due to the pandemic, the plans had to be altered, and the lectures became 5 in number with the first 2 centuries combined into one lecture, and we had to plan for the possibility of some being online.

### The lectures

**Tuesday 2 March** (covering 1421-1621)
**Paul Vallely -**
***What the charity of the Middle Ages has to teach Bill Gates and Mark Zuckerberg***

**Tuesday 15 June** (covering 1621-1721)
**Tom Cockitt**
***Manchester and the English Civil War***

**Wednesday 15 September** (covering 1721-1821)
**Professor Hannah Barker**

*Life in a City of Business, Noise and Strangers: work, family, faith in industrial revolution Manchester*

**Tuesday 26 October** (covering 1821-1921)
**Prof Tom McLeish -**
***Lessons from Medieval Science for Science, and Science-Theology today***

**Tuesday 3 November** (covering 1921-2021)
**Dean Rogers Govender**
***A Cathedral for the 21st Century***

Two of the lectures have therefore taken place during the 2021-21 season, but both online. Paul Vallely gave a very interesting slant to the concept of Philanthropy during the centuries of 1421 – 1621 and related it to life in Manchester and the surrounding area at that time.
Tom Cockitt (arranged by the Arts Section) covered 1621-1721, concentrating on the events around the English Civil War, and how the troops used the area around the Cathedral as their campaign bases. Again, this was online.

We thank Canon Dr David Holgate from Manchester Cathedral, who joined us to introduce the Cathedral and the importance of celebrating the last 600 Years. Thanks also go to the Cathedral Administrators, and to Nicholas Rank for all their help and encouragement during the setting up of this fascinating project.

Dr Susan Hilton
President 2018-21

## Lectures Arranged by the Arts Committee

All of our lectures this year have been online.

The Arts Section lecture programme began on 6 October 2020 with a presentation given by Arts Section Committee member **Joanna Lavelle** on ***The Remarkable World of Joyce Grenfell – Lucky Amateur or Consummate Professional***. Joanna has been performing Joyce Grenfell's work for over 30 years and in this talk she gave an insight into Joyce's background and professional career. Joyce Grenfell was an entertainer, writer, singer, film actress and broadcaster on both television and radio, and Joanna argued that though Joyce died 40

years ago, her influence can still be seen through the work of today's performers.

On 24 February 2021 Arts Section Committee member **Jim Howell** gave the audience an insight into a country he loves in his talk entitled ***Dying Laughing – a Short Walk Around Romanian Culture***. After accidentally starting to study Romanian while taking a degree in French at Manchester, he first visited the country to spend a year as a British Council Scholar studying Philology, then spent most of the nineties based in Bucharest whilst installing banking systems. This gave him the opportunity to wander the mountains and he spent time talking to shepherds and visiting a host of interesting places. His talk aimed to give an overview of the culture he loves – including an item about an unusual graveyard known as the Merry Cemetery; a shepherds' folk-song and the work of a great 20th century poet and philosopher Lucian Blaga.

His wide experience of running tours has provided a rich collection of people and places for **Mike Higginbottom**. He specialises in particular aspects of Victorian and 20th Century history, with a diverse lecture programme that gives an informative and entertaining look at social and architectural history, with subjects from cemeteries and sewers to theatres and country houses, and in his talk ***Interesting Times – Interesting People*** on 13 April 2021, he recounted some of the more memorable experiences he has encountered across the globe from London to Chicago.

Why does George Orwell matter today? This was the theme of **Dr Alan Sennett**'s talk – ***George Orwell – A Political Life***, on 4 May 2021. Orwell's analysis of authoritarian regimes means that many of his phrases and concepts have become part of our everyday language – such as 'Big Brother' and 'Newspeak' and highlighted issues which are common today such as the intrusive state and 'Fake News'. In many areas Orwell's political insight never seemed so apposite as today. But Dr Sennett said his arguments needed to be understood in the context of Orwell's own experience and he gave a fascinating insight into his background – from being an imperial policeman in Burma, a struggling writer in the depression, and a fighter against Fascism in Spain to being an analyst of the emerging Cold War.

**Professor Vivien Gardner** highlighted the extraordinary life of Henry Cyril Paget in her talk on 7 June 2021 entitled: '***Sensation,***

***Sensation, Sensation' Collecting the New Age – the Extraordinary Case of the 5th Marquis of Anglesey*** in a snapshot of the 'new' lifestyles of many of the cultural elite in Britain at the turn of the last century that fascinated so much of the country. Paget inherited the Marquisate at the age of 23 with an annual income of £110,000 and within four years bankrupted the estate. He was an obsessive collector spending on jewels, cars, boats, furs, perfume, medicines an adopted child and theatricals. He died in Monte Carlo in 1905 aged 30. Professor Gardner argued that paradoxically the Marquis's collecting was only made possible by the very aristocratic privileges under threat from the major social and political shifts taking place in the period.

On 15 June 2021 **Tim Cockitt** spoke about ***Manchester and the Civil War.*** As the Civil War erupted, Manchester, a peaceful quiet market town, declared for Parliament (Salford declared for the King). A Royalist Force led by James Stanley – Lord Strange -(later the Earl of Derby) laid siege to Manchester in September 1642. The lecture told the story of the week-long siege – which involved St Mary's Church, now the Cathedral and Lord Strange's town house – now Chetham's Library and Music School. The siege was said to be very much an amateur affair with few experienced soldiers on either side, and matters were not helped when it rained all week! Eventually the Royalists departed.

The intriguing hidden meanings in a portrait of two ambassadors to the court of Henry VIII at the time of his divorce from Katherine of Aragon was the fascinating topic of **Brian Healey**'s talk on ***Hans Holbein and the Ambassadors Secret***, on 28 May 2021. The painting, which hangs in the National Gallery, has been the subject of much interpretation and research. Brian Healey's lecture looked at the possible significance of the painting's many details and the relevance they may have had to the political background that was threatening to destabilise the then known world.

Patricia McWilliam-Fowler
Chair, Arts Committee

## Lectures Arranged by the Science and Technology Committee

This summary reflects a year which has been affected by the Covid-19 pandemic. All lectures have been delivered online using

the Blue Jeans Events app, as opposed to our usual practice of delivering them live at the Royal Northern College of Music. This has had some positive outcomes in that people outside the Manchester area have been able to attend the lectures and this maybe something to consider going forward to increase membership of the society. Similarly, lecturers who may not have been able to present lectures due to the time constraints of travelling have been happy to present online. The negative aspects are that the social side of attending lectures and meeting the speakers has inevitably been absent.

The session has been a successful one for the committee as we have implemented the 2020-2021 programme, developed last year, and also planned a programme for next year, 2021-2022. In addition, following the success of the afternoon seminars in Church House last year, we have planned a similar online event for June 16th 2021. This was an initiative by Brian Tyler and the topic is climate change. We are pleased that Dr Claire Gough from the Tyndall Centre for Climate Change Research has agreed to contribute.

The 2020-2021 programme ran effectively using the Blue Jeans app and our lectures were well attended with good feedback. The lectures presented this year were as follows.

7 September 2020
**Chris Goodall** - ***What we need to do now***

29 September 2020
**David Cole-Hamilton & M Pilar Gil** - ***Elements in Danger***

19 October 2020
**Richard Rawlins** - ***Real Secrets of Alternative Medicine***

19 November 2020
**Michael Merrifield** - ***21st Century Telescopes***

1 December 2020
**Will Dixon** - ***Cloudy with a chance of pain***

11 February 2021
**David Brown** - ***Design and Operation of Dams***

21 April 2021
**Isabel Hook** - ***Supernovae and the Search for Dark Energy***
*(Joint Lecture with the Institute of Physics)*

**Committee for 2021-2022**

Dianne Bamber (Chair) (May 2018)
Minaxi Desai (May 2017)
Ian Cameron (President -ex-Officio)
Melissa Lord (co-opted)
Paul Miller (Feb 2017)
Jim Thomas (Secretary) (Feb 2019)
Peter Williams (Feb 2019)
Desmond Winterbone (October 2016)
Lesley Roberts (March 2021)

**Corresponding Members**

Chris Baker
Michael Sinnott

I would like to take this opportunity to thank all the committee members for their contribution this year and their valiant efforts in making the online lectures a success. I would like to particularly thank Jim Thomas for stepping into the secretary role at short notice and carrying it out so efficiently. Also, our outgoing president Sue Hilton for her valuable input and guidance over the years. Finally, I must mention Brian Tyler who, I am sad to say, has resigned from the committee after many years. We will miss your excellent suggestions and input.

Dianne Bamber FIBMS
Chair, Science and Technology Committee

## Lectures Arranged by the Social Philosophy Committee

In a reduced season of lectures due to working around the Coronavirus Pandemic we held no lectures in the Autumn term of 2020 but began on 19 January 2021 by hearing from **Professor George Leeson** who addressed members on ***The Challenges and Opportunities of an Ageing Population***. This was followed on 27 January by **Keir Giles** who posed the question ***What Drives Russia to Confront the West?***

On 24 March **James Cordiner** spoke on ***Engineering the Ship Canal: the Past, Present and Future***. Most recently **Professor David**

**M Schultz** lectured on ***How Extreme Weather Events Alter due to Climate Change***. The committee has one more lecture this season which will be delivered by **Caroline Churchill** who will speak on ***Delia Derbyshire and the BBC Radiophonic Workshop.***

I will be stepping down from the chair at AGM in September but should like to thank Philip Hulme (secretary), Ian Bradford, Marcia McCauley, Ian Cameron, Susan Hilton, Sheila Whitaker, Kenneth Letherman and Brendan Hegarty for their time and hard work throughout the year. We have had happy committee meetings.

Kenneth Letherman and Brendan Hegarty have indicated that they will be stepping down from the committee but we look forward to more volunteers from among the members of the Society joining us. I am delighted to announce that Sheila Whitaker has agreed to take the chair when the committee resumes meeting in the new academic year.

Peter Barnes
Chair, Social-Philosophy Committee

## Lectures Arranged by the Young People Committee

The YP Section is responsible for planning and delivering three lectures per year, designed to appeal to Young People, particularly of sixth form and early college years, though also to the Society members and guests.

However, as a result of the Covid pandemic, our Section actually delivered four lectures during the year, including the Society's pioneering BlueJeans online event which took place on 20 May last year, featuring **Dr Kirstie Whitaker,** research Fellow at the Alan Turing Institute, and entitled ***'There are no adults: My Journey to realising that no one has a Plan!'*** It took the form of a interview involving Withington High School 6th form pupil Tea Milanovich posing questions to Kirstie and the format proved highly successful.

Our next lecture took place on 3 November, delivered by **Terry Callaghan**, Professor of Arctic Biology and Director of the Sheffield Centre for Arctic Ecology, Animal and Plant Sciences at the University of Sheffield. His topic was ***'The Rapidly Changing Arctic – what it means for the rest of the World'***. Melissa Lord chaired and newly co-opted committee member

On 4 February, **James Grime,** a British mathematician and speaker formerly of the Millennium Mathematics Project at the University of Cambridge, delivered his talk entitled ***'Bits and Pieces, Secrets of a Digital World.***

And on 15 March, our final talk of the year was given by **Sarah Bridle**, Professor in the Extragalactic Astronomy and Cosmology research group in the Jodrell Bank Centre for Astrophysics, part of the School of Physics and Astronomy at the University of Manchester. Her title was '***Change your Diet: the easiest way to help reduce your Climate Impact'***.

The current Young People Committee Members are:
Chairman: Peter Whitaker
Secretary: Melissa Lord
George Baker
Vienna Barowska (co-opted)
Rachel Croft – ex-Officio
Susan Hilton – President – ex-Officio
Lady Mary Mallick
Teodora (Tea) Milanovic (co-opted)

It is intended to recruit an additional two members during the year, and we would invite any members, particularly but not exclusively, those with active involvement with young people and their education.

I would like to thank the commmittee members for their time and expertise in furthering the aims of our section. A key aim for the next year is to systematically develop our marketing to attract a larger number of lecture attendees and widen the contact level particularly with sixth form colleges throughout the Greater Manchester region

Peter Whitaker
Chair, Young People Committee

# Treasurer's Report

As set out in the President's Report 2021 was again a challenging year for the operation of the society. A year when our hopes to develop our offer to members and the public were largely thwarted by the ongoing effects of the Covid-19 pandemic. At the same time though, this meant that we did not incur some of the costs we had budgeted for and our investment portfolio performed really well, returning to levels well above its pre-pandemic value.

Overall, the Society ended 2021 with a net increase in the value of our funds of £224,030. The breakdown of this increase is set out in the detailed income and expenditure account below and further explanation follows.

At an operational level, the Society recorded a deficit of £57,774 compared to a deficit in 2020 of £15,779 and budgeted deficit for the year of £64,296. Our budget for 2021 has assumed some form of return to normal operations with regard to our lecture programme. Together with delivery of other initiatives that we had budgeted for. This did not happen and all lectures were delivered online to members and the public. Whilst this achieved savings to our meeting costs, the time required by our professional staff to deliver and support these events meant that we were unable to start the other initiatives we had budgeted for. Again, this delivered savings against budget but has set us back in our ambition to diversify our offer to members and the public with the objective of increasing subscription income in the medium to long term.

At the same time though, as set out by the President in her report, membership numbers fell during 2021 as a result of both pandemic and its impact on our programme delivery. This together with a discount offered to members to stay in the society has resulted in a reduction in both subscription income and the associated Gift Aid we can claim from HM Revenue and Customs.

During the year we also invested in the purchase of new computers for our professional staff to enable them to work more efficiently at home during lockdown and support our delivery of an online programme. We believe this cost will represent value for money as it will help the Society as we hopefully return to more normal operations and look to broaden our programme offer through other means, such as podcasts.

Another item of additional expenditure incurred during 2021 was £5,000 to engage the University of Central Lancashire in a piece of research into the links the Society had in its early days with the transatlantic Slave Trade and its ultimate abolition. This will be reported to the Society in the first half of the 2021/22 financial year.

The final major item of additional expenditure was the costs associated with our move out of Church House to our new location at Jactin house. This led to an element of double costs as our agreement with our new landlords overlapped with the run off of our lease on Church House, as well as direct costs associated with the move. Going forward through, we will see reduced levels of rent and service charges.

As set out at the start of my report, we achieved a net increase in our funds in the year of £224,030. Despite the operating deficit of £57,774 this was achieved through an increase in the value of our investment portfolio in the year of £281,804. This increase is down to the work of our investment managers, Brewin Dolphin, who have not only returned our investment portfolio to its pre-pandemic level but have secured further growth in its value. This is at a time when the cash we have withdrawn has increased to support the Society's investment in its new strategy for growth and diversification. We thank them for their work.

In summary, 2021 has been a good year financially for the Society, despite the level of operating deficit. Our position at 30 June 2021 puts us in a strong position for further investments in the future.

Trevor Rees
Honorary Treasurer

## The Manchester Literary & Philosophical Society
## Income and expenditure account for the year ended 30 June 2021

| | 2021 £ | 2020 £ |
|---|---|---|
| **INCOME** | | |
| Subscriptions and Gift Aid | 26,510 | 32,708 |
| Investment income | 26,156 | 39,488 |
| Donations and legacies | 44 | 2,909 |
| Sundry Income and Donations | 796 | 277 |
| **TOTAL INCOMING RESOURCES** | 53,506 | 75,382 |
| | | |
| **EXPENDITURE** | | |
| **Function costs** | | |
| Functions and meeting costs | 200 | 12,130 |
| Research Costs | 5,000 | - |
| Printing of Memoirs | 1,591 | 1,363 |
| Programmes/ Promotional Expenses | 784 | 3,245 |
| | 7,575 | 16,738 |
| **Office costs** | | |
| Rent and services charges | 16,365 | 15,985 |
| Office Relocation | 4,673 | - |
| Heat and light | 459 | 217 |
| Website and IT costs | 8,728 | 2,409 |
| Staff costs | 55,512 | 37,292 |
| Library | - | 133 |
| Stationery and photocopying | 952 | 1,400 |
| Postage, telephone and equipment hire | 1,044 | 1,464 |
| Insurance | 952 | 1,975 |
| Sundries | 138 | 487 |
| | 88,823 | 61,362 |
| **Society costs** | | |
| Legal and professional fees | 820 | 31 |
| Independent examination fee | 2,710 | 2,500 |
| Investment management fee | 10,592 | 9,643 |
| Bank charges / PayPal | 760 | 887 |
| | 14,882 | 13,061 |

| | | |
|---|---|---|
| **TOTAL COSTS** | **111,280** | **91,161** |
| **Net operating (deficit)/surplus** | **(57,774)** | **(15,779)** |
| **Net investment (losses)/gains** | **281,804** | **(84,332)** |
| **Net Movement in funds** | **224,030** | **(100,111)** |

## The Manchester Literary & Philosophical Society
## Balance Sheet for the year ended 30 June 2021

| | 2021<br>£ | 2020<br>£ |
|---|---|---|
| ***Fixed Assets*** | | |
| Tangible assets | | - |
| Investments | 1,617,238 | 1,360,697 |
| Investment in Subsidiary | 100 | 100 |
| | 1,617,338 | 1,360,797 |
| ***Current Assets*** | | |
| Debtors | 3,632 | 1,130 |
| Cash at bank and in hand | 28,930 | 59,764 |
| | 32,562 | 60,894 |
| ***Creditors:***<br>Amounts falling due within one year | (14,673) | (10,494) |
| ***Net Current Assets*** | 17,889 | 50,400 |
| ***Total Net Assets*** | 1,635,227 | 1,411,197 |
| ***Funds of the Charity*** | | |
| Unrestricted funds | | |
| Expendable endowment fund | 1,635,227 | 1,411,197 |
| ***Total Funds*** | 1,635,227 | 1,411,197 |

For the year ending 30 June 2021, the company was entitled to exemption from audit under section 477 of the companies Act 2006 relating to small companies.

These financial statements were approved and authorised for issue by the Trustees at a Council meeting held on Monday 9th August 2021 and signed on its behalf by:

P FENN Secretary

T REES Treasurer

Company Registration Number 9330.
Registered Charity Number 235313.

# Council and Officers 2020-2021

**President -** Susan Hilton

**President Elect -** Ian Cameron

**Vice-Presidents**
Chris Baker  Tony Jackson

**Honorary Secretaries**
Peter Hilton (resigned 22.09.20)
Robert Stanfield-Cudworth (22.09.20-30.01.21)
Peter Fenn (from 19.4.21)

**Honorary Treasurers**
Trevor Rees  Greg Mauchline

**Honorary Librarian**
Christine Chappelle

**Honorary Memoirs Editor**
Graham Booth

**Members of Council**
Dianne Bamber, Peter Barnes, Chris Boyes, Ronald Catlow, Joanna Lavelle, Patricia MacWilliam-Fowler, Peter Whitaker

**SECTION OFFICERS**

**Arts**
Chair: Patricia MacWilliam-Fowler
Minutes Secretaries: Tony Jackson, Joanna Lavelle

**Science & Technology**
Chair: Dianne Bamber
Secretary: Peter Williams

**Social Philosophy**
Chair: Peter Barnes
Secretary: Philip Hulme

**Young People's**
Chair: Peter Whitaker
Secretary: Melissa Lord

**Office Staff**
Aude Nguyen Duc  Rachel Croft  Will Stonier

# 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 Fairbairn, 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 Dukinfield Darbishire, 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 |
| 1963-1964 | 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 |
| 2016-2018 | Diana M.Leitch BSc, PhD, FRSC, MBE |
| 2018-2021 | Dr. Susan R Hilton M.B. Ch. B., DRCOG, MA, FPPH |

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

# Honorary and Golden Members

**As at 30 June 2020**

| | |
|---|---|
| 1955 | Mrs M Ainsworth |
| 1990 | Professor Sir J Ashworth |
| 1991 | Mrs A Boulton |
| 2004 | Mrs H Bradshaw |
| 2019 | J Brokenshaw |
| 1968 | Mr J Davidson |
| 1989 | Mr M and Mrs J Evans |
| 1962 | Miss S Lowe |
| 2013 | Professor L Merrick |
| 1999 | Professor Sir G Prance |
| 1990 | Sir M Richmond |
| 2021 | Mr A and Mrs B Rose-Innes |
| 2013 | Professor Dame N Rothwell FRS |
| 1994 | Sir R Scott |
| 2019 | Ms K Slater |
| 2004 | Dame J Smith |
| 2015 | Dr. T Sommer |
| 1964 | Professor G Wedell |
| 2008 | Mr P Willson |

# Elected and Corresponding Members

**As at 30 June 2020**

| | |
|---|---|
| 1972 | Professor A Thackray |

# 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 2021

* Denotes corresponding members

We are not including Members' addresses due to the requirements of the Data Protection Act.

| | |
|---|---|
| 2014 | Mr J and Mrs B Adams |
| 2020 | Mr G Adshead |
| 2021 | Mr D Adu-Boakye |
| 1989 | Professor S Al-Hassani |
| 2018 | Dr K Amano |
| 2010 | Mr J and Mrs J Argust |
| 2009 | Mr D Astbury |
| 2008 | Mr C and Mrs J Baker |
| 2008 | Mr G and Mrs C Baker |
| 2011 | Dr R and DR C Baldwin |
| 2020 | Dr D Bamber |
| 2021 | Mr D Barlow |
| 2002 | Mr P Barnes |
| 2020 | Mr K Bent* |
| 1986 | Mr P Berry |
| 2019 | Dr M Bhavnani, OBE |
| 2008 | Professor G and Mrs M Booth |
| 2020 | V Borowska |
| 1999 | Mr C Boyes |
| 2008 | Mr I Bradford |
| 2003 | Mr D Brailsford |
| 2021 | Mr J Brailsford |
| 2009 | Mr J Brandrick |
| 2021 | Miss E Brocklebank |
| 2011 | Mr M Brown |
| 2009 | Dr C Burke |
| 1985 | Dame S Burslem |
| 2017 | Miss V Byrne |

2010 Mr I and Mrs S Cameron
2009 Mr N Campbell
1981 Mr J Carroll
2020 Mr P and Mrs L Carstensen
2015 Mrs H Carter
2020 Mr C Casson-Suratan
1981 Dr R Catlow
2012 Mr J Cave
2011 Mr R Chiverton
2018 Dr P Coley
2020 Mr R Conlon
2020 Mr Z Cook
2021 Mr I Cook
2021 Mr E Cox
2010 Mr B Crebbin
2013 Dr M and Mrs J Cunningham
2020 Dr D Daji and Ms N Jaeger
2010 Dr W Darlington
2009 Professor J Davies
2012 Mr W and Mrs J Davies
2019 J Davnall
2017 Dr T Daya-Winterbottom*
2021 Mr T and Mrs L Dean
2004 Dr A Deiraniya
2011 Mr B Derby
2013 Professor M and D Sharad Desai
1986 Professor S and Mrs D Donnachie
2006 Dr P and Mrs A Donnelly
2020 Dr. N Smith
2019 Miss D Drehmer
2021 Ms J Duffett
2013 Mrs E Dyson
1978 Mr J Eagle
1984 Mr A Elliot
2021 Dr M Ellis
1994 Professor M and Mrs C Elstein
2013 Dr N Emekwuru

1988 Mr P Emerson Jones
2019 F Farnorth
1983 Professor P Farrell*
2012 Dr P Fenn
2021 Y Fereidooni
2010 Mr F Fernley
2004 Mrs A Fitzpatrick
2015 Professor J Frame
2017 Dr P Fyans
2013 Mr D Gane
2021 Professor V Gardner
2021 Mrs A Gartside
2021 Mr P Gavagan
2018 Mr J Glenn and Mrs J Lavelle
2011 Mr I and Mrs A Grant
2007 Professor J Green
2020 T Hafferty
2020 Mr T Hague
1994 Mr S and Mrs M Halsall
2021 Mr M Hancocks
2016 Dr J Hassall
2021 Mr R Haynes
2009 Judge B and Mrs I Hegarty
1989 Professor J Helliwell
2020 O Hersey
2021 Revd C Hewitt and Dr G Rink
2009 Miss G Heyworth
1989 Mr D Higginson
2021 Mr R and Mrs E Hill
1986 Mr P and Dr S Hilton
2009 Mr B Hooley
2021 Mr O Horan
2009 Mr J Howell
2015 Mrs J Howells
2006 Mr P Hulme
2012 Mr M Hunt
2009 Professor D and Mrs L A Jackson

2010 Professor A Jackson
2013 Mr T Jackson-Baker
1991 Professor M Jayson
2010 Mr D Jenkins
2019 M Jenkinson
2017 Professor N Jones
2021 Mr L Jones*
2007 Mr L and Mrs D Jowsey
2018 Mrs V Kelly
2020 P Kerry
1997 Mr M and Mrs E Kershaw
2020 S King
2021 Mr A King
2010 Professor P Kumar
2021 Ms J Lambert
2010 Mrs J Lavelle
2007 Mr M Lees
1988 Mr W Lees-Jones
2008 Dr D And Dr D Leitch
2003 Professor K and Mrs R Letherman
2021 Prof G Levermore and Dr M Carter
2010 Mr R Lewis
2021 Mrs J Lewis
2012 Mr G and Mrs J Lloyd
2020 Mr P and Mrs M Lord
2021 Mrs P MacKenzie
2021 Mr R MacLean
1990 Mr N MacPhail
1981 Mr C and Mrs H Makepeace
1999 Dr P Makin
2010 Mr C Malkin and Ms C Brice
1975 Professor Sir N and Lady M Mallick
2021 Mr S Marland
2009 Dr M and Mrs M Martin
2016 Mr D Martin
2013 Mr G Mauchline
2017 Mr R Maund

1983 Mrs M McCauley
2018 Dr M McDowall
2017 Dr A McNab
2013 Mrs P McWilliam-Fowler
2021 Mr C Michie
1988 Dr J Miller
2020 R Millington
2004 Mrs G Mitchell
2020 C Mitchell
2021 Mrs A Moat
2012 Mr D Morris
2021 H Morris*
1988 Dr J Moscrop and Ms C Orgell-Rosen
2017 Mr B Murphy
2018 Mr J and Mrs Y Neild
1997 Dr P and Mrs K Newton
2007 Mr J O'Neill
2015 Mr A O'Neill
2016 Mr G Palmer
2021 M A Parr
2013 Mr D Peat
2019 Mr T Phelan
2020 Mr A Pickwick
2001 Mrs B Piper
1986 Dr T and Mrs M Porter
1985 Reverend Dr W Povey*
2008 Mr D and Mrs J Poyner
2011 Mr S Procter and Miss C Rigg
1982 Mr F Purslow
2019 Mr S Rapley
2020 Mr N Rayan
1981 Mr R Rees
2016 Mr T Rees
2020 Mr R Remelie
2004 Mr W Richardson
2014 Mr J Riley
2021 Professor T Robbins and Professor B Sahakian

1981 Professor T Roberts
2018 Ms L Roberts
2007 Mrs M Ross
1992 Dr P Rowlands
2004 Mr P Rubery
2005 Mr M Sanderson
2008 Dr R and Mrs L Sandler
1971 Mr M Sargent
2008 Dr C Saunders
2020 Ms W Shaffer
2021 Mr V and Mrs R Shah
2015 Professor P Shenton
2011 Dr D Shreeve
2010 Professor M Sinnott
2021 Ms K Skingle
2013 Dr A Smith
2021 Mr S and Mrs S Smith
2009 Mr T Smurthwaite
1989 Mr J Spencer
2020 R Stansfield-Cudworth
2020 Dr K Steele
2021 Dr R and Mrs P Stoddart
2001 Mr N Sutton
2000 Ms W Taylor
2000 Mrs N Tennant
2017 Professor J Thomas
1981 Mrs H and Dr J Stuart Thompson
2009 Professor D and Dr H Thompson
2017 Ms M Thompson
2011 Dr J Tipping
2017 Dr J Tomlinson
2016 Mr A Treece
2010 Dr B Tyler
2021 Mr T Unsworth
2019 J Vale
2020 Mr P Vallely and Mrs C Morgan
2020 H Veitch

2018 Dr J Wager
2005 Mrs J Wainwright
2021 Mr M and Mrs H Walker
2009 Professor T Warnes
2008 Professor J and R Waterton
2018 Dr S Wattam
2021 Mr P Waugh
2014 Mr N Webb
2014 Dr C Weinkove
2021 A Welch
2017 Mr I Whelan
2009 Mr P and Mrs S Whitaker
2015 Mr T Whitehead
2020 Mr B and Mrs N Whitehead
2010 Mr B and Mrs E Williams
2012 Dr P Williams
2014 Mr M Williams
2017 Dr W and Mrs E Wilson
2008 Mrs B Wingard
2013 Professor D Winterbone
1994 Mr A Wood*
2021 Mr S Wood
2020 Mrs C Wright
2009 Mr B Yates
2013 Mr R and Mrs B Young
2021 Mr A Young
2010 Mr L Zastawny
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# Author Guide

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Cover illustration: Thomas Barritt's portrait of Nathan Wood, Pattern Maker of Hanging Bridge. Chetham's Library, Manchester Scrapbook, fo. 4.

Taken from the article,
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by Professor Hannah Barker