

POWER AND CONSERVATION THE IMPORTANCE OF THE HISTORY OF TECHNOLOGY

R. Angus Buchanan

As one of the handful of surviving people who were Founding Members of both ICOHTEC and TICCIH, I welcome the opportunity to speak on this first occasion in four decades that the two organisations have arranged a joint-meeting. I was present at the foundation of ICOHTEC in Paris in August 1968, when the International Committee for the History of Technology was created as a Scientific Section of the International Congress for the History of Science, Technology and Medicine. It was an exciting moment to be in Paris, when the student riots had subsided, leaving piles of loose paving stones at the sides of some of the boulevards, and when the Soviet extinction of the liberalisation of Czechoslovakia in the Spring had marked a serious crisis in the prolonged ‘Cold War’ between East and West. I had been sent to the Congress as the representative of the Newcomen Society to attend the consultations about the history of technology which led to the creation of ICOHTEC and to my appointment as the first British representative and a member of the Executive Committee. In time I became the Secretary General and then the President. Meanwhile, in June 1973, I attended the First International Conference for the Conservation of Industrial Monuments (FICCIM), at Ironbridge, and enjoyed the *camaraderie* of young museum curators and other conservationists anxious to give due emphasis to the industrial heritage. I went

on to attend the Second Conference (SIC-CIM) at Bochum in 1975, and the Third Conference (TICCIM) at Grangärde in Sweden in 1978. Then my wife and I attended the Fourth Conference at Lyon and Grenoble in 1981, when the repetition of the first letter in the abbreviation made necessary the adoption of the permanent name as TICCIH, The International Committee for the Conservation of the Industrial Heritage.

Although I had greatly enjoyed participating in the activities of both these organisations, I decided at this point that it was necessary to concentrate my attention on one or the other, and as my primary interest at that time was academic rather than conservationist I chose to devote my attention to the development of ICOHTEC. I reckoned, in particular, that the history of technology required stronger support than it was receiving, at least in the United Kingdom, while enthusiasm for industrial archaeology was giving an enormous boost to conservation studies, and to securing the preservation of a magnificent range of features from the industrial heritage of the nation. This dichotomy between the history of technology and the practical conservation of industrial artefacts remains strongly entrenched, despite the success of SHOT – the American based Society for the History of Technology – and various other initiatives in the USA and Europe which seek to encompass both emphases, so I consider that it is appropriate on this occasion to reflect on the nature of the relationship and the continuing importance of the history of technology.

When James Boswell visited the famous Boulton & Watt factory at Soho, Birmingham, in 1776, he reported Matthew Boulton saying to him: “I sell here, Sir, what all the world desires to have – Power”. This quality of physical power, enabling people to make and do things, is the essence of tech-

nology, and the exploitation of non-human sources of power through tools, machines and engines has been the outstanding characteristic of the process of human evolution and of industrialisation. The history of technology is thus largely concerned with understanding the process of power utilisation, and with establishing its role in the development of the modern world. A sympathetic attitude towards the conservation of industrial artefacts is both a product of such increased understanding, and an insurance that it will be carried forward in future policy-making. So I am concerned here to demonstrate the crucial role of the history of technology in understanding how the modern world has evolved, and of the importance of enlightened conservation in the process of achieving this objective.

Perhaps the most effective way of showing the vital part played by the history of technology is through the experience of some of its outstanding exponents, and I would like to consider three such examples. I take first the career of Joseph Needham (1900–1995), because this points up in a most emphatic way the value of history – and the history of technology in particular – to understanding one of the most important conundrums of the modern world – the rapid rise in the power and influence of China since the middle of the twentieth century. Needham came to maturity in the unsettled years between the two World Wars. Despite some colourful eccentricities and wide-ranging interests in religion and philosophy – he was a devoted Anglo-Catholic in religion and had strong Left wing views in politics – he had trained as a biologist and had established himself by the 1930s as a brilliant researcher, a Fellow of Caius College Cambridge, and a Fellow of the Royal Society. When the Second World War broke out in Europe he was commissioned to go to China as an official representative of the British government to give scientific advice

to the government of China, then locked in a desperate resistance to Japanese invasion.

Needham stayed in China for four years, travelling widely, mastering the written and spoken language, and assembling a vast collection of Chinese scientific literature. In this period he acquired a better grasp of the history of Chinese science and technology than any previous Western scholar – and possibly even any Chinese scholar – and he formulated the massive work of scholarship that dominated most of the rest of his long life. This was the preparation of a comprehensive study of *Science and Civilisation in China* which began to appear from Cambridge University Press in 1954 and has continued ever since, now reaching 21 volumes, with no end in sight. Needham wrote much of the text himself, but he also assembled an excellent team of Chinese scholars to assist him and he set up an Institute in Cambridge to carry the project forward, even after his death in 1995.

The problem that inspired Needham to undertake this enormous task was the puzzling fact that Chinese civilisation had been ahead of the rest of the world in virtually every branch of science and technology until around AD 1500. In iron and steel technology, in the manufacture of fine porcelain, in paper and printing, in the use of the magnetic compass, and in the development of gunpowder – to mention only a few of the outstanding fields of technological skills – China led the world for well over a millennium. Yet in comparison with developments in Western Civilisation after 1500, when the Scientific Revolution and the intellectual Enlightenment transformed the technological competence of the West, Chinese science and technology were relatively stagnant. Needham's explanation of this remarkable shift in the balance of technological achievements was long and complex, but in summary it involved a number

of cultural factors amongst which the most important was the crucial position played in the hierarchy of Chinese government by the mandarins – the professional, non-hereditary, clerical class – who determined most matters of economic policy and technological administration in successive Chinese empires. Needham argued that, despite the astonishing success of this clerical class in maintaining the stability of Chinese society over two millennia, it had acted as a brake on Chinese enterprise by preventing the adoption of innovations unless they were of immediate economic importance such as those involved in river works to control flooding. There is, of course, no completely satisfactory answer to the

problem of what we have come to call ‘the Needham Question’, but by deriving his answer from a coherent mass of thoroughly researched evidence Needham has presented both scholars and administrators with a well structured foundation for planning and action. There can be little doubt that the awareness of Chinese decision-makers to their own technological history has been greatly enriched by this work of scholarship, and that it has helped to promote the rapid advance of China in recent decades. In this instance, the work of one devoted historian of technology has had a truly momentous effect on the modern world.¹

My second example is that of another academic, the distinguished Ameri-

R. Angus Buchanan – brittiläisen tekniikan historian uranuurtaja

R(ober) Angus Buchanan (s. 1930) on Ison-Britannian tekniikan ja teollisuuden historian tutkimuksen tärkeimpiä hahmoja. Hän on tehnyt elämänuransa Bathin yliopistossa teknologian historian professorina (1960–1995). Buchanan toimi pitkään myös Centre for the History of Technology, Science and Society -laitoksen johtajana.

Hän on yhä yli kahdeksankymmentävuotiaana tärkeä luennoitsija ja osallistuu säännöllisesti alan konferensseihin. R. Angus Buchanan on ollut perustamassa alan tärkeimpiä kansainvälisiä järjestöjä niin teknologian historian kuin teollisuusperinteen alalla. Hän on sekä ICOHTECin (International Committee for the History of Technology, per. 1968) ja TICCIHin (The International Com-

mittee for the Conservation of Industrial Heritage, per. 1978) perustajajäsen. Hän on tutkinut laajasti tekniikan ja teollisuuden historiaa eri näkökulmista. Hänen tuotannostaan löytyy sekä työväenhistoriaa, teollisuushistoriaa, teknologista muutosta ja insinöörikuntaa käsitteleviä tutkimuksia. Hän on myös yksi merkittävimpiä teollisuusarkeologian pioneereja.

Hänen laajasta tuotannostaan voi tärkeimpinä teoksina nostaa esiin seuraavat kirjat:

Technology and Social Progress, 1965; *Industrial Archaeology in Britain*, 1972, 2nd. ed., 1980; *History and Industrial Civilization*, 1979; *The Engineers: A History of the Engineering Profession in Britain 1750–1914*, 1989; *The Power of*

the Machine: The Impact of Technology from 1700 to the Present Day, 1994; *Brunel: The Life and Times of Isambard Kingdom Brunel*, 2001.

R. Angus Buchanan on edellä mainittujen teosten lisäksi toimittanut useita teoksia ja toiminut alan johtavien tieteilisten aikakauskirjojen toimistuskunnissa. Oheisen esitelmän hän piti Tampereella elokuussa 2010 järjestetyssä ICOHTEC-TICCIH-Worklab -konferenssissa *Reusing the Industrial Past*.

Kimmo Antila

can Professor of the History of Technology, Melvin Kranzberg (1917–1995). In the 1930s, Kranzberg was a promising student of European History who seemed destined to an academic career as a teacher of Modern French History. But service in the American army on the Western Front in the closing stages of the Second World War set him on a different trajectory. He returned to academic scholarship and established a reputation as a brilliant teacher and organiser, but his interests had widened from European History into more general cultural fields so that he took the lead in promoting the emergence of a new historical specialisation, the history of technology. Kranzberg used to like telling how he had been rebuffed by prominent historians of science when seeking to get more academic attention for technological history, so that he had decided to seek recognition for the history of technology as a discipline in its own right. His first great success in achieving this objective came with the foundation of the Society for the History of Technology (SHOT) in 1958, with its own distinctive journal, *Technology and Culture*, of which Kranzberg became the first Editor. Within ten years, the Society and its journal had flourished mightily, with many American universities and colleges introducing courses and teaching posts in the history of technology.

Kranzberg always had the vision of SHOT as an international society, and from the early days it had supporters in Europe and elsewhere, and several excursions have been made abroad for its Annual Conference, but the bulk of its membership has remained American. However, Kranzberg seized the opportunity of meeting international representatives at the International Congress for the History of Science, Technology and Medicine to establish a ‘Scientific Section’ for the history of technology, and this was fulfilled in Paris in 1968 with

the creation of ICOHTEC, as I have already described. By persuading historians from the Soviet Union and its dependent states to take part in its formation, Kranzberg managed to give ICOHTEC a modest but not insignificant role in overcoming the tensions of the Cold War by creating a genuine fellowship of scholars who sought constructively to explore the differences in their historical interpretations of technology. The organisation made a strong start with a Symposium organised by Maurice Daumas at Pont-à-Mousson in France in 1970. A Russian delegation was led by S. Schuchardine, and the first Chairman was Eugene Olszewski from Poland, and with Mel Kranzberg leading an impressive American delegation the meeting was a cordial and instructive occasion. It was the first of a long series of symposia, with meetings at first alternating in Europe between East and West. Whether or not ICOHTEC made any material difference to the course of political events, it flourished throughout the 1970s and 1980s. It then calmly rode out the collapse of the Soviet empire and the political reorganisation of Europe, and it has continued to provide a forum for international discussion of the history of technology into the twenty-first century.

Mel Kranzberg died in 1995, having attended his last ICOHTEC meeting in Bath, UK, the previous year, but he had lived to see the outstanding success of both SHOT and ICOHTEC. This was no mean achievement, contributing mightily to the establishment of the history of technology as an international discipline and demonstrating the value of the subject as a means of interpreting the character of modern industrial society. He remained to the end of his life a creative and effective scholar, coining such gnomic aphorisms as: *Technology is neither good nor bad, nor is it neutral*, the first of a series of ‘Kranzberg’s Laws of Technological History’. He was undoubtedly one

of the giants of the history of technology, but he will be best remembered by those who knew him for his irrepressible good humour, his inspirational enthusiasm for his subject, and his unflagging support for his fellow scholars in the history of technology.²

The third of my great men of the history of technology is L.T.C. Rolt (1910–1974), the centenary of whose birth has been the subject of several commemorative ceremonies this year. Tom Rolt was trained as a mechanical engineer, but he discovered a talent for writing about engineers and their work in a way that was lucid and instructive, and used it to write a series of engineering biographies and industrial studies. His first great success came with *Narrow Boat*, an elegant travelogue of a voyage that he made with his first wife over the British canal network, then in serious decline as a result of rail and road competition, in the first months of the Second World War. Immediately after the war, this book became the rallying call of one of the most successful British conservation movements, the Inland Waterways Association, which was largely responsible for bringing the condition of the neglected waterways to the attention of the public and winning support for their retention and revival. Once launched upon the conservation of obsolete industrial artefacts, Rolt went on to inspire the preservation of narrow gauge mineral railways such as the Tallylyn Railway which had served a quarry in North Wales. Not only did he succeed in rescuing the decaying track and rolling stock, but he also organised the system of running such restored railways as a commercial venture staffed mainly by volunteers. It was a system which was then applied to many other redundant railways, including several of standard gauge tracks, and it has been tremendously successful in keeping such railways open as tourist attractions.

Rolt showed similar dedication and ingenuity in promoting several societies for the maintenance of Vintage and Veteran motor vehicles, the promotion of a National Railway Museum in York by the Science Museum, and the salvage of the rusting hull of I.K. Brunel's steam ship *Great Britain* from the Falkland Islands. With the surge of interest in British industrial archaeology in the 1960s, Rolt devoted time and energy generously to the encouragement of a wealth of local society activities concerned with the conservation of the industrial heritage. The last and most ambitious of these was the Association for Industrial Archaeology, which grew out of conferences held at the University of Bath in the 1960s, and which had been supported unstintingly by Tom Rolt. It was very appropriate, therefore, that he should have become the first President of the AIA when it was established at a conference on the Isle of Man in 1973, and his death the following year was a sad loss to the conservation movement. But by then the main points had been secured in the recognition of the value of the industrial heritage and the creation of an administrative infrastructure to ensure its preservation, and Tom Rolt's legacy has been sustained by interest in his superb books, many of which remain in print and continue to enthuse new generations of readers in the lives and works of British engineers.³

These sketches of the careers of three men who have made substantial contributions to the history of technology represent a much larger number of men and women, scholars and practical people, who have been enthused by their example. While this sort of *ad hominem* discourse does not necessarily provide scientific proof of the importance of the history of technology, it nevertheless justifies the formulation of a series of propositions which imply such a conclusion. In the first place, these experiences demonstrate the value of a sound

historical understanding to the successful conservation of the industrial heritage, and that the history of technology is an indispensable component of such intellectual equipment. This is because the history of technology illuminates most clearly the role played by the control of physical power in human history, determining the transitions between the four great human epochs: the reliance on human power alone during the long eons of hunter-gatherer societies; the introduction of animal power in the rise of societies depending upon agriculture and animal husbandry; the development of devices for the utilisation of wind and water power during the rise of urban civilisations; and the transition to mechanical power in the period of industrialisation, when human beings have begun to harness the deep powers of the universe. An understanding of this process implies an insight into the nature of invention and its transformation into successful innovation in manufacturing industry, in transport systems, and in modes of communication. Such an understanding had been firmly grasped by Needham, Kranzberg, and Rolt, and enabled them to interpret the social significance of the great transformations which they studied. Without such an historical understanding, both large scale and modest scale developments lack credible foundations, and cannot produce lasting success.

The second proposition which I suggest arises from my 'case studies' is derived from the same historical understanding, and is the perception that, for all its weaknesses, forms of democratic participation provide more enduring foundations for sound growth than any imposed by dictation from politically powerful elites. The major weakness of democratic governance is the difficulty of taking painful decisions, so that the choices which would be clinically the most efficient have frequently to be moderated by compromises and rewards

in order to make them socially acceptable. Nevertheless, the frustrations represented by Needham's analysis of the role of the mandarins in slowing down the rate of Chinese development, and the perception of Kranzberg that technology is capable of being used and abused by human direction, both illuminate the value of personal participation in government. When it comes to promoting the ingenuity of innovation and enterprise in society, technology is more likely to flourish where such qualities are encouraged by social rewards in a relatively 'open' society than in one under strong dictatorial domination. Democratic participation is thus a vital component in ensuring that effective controls are maintained over technological development. They can not prevent its abuse if it falls into the wrong hands, but they can protect the interests of the individual from being submerged by collective pressures.

As a third proposition, I suggest that historical understanding and democratic participation are both implied in well-conceived exercises in industrial conservation. This was clearly demonstrated in the many conservation campaigns undertaken by Tom Rolt, in which a well-informed historical intelligence harnessed the enthusiasm of teams of volunteers willing to devote their time, energy and money to achieving the preservation of key industrial monuments in ways which presented their power and working capacity. No serious conservationist would want to preserve everything from past industrial and transport systems, and the process of selecting the best specimens for conservation can be difficult, but it is important that those features selected for protection should be preserved as far as possible within their social and historical context. This means that, as Rolt clearly understood, they should be preserved as working exhibits, preferably doing the work they were intended to perform, although as

this would not normally be possible they should at least be able to simulate the circumstances for which they were designed. Tom Rolt had a vision of the revival of the British canal network as a transport system serving the needs of modern industry, but as this was no longer a realistic objective he had to settle for saving the canals as attractive social amenities and sources of tourist revenue. It was for him a second-best, but better than the complete annihilation of the canals which seemed imminent in the 1940s, and it represented the conservation of a valuable educational and leisure amenity.

The conclusion that I wish to draw from these sketchy observations is that the enterprise of discriminating conservation in which ICOHTEC and TICCIH are both engaged, with their different but convergent emphases and perspectives, is one in which the illumination of a constructive understanding of the history of technology is of fundamental importance. Without it, we are likely to preserve the wrong things and to display them in ways that are out of context and as such are either inaccurate or meaningless. With historical understanding, however, they acquire a 'landscape' and become powerful instruments of illumination and enjoyment. To secure such a combination it is necessary to build up our expertise in the history of technology, academically and professionally, and to make sure that we give it scope to determine the future development of conservation policy. The way in which this is done will obviously vary from one national tradition to another, but the need to promote the relationship between

the history of technology and the strategies of conservation is one to which we all need to apply our resources. As this Conference demonstrates, the discourse arising from this conjunction has already begun: let us hope that it will continue to flourish.

Prof. R. Angus Buchanan is Emeritus Professor of the History of Technology at the University of Bath and Honorary Director of the University's Centre for the History of Technology, Science and Society. He has written extensively on technological change, industrial archaeology, engineering history, and I.K. Brunel.

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¹ For Joseph Needham, the best resource is the multi-volume *Science and Civilisation in China*, but the argument of the 'Needham Question' is more succinctly presented in various essays which Needham wrote, such as those published as *The Grand Titration: Science and Society in East and West* (Allen & Unwin, London, 1969). An excellent recent account of Needham's career has been written by Simon Winchester: *Bomb, Book and Compass: Joseph Needham and the Great Secrets of China* (Penguin, London, 2009; first published in the USA as *The Man Who Loved China* by Harper Collins in 2008). I have also found useful the obituary notice and commemorative articles in *The Caian*, the magazine of Gonville and Caius College, Cambridge, for 1994-1995 and for 2003-2004. I am grateful to my friend Christopher Couchman, for bringing these articles to my attention.

² For Melvin Kranzberg, see Robert C. Post, 'Chance and Contingency: Putting Mel Kranzberg in Context', in *Technology and Culture*, vol.50, no.4, October 2009, pp. 839-872.

³ For Tom Rolt, the best account is his autobiography, published in three volumes: *Landscape with Machines* (Longman, London, 1971); *Landscape with Canals* (Allen Lane, London, 1977); and *Landscape with Figures* (Alan Sutton, 1992). For some of his best writing, see also *Narrow Boat* (many editions since 1944), and *Isambard Kingdom Brunel* (Longmans Green, London, 1957).