Atoms in Wonderland

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This paper is a sortie into a relatively unexplored aspect of the 'Atomic Age'. It grew out of work on the 1951 Festival of Britain, in which science, and atoms in particular, were explained to visitors by means of clever images and analogies. These leaned heavily on well-known images of Alice in Wonderland - Alice who was curious, who asked questions, who drank from the bottle marked 'Drink me' and grew first very small, then very tall. This seemed to be an ingenious example of the representation of atomic science, with its emphasis on the extraordinarily small nature of atoms and the unimaginably powerful application in the atomic bomb. Representations, as we know, have the power to affix meaning to objects and concepts, giving them a 'reality' in individual and collective lives.[1] However, the question of what those meanings are, how they are achieved, how they are transcribed from author - to designer or visualiser - to audience, is by no means straightforward. Obviously we have to pay close attention to the visual conventions and tropes which are employed. But while there were indeed many significant images in exhibitions and museum displays, what is also apparent in this immediate postwar period is a lack of visuality, and a reliance on old-established textual representations.

This is in part due to the special circumstances of Britain in the aftermath of the Second World War. A Labour Government under Clement Attlee swept to victory in the first peacetime election with an agenda of radical social democratic change. However, first of all there were shortages of just about everything, and rationing was not finally abandoned until 1954, though by the end of the 1940s the supply of most items had eased. Film was strictly rationed (all film stock had to be imported from the US), paper supplies likewise, so that books were printed on cheap and nasty paper, with few illustrations if any, with covers using crude blocks of colour to brighten them up.[2]

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[1] See R.W. Rydell & N.E. Gwinn, *Fair Representations* (Amsterdam: VU University Press, 1994), Introduction.

[2] Leo Enticknap, "Newsreel and Government 1943-1950", unpublished seminar paper University of Teesside, November 2002. Paper rationing affected both newsprint and paper for the publishing industry. Until April 1950, all imports of wood pulp and other paper making materials had to be made through the Government Paper Controller, who also strictly controlled prices; Richard Hills, *Papermaking in Britain 1488-1988* (London: Athlone, 1988), p. 188. Chapman Pincher's *Into the Atomic Age* (London:

Budgets were restricted. Even when an exhibition as important as the Festival of Britain was agreed, it suffered a severe budget cut half-way through implementation. And second, a general climate of secrecy affected a wide range of governmental interests and continued long after the war had ended. Anything to do with defence was particularly vulnerable to the dictates of 'Official Secrecy', as remarked upon by Margaret Gowing, historian of the atomic energy industry, who argued that obsessive official secrecy prevented clear public understanding of atomic power, and of the huge industrial effort it involved.[3] And finally, this was of course the period of the Cold War, the Berlin airlift, Korea, and nuclear testing. So we should remember that it was a situation of desperately tightened belts in the 1940s, only gradually improving through the 1950s, of continued austerity, calls for sacrifice for the greater good, and official obsession with secrecy.

In addition, I would like to focus on the question of audiences and reception at this time. Obviously audiences may be very diverse, messages are interpreted subjectively, media penetration has limits, and all dissemination of information works at different levels at the same time. Nevertheless at this period there was a very clear notion of who the 'public' was, that is the relevant public as opposed to the popular masses. Here it is important to make a distinction between the idea of a particular audience and the more general notion of popularisation. Popularisation was (and still is) generally used to refer to a subject which was made 'popular' by being simplified or presented in an accessible manner to those who would not otherwise understand it and were not part of the community in which discussion of the subject was current. On the other hand the notion of the 'public' is prior and refers to how the audience is constructed or understood by those specialised practitioners who had to address it. It is therefore important to examine shared assumptions about the nature of that public.[4]

The 'public', as understood by almost any educated person in the 1940s and 1950s, revolved round the notion of the 'informed layman'. This had an old and distinguished

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Hutchinson, 1948), bore a note on the back of its title page, 'This book is produced in complete confirmity with the authorized economy standards'.

[3] Margaret Gowing, *Reflections on atomic energy history: The Rede Lecture* (Cambridge: CUP, 1978). For an exaggerated concern with secrecy, one has only to cite the exhortations to confidentiality that run through most of the Festival of Britain official papers.

[4] A helpful discussion of these distinctions may be found in Stefan Collini, "Before Another Tribunal: The Idea of the 'Non-Specialist Public'", in *English Pasts: Essays in History and Culture* (Oxford: Oxford University Press, 1999), 305-325.

lineage. From the 18th century and earlier, men of intelligence and culture thought it entirely normal to read the latest works across the arts and sciences. The great Victorian periodicals were addressed similarly to such people, despite growing worries that the latest science was less easy to communicate. In the 20th century, the 'common reader' invoked by Virginia Woolf has much in common with the notion of the well informed but non-expert reader who could understand and be receptive to demanding modern ideas. The intelligent layman was the target of an enormous amount of literature and scientific works (of the type that the French call *haute vulgarisation*), for example, Bertrand Russell's *ABC of Atoms*.[5] By the postwar period the intelligent 'layman' had well defined if quasi-mythical characteristics, which indeed reflect much of contemporary political and intellectual aspiration, and may be summed up as follows. He (and he was generally still a 'he') was above all an involved citizen, educated in the grammar or public schools, who was open-minded, interested in science, who listened to the Home Service on the radio, enjoyed the Brains Trust, and read Penguin specials on serious topics, who took an intelligent interest in the comment of a broadsheet newspaper, knew all about the laws of cricket, and probably belonged to a society or two (such as the Council for the Protection of Rural England, or the Royal Society of Arts), went rambling in the countryside, and thought that modern town-planning was the right approach to solving problems of urban poverty.[6] The notion of the intelligent layman and upstanding citizen persisted quite a long time - as late as 1968 in a Science Museum guide book, the section on atomic physics noted, 'The formula E = mc2 may already have come to the notice of the observant layman'.[7] But in the period under consideration here, 1945 to 1958/60, it was particularly strong. There was a watershed around 1960, a change in sensibility, which for good reason coincides with C.P. Snow's attack on literary intellectual culture, and by

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[5] Bertrand Russell, FRS, *The ABC of Atoms* (London: Kegan Paul, 1923). The language of this is reasonably accessible but still demands a good knowledge of science and maths. He followed this two years later with *The ABC of Relativity* (London: Kegan Paul, 1925).

[6] This may seem exaggerated, but see the attempt to draw up a graph of characteristic interests for the Festival of Britain's pavilion SP14, which later became the 'Lion and the Unicorn' pavilion, celebrating the eccentricities and character of the British; Memorandum 16 August 1949 to the Presentation Panel, Public Record Office (hereafter PRO), WORK 25/48/A5/49/D59.

[7] *In the Science Museum* (London: HMSO, 1968), p. 89. The era of the informed layman is sometimes said to have finally come to an end with the lingering demise of the up-market weekly journal, *The Listener* (London: BBC), for the intelligent reader in 1990.

extension on the very existence of the informed layman, in his still notorious *The Two Cultures*.[8]

The paper will examine two main areas: first, the presentation of atomic science and energy in exhibitions and museums, which were most susceptible to official influence, and second, aspects of communication and representation of atomic power in literature and in organisations set up for the so-called intelligent layman. A number of themes will recur. These concern the limits of language and visuality in presenting a coherent picture of atomic power, where pure science was presented quite detached from its applications; the hopes for a radiant future which reflect an obsession with modernity and the quest for solutions to economic problems; and finally, attempts to 'domesticate' atomic energy by bringing it into everyday life in diverse ways.

1. Museums and Exhibitions

How did Britain's national scientific museum present atomic science? The postwar Science Museum in London was bomb damaged, had a minimal budget, and hard-pressed staff who had to stretch their work across a number of galleries. The curator responsible for the Physics gallery was Dr. F.A.B. Ward, who also managed the horology department. Ward was a physics graduate who had spent the years 1929-31 doing postgraduate research in the Cavendish Laboratory under Rutherford. In 1937/38 he put on a display called 'Atom Tracks', of which the centrepiece was C.T.R. Wilson's original cloud chamber.[9] After the war the Museum mounted a number of exhibitions which dealt with atoms and atomic energy:

1946	Atomic Energy and Uranium
1947	Electron Jubilee
1951	Science Exhibition (part of Festival of Britain)
1958	Atoms at Work Today (cancelled)
1961	Atom Nucleus Jubilee

[8] C.P. Snow, *The Two Cultures* (Cambridge: Cambridge University Press, 1959), and not out of print since.
[9] Alan Morton, "The Atom Train: exhibiting physics", unpublished seminar paper, The Royal Institution, London, May 1996.

There was also a physics gallery, though exactly what it contained is not clear until the early 1960s.[10] Let me look briefly at the constraints when planning these exhibitions.

In December 1945 planning started for a new temporary exhibition.[11] It was originally to be called 'The Atom and its Energy Store'. It is not clear when the name was changed, but uranium was familiar to everyone as the material used in atomic bombs, whereas 'energy store' was rather vague. The subject was firmly set in the context of pure scientific research, with a historical introduction showing atom models, Wilson track photos, Aston's mass spectrograph, and Cockcroft and Walton's 1932 accelerator (always a favourite exhibit which soon assumed as iconic a status as Wilson's cloud chamber). Moreover, the language used - 'atom' as opposed to 'nuclear' - is significant in terms of public presentation. Atoms were small and relatively inoffensive, and had interesting properties; in contrast nuclear physics promised the release of enormous power and energy. The boundary between pure research and its applications was thus conveniently blurred in the language.[12]

When however it came to the display of industrial applications, it was essential to show the actual material concerned - uranium. Here the Museum was constrained both by its dependence on industrial companies for samples, and by the Government (through the Ministry of Supply, within whose realm all atomic research lay), who preferred to give as little information out as possible. As the Science Museum Director, Herman Shaw, wrote:

> I realise that the present policy may not allow the full story of uranium to be told but it occurs to me that much might be explained in a popular way that would not prejudice the position: such knowledge as was obtainable before the war could no doubt be made available, together with any later details that may be known generally.[13]

Negotiations had to be carried on in a three-way manner, between the Ministry, the industrial suppliers and the Museum. Eventually after some pressing, Imperial Chemical

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[10] F.A.B.Ward, *Handbook of the collection illustrating Atomic Physics* (London: HMSO, 1963).
[11] Science Museum 'Z' Archive, 79/152, file 8260B.
[12] The distinction, embodied in University textbooks, is technically that atomic physics is concerned with the properties of electrons attached to the nucleus. Nuclear physics on the other hand concerns itself with the constituents of the nucleus *per se*. Not only are the constituents different, but the energies involved are of several orders of magnitude greater. My thanks to Colin Hempstead for elucidating this distinction.

Industries agreed to provide samples of metal compounds and a large sample of uranium weighing about 30lbs., and also agreed 'to draft legends descriptive of the exhibits in such a way as not to disclose the method of obtaining metal from its compounds'.[14] This was to set a precedent: increasingly in complex areas, especially where affected by the demands for secrecy, the Museum accepted labels written by outsiders.

In terms of the display of the applications of atomic energy, it is not clear that much was actually shown. The displays did include uranium-based glazed glassware and pottery which fluoresced brilliantly under ultra-violet lamps, and were very popular with visitors, but had nothing to do with atomic energy.[15] So pure science was combined with a few decorative and marginally useful applications, in a way that was reminiscent of 19th century displays. According to Shaw, 30,000 people visited the exhibition in its opening week, which seems an astonishingly high number. But alternative forms of entertainment were in short supply, and the topicality of the subject no doubt contributed to its popularity.

The exhibition in the following year, 1947, was not organised by the Museum but by a committee of the Institute of Physics. There were working exhibits (e.g. of 'Photoelectric Effect in Air'), radiographs, and again it was regarded as particularly successful, and the Museum asked to retain most of the exhibits permanently.[16]

After that the Museum's entire energies were devoted to smartening up the galleries and preparing for the Festival of Britain, which opened in May 1951 on the hundredth anniversary of the Great Exhibition. Within the Festival there were three sites which displayed atomic science, one in the Dome of Discovery in the main South Bank Exhibition, the second at the Science Museum with the special Exhibition of Science, and the third in Glasgow in the Exhibition of Industrial Power. The Festival was above all a site for the display of official science, put together by experts in the field, well designed in fresh and exciting displays, financed and controlled by the Government appointed

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[13] H. Shaw to W.A.Akers at Tube Alloys, Ministry of Supply, 31 December 1945; Science Museum 'Z' Archive, 79/152, file 8260B. There was also concern over the publication of where sources of uranium could be found.
[14] Ibid, 'Note of Interview on 22 January 1946'.
[15] This underlines the lack of distinction between 'atomic' and 'nuclear' properties. Fluorescence is an atomic property, and has nothing to do with the fissile or radioactive nature of uranium.
[16] Science Museum, Documentation Centre, file 8319. There is not a great deal of information about this exhibition, though an official handbook was apparently written by D. Follett of the Science Museum.

Festival Office. The organizers' twin concerns were to emphasize the British contribution to the story of discovery, and that all displays should be communicable to a lay public. If any science was complex and in need of demystifying, it was surely atomic physics.

It was here that *Alice in Wonderland* came into her own. This was not in itself particularly original, many people were no doubt already familiar with George Gamow's *Mr. Tompkins in Wonderland.*[17] There does indeed seem to have been quite a bit of 'wonder' around at this time, even advertisements draw on the classic fairytale. *Alice* is of course a book for adults as much as children, who appreciate Lewis Carroll's puns, his verbal and mathematical puzzles, and it was unquestionably a book familiar to all those educated laymen. Ideas from *Alice* also featured prominently in another pavilion in the Festival, the Lion and the Unicorn pavilion. Using Alice as an analogy appears to have originated with the Festival organizers, as planning documents show. It was proposed that the Exhibition of Science (like earlier exhibitions at the Science Museum), should explain the underlying science, and locate atoms (even entered under an atom symbol) in a story about the structure of matter. However, the exhibition threatened to become too technical and complicated and therefore less attractive to the lay public, which is perhaps why press releases issued by the Festival Office during the preceding year used Alice as an entrée to the spirit of discovery and unravelling the nature of matter. As the writer enthused:

> Entry to the exhibition will be through a series of chambers in which ordinary objects are successively magnified until the spectator, narrowing on a single crystal, can see the atoms which compose it. Like Alice, nibbling her magic toadstool, he will be able to grow smaller at will and finally, at a magnification of ten thousand million times, to wander through a Wonderland in which the nucleus of the atom and its surrounding electrons are spread all around him.[18]

This was actually implemented in the entrance passage to the exhibition. Wonderland provided a perfect metaphor for the atomic world, where atoms and electrons were so small they were impossible to imagine unless you shrank to their size. Alice too could be

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[17] George Gamow, *Mr. Tompkins in Wonderland* (Cambridge: Cambridge University Press), first published in Britain 1940, and by 1950 had gone through 11 reprintings.

[18] FOB/Press/5/50 'Science and Technology in the Festival of Britain', p.4, Science Museum Z Archive, file 8930. Press releases from the Festival Office were apt to run to 7 or 8 pages! For details of the actual

directly harnessed to the visitor, an imaginative alter-ego searching for how things really are -

> 'If, like Alice, the visitor is given to asking questions, he may well wonder how the atoms, through which he has just wandered and which are seen to consist largely of empty space, square with a world of shapes, colours, scents and life. The display in the main body of the exhibition is the answer.[19]

Alice appeared in the official *Guide to the Science Exhibition*, written by Jacob Bronowski, as the guide who helped the visitor to make the imaginative leap to 'see' and therefore 'believe' what this invisible world was like.[20] And Alice was useful in other ways. She was a living child, and the atomic world was not just composed of inanimate matter but also encompassed living cells. Atoms therefore, as suggested by the passage just quoted, could square with 'life' with all its colours, scents and shapes.[21] It thus provided a welcome counterbalance to images, often found in the press, of bombs, death and destruction and fears about uncontrolled chain reactions. The word 'wonderland' itself not only engendered happy memories of childhood innocence and a world of fantasy, but also had nice overtones of future promise, of a world where advanced technology would create freedom from want and labour, as the manufacturers of vacuum cleaners and electric cookers were wont to promise. Finally, Alice did not need to be actually depicted in the displays, she was simply present in the text, so familiar an image that her presence could be summoned by a single word to the mind of the visitor. No wonder that the Festival organizers liked Alice, and the idea of Wonderland will recur again below.

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exhibition, see Sophie Forgan, "Festivals of science and the two cultures: science, design and display in the Festival of Britain, 1951", *British Journal for the History of Science* (1998), **31**: 217-40.

[19] Ibid. Note the gender slippage - the visitor is a 'he'. This was avoided by Bronowski, who used the direct 'you' in his Guide, *1951 Exhibition of Science: South Kensington* (London: HMSO, 1951), pp. 7-8.

[20] It could further be argued that Alice is more than a metaphor, in that commonsense is unable to provide analogies for concepts which underlie experiments in nuclear physics, which are not based on simple direct observations, but rely wholly on mathematical framing and interpretation. However inaccurate, Alice could serve to give some understanding by way of a familiar analogy.

[21] While Britain never embraced ideas of 'vital forms' to the extent that the States did, there were people, particularly in design and the arts who were familiar with these ideas; Brooke Kamin Rapaport & Kevin L. Stayton, *Vital Forms: American Art & Design in the Atomic Age, 1940-1960* (New York: Brooklyn Museum of Art, 2001). There are occasional references in British images of atomic explosions in organic terms to the beauty of the 'object', unfolding like a sea-anemone, but these are comparatively rare. The dust cover of George Gamow, *Atomic Energy in Cosmic & Human Life* (Cambridge: Cambridge University Press, 1947), does however use a picture of a flower in bloom together with a microscopic view of a cell.

As far as the rest of the Festival was concerned, atomic energy featured in two sections - first the Dome of Discovery in the main South Bank Exhibition. In the Dome it was set clearly in the context of pure research in Physics - at the end of a classic genealogy of great discoverers - Boyle, Newton, Faraday, Kelvin, Maxwell, J.J. Thomson and Rutherford[22] - and while it is difficult to reconstruct precisely how the exhibits were put together - there was a mural by Laurence Scarfe of the Nuclear Physics Laboratory at Harwell, a large model of the British Experimental Atomic Pile (known by the clown-like acronym of BEPO), x-ray films, a model of the Cockcroft-Walton type cascade generator, radiation monitoring equipment, microscopes and viewers for stereo-radiographs, ray track apparatus, Geiger-Muller tubes and so forth.[23] There was also a mural (though possibly not used) entitled 'The Brighter Side', showing a happy scene with children dancing round an oak tree, atom symbols, and a plate of healthy food and drink.[24] There were varied examples of applied science - X-ray investigations of paintings at the National Gallery, a reconstruction of the Stag Decoration on an iron standard found at the Anglo-Saxon site of Sutton Hoo, containers for radioactive isotopes, television projection lens, and designs derived from crystal patterns.[25] The emphasis in the catalogue was on British pioneering work in nuclear physics, though admitting that the development of the pile was an international effort, and on the uses in medicine, particularly in radioactive tracers.[26] 'Atoms for peace' was not actually used as a slogan, as it would be soon by the UK Atomic Energy Authority, but enormous emphasis was placed on peaceful uses of science, and its military connotations simply ignored.

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[22] Ian Cox, *The South Bank Exhibition: A Guide to the Story it tells* (London: HMSO, 1951), section on the Physical World, p. 62

[23] *1951 Exhibition London Catalogue of Exhibits* (London: HMSO, 1951), pp. 105-110. The idea of the mural came from Sir John Cockcroft, arguing that a 'mere portrait gallery' should be avoided, and show a large modern laboratory with one wall represented the 'experimental face' of a nuclear reactor; PRO, WORK 25/52/A5 Physics Advisory Panel, meeting 10 August 1949. In the final display quite where the ladies shoes, bathroom cabinet, brass coal scuttle, air-flow hot water bottle and Newmarket binoculars fitted in is hard to say, and shows the dangers of indeed assuming too much from the list of exhibits. However, the organisers were always keen to show the domestic applications of scientific knowledge.

[24] Designed by Gordon Bowyer, the legend to the mural ran, 'Atomic energy can help mankind giving large new sources of power, teaching about life processes of the human body, offering immense potentialities for good in medicine, biology, chemistry, agriculture, industry - given the right chance'. Photograph in author's possession.

[25] *1951 Exhibition London Catalogue* (note 23), Nos. B155, B159, B144-45, B675, B700-708.

[26] *The South Bank Exhibition* (note 22), p. 62.

The approach was similar in the third site, the Glasgow Exhibition of Industrial Power. Here the final display was called the 'Hall of the Future', where the past was firmly linked to the present through the persons of great pioneers (this time Watt, Trevithick, Faraday, Parsons and Rutherford). Rutherford naturally provided the link to the future, to the potential use of unlimited power, equivalent to the 'power of the sun'. The catalogue was cautious enough to admit that 'The use which has been made of these discoveries… will determine whether we are entering an age of undreamed of plenty and comfort, or whether we are working out our complete extinction'.[27] In the context of the whole catalogue, however, this was just one small cautionary note.

The upbeat, confident message of the Festival (which was very typical of all exhibitions organised by public bodies), was in marked contrast however to an earlier exhibition organised in 1947 by the right-wing newspaper *The Daily Express*, in London, by Chapman Pincher (Fig. 1). Pincher is now remembered as a spy-hunter and politican-baiter, but he had a science degree and during the war had worked in the rocket division of the Ministry of Supply. He had therefore some qualification for appointment in 1946 as the paper's defence, science and medical editor.[28] This exhibition dealt openly with military aspects. The introductory section followed the standard pattern of focussing on the nature of atoms, followed by the splitting of the atom, but it then concentrated on the bomb, Hiroshima and the effects of the bomb. It seems to have been largely photographic in content, but the pictures displayed of victims of the bomb were distinctly unsettling to say the least. There was also a chart of the putative effect of an atomic bomb if dropped on a British city, which was a favourite device in many US publications. These provided some counterbalance to the section on future possibilities, and Pincher's book on the subject published the following year had much to say both about peaceful uses and what other nations were doing. He was also clear about the need for Britain to

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[27] Guide to *1951 Exhibition of Industrial Power, Kelvin Hall Glasgow* (London: HMSO, 1951), p. 45. Underlying much of the promotion of nuclear energy was assumption that the country's industrial strength depended on coal, and the fear that coal supplies would be wholly inadequate for future energy needs; e.g. *Britain's Atomic Factories,* (London: HMSO, 1954), pp. 4-5.

[28] Pincher listed BSc. after his name in his newspaper columns, in the guide and book relating to the exhibition, *The Atomic Age Exhibition* (London: *Daily Express Newspapers,* 1947, copy Science Museum library) and *Into the Atomic Age* (London: Hutchinson, 1948). See *Who's Who* (London: A & C Black, 1997), where Pincher lists his recreations as 'spy-hunting, ferreting in Whitehall and bolting politicians'.

remain fully up-to-date in its ability to manufacture atomic bombs and made a somewhat optimistic assessment of the situation just post the McMahon Bill.[29]

Official institutions such as the Science Museum eschewed all mention of the bomb. However, for the collection of material, they were increasingly in the hands of universities (who either threw out old equipment, or donated it at the behest of retiring professors), and of the atomic energy industry itself. Collecting was at best reactive. There seem to have been relatively few acquisitions in this area during the 1950s, judging by the *Handbook* of the collection by Ward issued in 1963.[30] The constraints were also illustrated by the cancelled 'Atoms at Work Today' exhibition in 1958. This was one of several exhibitions put together by the UK Atomic Energy Authority and was designed as a travelling exhibition.[31] The boards had been used in several exhibitions already and needing refreshing. A cost of £1420 was quoted. The Science Museum, shocked, replied that its annual budget for special exhibitions was £50, and the idea was dropped.[32] However, much of this material did come eventually to the Science Museum in the mid 1960s, along with information for labels. This led later to accusations by left-wing academics that the Museum was almost an arm of the UK Atomic Energy Authority, who did indeed sponsor the gallery's refurbishment in the early 1980s.[33] Even today in the Nuclear Power Gallery, a certain ambiguity remains, and a screen accompanies the Magnox display saying 'Original material provided by British Nuclear Fuels. Edited by The Science Museum.'[34]

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[29] The bill severely restricted passing atomic information to non-US parties, and was finally passed in August 1946. The exhibition was open Jan-Feb 1947. In his book, writing in October 1947, Pincher reckoned that there were gaps in UK knowledge, but that missing information had not been asked for on account of political reasons. If the need arose, i.e. international control was not achieved, he thought, over-optimistically, that the UK would have no difficulty acquiring the relevant information from the US. Pincher also illustrated the problems of secrecy, and alleged that the Ministry of Supply had tried to get the exhibition stopped; *Into the Atomic Age* (note 28), p. 96.

[30] F.A.B.Ward, *Handbook of the collection illustrating Atomic Physics* (London: Science Museum, 1963).

[31] Others in this period were 'Atoms for Peace', in London, 1955, as well as exhibitions in areas where power stations were planned, e.g. Thurso, Caithness, April 1955, near the Dounreay site. Note the 'Atom Nucleus Jubilee' was a small exhibition set up in the ground floor demonstration room, organised by Ward in conjunction with the Institute of Physics who put on an international conference in Manchester in September 1961 at which Ernest Marsden was present.

[32] Science Museum Documentation Centre, file 9653. There followed a long dispute over transport costs of £66.5s for getting the material out of store, which the Museum eventually won.

[33] Les Levidov and Bob Young, "Exhibiting Nuclear Power: The Science Museum Cover-Up", *No Clear Reason: Nuclear Power Politics* (London: Free Association Books, 1984), pp. 53-79.

2. Informing the intelligent layman

The second part of this paper will discuss some of the literature published for that lay public mentioned earlier, and outline some of the wide spectrum of views and approaches taken by providers of knowledge. First of all, there was naturally a considerable gap between what researchers in the field knew, and what was published in scientific journals, let alone in the wider press. The dictates of secrecy dominated. Secondly, from 1945 there was an active group of people, including many scientists such as P.M.S. Blackett, Julian Huxley, and Kathleen Lonsdale, who viewed nuclear energy with deep foreboding and actively campaigned for international control through the United Nations of all weapons.[35] The anti-nuclear lobby was present from the start. There was also a group of scientists working within the industry who were concerned both with their own public identity as atomic scientists, and to educate the public about the wartime work and future applications, the Atomic Scientists Association, in which Joseph Rotblat was extremely active. The ASA produced a journal, a travelling exhibition in a train 1946-47, conferences and books, and their engagement with the public was not unlike that of the Atomic Scientists organizations in the US described by Jessica Wang.[36] I do not propose to discuss these further here. Rather I will briefly discuss the publications of the UK Atomic Energy Authority to provide a picture of the official Government view, then describe some of the varieties of image and language used in books for the non-specialist reader, and finally look at one particular organisation, the Institute of Atomic Information for the Layman, which attempted to 'domesticate' atomic energy.

The publications issued by the UKAEA provide a useful comparison. Two things are notable. First, paper shortages and quality restrictions do not seem to have applied to these Government publications. The paper, use of photographs, coloured

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[34] British Nuclear Fuels is part of the UK Atomic Energy Authority.

[35] For example, P.M.S. Blackett, *Military and Political Consequences of Atomic Energy* (London: Turnstile Press, 1948). The literature here is quite large; Blackett and Julian Huxley also found a ready outlet for their views through Penguin Books.

[36] Jessica Wang, "Scientists and the Problem of the Public in Cold War America, 1945-1960", *Osiris* (2002), **17**: 323-47. Joseph Rotblat (1904-), had worked at Los Alamos, and was director of research in nuclear physics at the University of Liverpool 1945-49, which was linked to the Government nuclear research programme; a prolific author, he became Secretary-General of the Pugwash conference 1957-73, and was awarded the Nobel Peace Prize in 1995. For information on the atom train, Alan Morton, cited note 9.

covers, were of infinitely better quality than the average book publication. The prices (5/-, 6/-; 25/30p) were not low (at a time when 3 gallons of petrol could be purchased for just under 6/-) which restricted their circulation to libraries and those who could afford to spend quite generous amounts on books. All publications were produced under the aegis of the Ministry of Supply and the Central Office of Information. The latter included staff who became some of the best known designers of the 1950s and 60s, who were extremely conscious of the latest ideas on 'good' and attractive design. Overall, the images embody an idea of hugely complex processes and machinery, but also of order and control. There are images of Harwell, built in reassuring neo-Georgian style (an exemplar of balance and order in architectural design, fig.2), of size and grandeur (the soaring towers of Windscale), of machinery and well-ordered control rooms (familiar from modern electric power stations, fig.3), of happy workers outside the plant (fig.4), of earnest young men doing clever things with synchrotrons, and modern well furnished hostels for young women (fig.5) - though there was the occasional slightly alarming picture, generally related to safety or the more dangerous cleaning operations.[37] Overall such books produce an impression of quality and professional expertise which 'unofficial' authors could not in general match. There was indeed good reason for this. In the 1950s there was a shortage of skilled staff and such publications were part of a concerted recruitment drive which aimed to show excellent working conditions as well as interesting work.[38]

In the wider market, what sort of books were published about atomic energy and what images did they use? As a broad generalisation within the period under consideration here, there were a large number, many written by scientists, and for the most part they described in favourable terms the development of the peaceful applications of nuclear power. Most were octavo size, printed on cheap paper, with few if any illustrations. Many were published by small presses, most of which flourished briefly in

[37] There was for example a figure clad in a heavy rubber suit looking like something from outer space; all images may be found in *Harwell: The British Atomic Energy Research Establishment 1946-1951*, (London: HMSO, 1952), and *Britain's Atomic Factories: The story of Atomic Energy Production in Britain*, (London: HMSO, 1954).

[38] My thanks to Jeff Hughes for this information.

the aftermath of the war, but quickly disappeared.[39] When there were pictures, the recurring image was of the Bikini explosion, occasionally rendered in colour in the way that children's book illustrators often used, which acted to emphasize the awe-inspiring power of the bomb, but somehow neutralized its consequences through the aesthetic grandeur or appeal of the image.[40] Otherwise such books contained adequate but rather crudely drawn line diagrams, together with photos of 'Pioneers of Atomic Research' together with contemporary scientists - the favourites were the Curies (always presented as 'pioneers'), Sir John Cockcroft (looking jolly and reassuring) and Sir James Chadwick (looking observant and deeply intelligent).[41] There were also scientific series produced by many of the larger publishers, such as The Home University Library of Modern Knowledge, published by the Oxford University Press. These could rely on titles by scientists which had been in print for decades, and were simply added to and revised to take account of recent developments.[42] And of course there were the Pelican specials in their distinctive blue covers published by Penguin Books, all of which had an established readership receptive to modern ideas and debate.[43]

With regard to language in particular, it is instructive to remember the popularity of pre-war texts such as Eddington's *Nature of the Universe*, 1928, and James Jeans' *The*

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[39] Some examples were Future Books, The Pilot Press, Winchester Publications, Sigma Books, Nova Atlantis. Some authors also seem to have published themselves, as simply the printer is listed. Certainly quite a number of titles did not make their way into the copyright libraries. On the question of publishing and authors in this section, I owe a debt to Beryl Jordan, who kindly helped with much information.

[40] R. Barnard Way, *Atomic Power* (Redhill, Surrey: Wells Gardner, Darton & Co., 1949), frontispiece; Chapman Pincher, *Into the Atomic Age*, plate 23; Robert D. Potter, *Conquest of the Atom: A Simple Guide to Atomic Energy* (London: Collins, 1947), frontispiece. The same is also true of many scientist sponsored books, such as *Atomic Challenge: A Symposium* (London: Winchester Publications, 1947), frontispiece, and the Atomic Scientists Association publication, edited by J. Rotblat, *Atomic Energy: A Survey* (London: Taylor & Francis, 1954), front cover.

[41] For example, C.H. Douglas Clark, *The Story of the Atomic Bomb: A Popular Review of the Principal Discoveries which have led up to its Production* (London: The Machinery Publishing Co. Ltd.,1945). Sir John Cockcroft (1897-1967) was Director of the Atomic Energy Research Station at Harwell (1946-59) and thus the head Government scientist and administrator of the nuclear power sector, and frequently wrote or spoke in the media; Sir James Chadwick (1891-1974), discoverer of the neutron, who had worked on the Manhattan Project, was Master of Trinity College from 1948. The two, together with Rutherford, personified the British contribution to atomic research in the public mind at this time.

[42] For example, Sir George Thomson, *The Atom* (Oxford: Oxford University Press, Home University Library); first published in 1930, and in its fourth edition by 1955.

[43] For example, A.K. Solomon, *Why Smash Atoms? The Secrets of Atomic Power* (Harmondsworth: Penguin Books, 1946); Susan Stebbing, *Philosophy and the Physicists: Does modern physics present a new world-view?* (1944, first published Methuen, 1937); *Science and the Nation* (1947, no author given, but introduction by P.M.S. Blackett and text by members of the Association of Scientific Workers); John Hersey, *Hiroshima*, (1946 and 1958); Peter Alexander, *Atomic Radiation and Life* (1957).

Mysterious Universe, 1930.[44] However, Jeans in particular had been criticised for his idealism and mysticism, and post-war readers seemed to prefer appeals to rationality and social utility rather than the imagination.[45] Many post-war authors saw themselves as bringing commonsense to the discussion, dismissing wild ideas about cars being able to run for ever on a walnut-sized piece of uranium. They certainly did not eschew equations, but these were accompanied by language which was direct and took care to explain each new scientific term.[46] They also saw themselves as keeping the public up to date and abreast of the latest developments.[47] They did not in the main feel the need to use elaborate analogies such as *Alice in Wonderland*, but assumed a fairly high level of education and intelligence on the part of the reader.[48]

A contrast may however be found in a few books, notably the publications by George Gamow, whose books were promptly published in Britain by the Cambridge University Press after their initial issue in the States. *Mr. Tompkins in Wonderland* has already been mentioned as especially successful.[49] Dedicated to Lewis Carroll and Niels Bohr, Gamow's text is by no means a light and easy read, but it does have considerable charm. It perhaps only loosely connects to the original Alice, though there are shades of a similar tone, in the conversations, the abrupt shifts of time and space, in Mr. Tompkins'

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[44] Michael Whitworth, "The Clothbound Universe: Popular Physics Books, 1919-39", *Publishing History* (1994), **40**. Whitworth also includes A.N. Whitehead, *Science in the Modern World* (Cambridge: Cambridge University Press, 1926), in his study of the significant success of these three books pre-war, all three published by the Cambridge University Press.

[45] Ibid. J.G. Crowther, Marxist and prolific author, was also very critical of the 'mystical' elements in Jeans.

[46] e.g. R. Barnard Way, 'There are formulae and equations too, in these pages for those who like them, and they can be interesting…', *Atomic Power* (note 40), p.1.

[47] The Newcastle Literary & Philosophical Society, a venerable institution, set up a panel in 1950 'To advise on purchase of science books for the educated general reader, in order to bring and keep this section of the library abreast of current thought', *Annual Report of the Newcastle Literary & Philosophical Society for 1950*. They thinned out obsolete books at the same time, but the library still has some 8 books on atomic science published and acquired in the late 1940s.

[48]. Oliver Sack's provides an illuminating example; as a child in the 1940s he read Victorian scientists such as Norman Lockyer's *The Spectroscope* (1873), as well as works such as Frederick Soddy's *The Interpretation of Radium* (Glasgow: John Murray, 1909), and George Gamow's *The Birth and Death of the Sun* (London: Macmillan, 1941) as well as the *Mr. Tompkins* books*;* cited in *Uncle Tungsten: Memories of a Chemical Boyhood* (London: Picador, 2001), pp. 214, 291, 312 n.2. Budding teenage scientists it seems more often than not might start with non-specialist books but soon went to the key texts by scientists, though these might be long out of date.

[49] Gamow also had in print postwar *Mr. Tompkins Explores the Atom* (Cambridge: Cambridge University Press, 1945, first published 1939 in the US), and *Atomic Energy in Cosmic and Human Life: Fifty Years of Radioactivity* (Cambridge: Cambridge University Press, 1947). Sachs read Gamow avidly, see pp. 305-05, 312 n.2.

incomprehensibility at what is happening to him, which would have been familiar to English readers of both *Alice* and that other uncomprehending fictional character, *Mr. Pooter.*[50] And Gamow introduces an apple-pie element, the shy Mr. Tompkins ends the last adventure by marrying the Professor's daughter and living happily ever after. However the illustrations for the Cambridge edition by John Hookham are of exceptional quality. They memorably portray complex notions of relativity, curved space, unbelievably flattened figures, diffraction patterns and so on. In black and white pencil, some full page, they have a most attractive and imaginative delicacy which recalls the best of children's book illustration at this time.[51]

My final example concerns the Institute of Atomic Information for the Layman, whose publications and activities were of a rather different sort. This organisation, on which information is scanty, was founded by Mrs. Muriel Howorth. She was a well connected and much travelled lady, who worked for the Ministry of Information during the war.[52] She was apparently asked to take an interest in atomic energy when the Ministry of Supply set up a department in 1946. A lady of strong enthusiasms and a certain idealism, her eyes were opened to the wonderful potential of atomic power to create an endless source of energy, to fructify the desert and transform the world for the better. She seems to have decided to convert the public single-handedly to this view and founded the Institute of Atomic Information for the Layman in 1948. What exactly this did, and who belonged to it, is not entirely clear. It was run from her home and does not seem to have had official sponsorship, though individual members of the atomic community and the Medical Research Council were present at some of its functions.[53]

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[50] G. and W. Grossmith, *Diary of a Nobody* (London: Dent, 1892).

[51] There were also a number of books written specifically for children, for example John Rowland's, *Atoms work like this: A Book for Young People* (London : Phoenix House, 1955). This carried the recommendation on the dust jacket "The scientist of tomorrow is the wide-awake boy of today and it is for him that John Rowland has written…." Directed inevitably at boys, and illustrated by line drawings, the images are of power stations and white-coated men doing things by remote control. At a price of 9/6d.(45p) this was aimed at an upper-middle class readership and probably at school libraries.

[52] Information on Muriel Howorth (died 13 September 1971, aged 84) is drawn from references in her various books, contemporary directories, the Soddy papers and accessions file at the Bodleian Library Oxford, Western Manuscripts, Ms.Eng.misc., and information kindly provided by D.S. Wilkinson. Humphrey Howorth, her second husband, became a major in the Army during the war and afterwards supported her activities by various business ventures.

[53] Pictures in her *Pioneer Research on the Atom* (London: New World Publications, 1958) show Frederick Soddy, Otto Frisch, Dr. E. Pochin, Dr. D.S. Wilkinson, and Lady Sandys, wife of Duncan Sandys, one-time Minister of Supply, at a 1953 dinner, together with various diplomatic and society worthies.

It got off to a slow start. There was a Ladies Atomic Energy Club, whose only known output was a ballet-mime called *Isotopia: An Exposition on Atomic Structure*.[54] This was a didactic entertainment, containing as characters the Narrator (who should wear a spangled scarf), Knowledge (who could be enveloped in parachute cloth), and Atom Man (dressed in silver), and a cast of 11 others (including Electron, Neutron, Proton, Agriculture, Medicine, Rat and Cow), plus a working geiger counter. The Narrator went through the history of atomic theory (from Democritus, Newton, Dalton and Faraday) while Atom Man danced on his points, and then turned to the uses of atomic knowledge in industry, agriculture and medicine. An example of the latter featured the cow.

> Narrator: "Radioactive sodium has been eaten by the cow and the radio-activity traced through its digestive organs to its stomach."
> (Cow mimes to be ill and leans over table. As Geiger clicks Cow pulls up, smiles, rubs stomach and retires to semi-circle smiling).
> "The cow should soon be a perfectly healthy animal." [sic][55]

But things improved. She started publishing books - *The Muriel Howorth Atom Series for the Layman*, through a company set up for the purpose by her husband.[56] A series of titles followed: *Atomic Terminology, Atom in Wonderland, Atom and Eve.* Most had a foreword by a reasonably distinguished society figure.[57] And in 1953 she attracted a patron, a scientist of some stature, Frederick Soddy, to become Chairman of the Society. There was an inaugural dinners (at Claridges), a spring symposium to celebrate the radioactivity jubilee (at Londonderry House), and a key book - *Atomic Transmutation: The Greatest Discovery Ever Made. Memoirs of Frederick Soddy, FRS, Nobel Laureate.*[58] Attracting Soddy to the Institute, getting him to talk to her, so that she could write a memoir, was certainly quite a coup. And she was a very determined lady,

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[54] Howorth, Muriel, *Isotopia: An Exposition on Atomic Structure…written in the form of a Mime to be produced by fourteen players* (Eastbourne, 1949), typescript copy British Library.
[55] Ibid., p. 9. Despite the no doubt unintended humour of the piece quoted, the pervasive existence of TB affected milk at this time should be remembered.
[56] This was New World Publications. At his death in 1961 he was named as the sole proprietor of the company; Muriel Howorth to Dr. Hunt, Keeper of Western Manuscripts, Bodleian Library, 12 September 1969.
[57] Lady Helen Nutting in *Atom & Eve* (London: New World Publications, 1955) and Beverley Nichols, popular writer/journalist in *Atomic Gardening* (London: New World Publications, 1960).
[58](London: New World Publications, 1953).

getting in touch with other scientists who had worked or corresponded with Soddy, as well as people working in the nuclear industry, particularly in the States.[59]

Soddy died in 1956, but nothing daunted Howorth produced a book on his life, and moved on to fresh fields, notably atomic gardening.[60] She founded the Atomic Gardening Society, formed links with Oak Ridge Atom Industries Inc., offered prizes of irradiated NC4x peanut plants, issued quarterly update pages, and had fun travelling round experimental gardens where 'atomic' plants could be seen. Her final publication was a novel, a thrilling tale of espionage and intrigue where the work of an atomic scientist and the future of the whole free world was threatened.[61]

There were several features of Soddy's work and character which help to explain this rather unlikely friendship. To begin with, the idea of 'transmutation' with its alchemical overtones, seems to have struck a chord.[62] This was marvellous language to use to depict a world changed by the application of limitless power, and Howorth frequently did so. Her language, which was often addressed to women, was enthusiastic and sometimes striving for effect, but not technically inaccurate and she was careful to get her material checked.[63] Above all she wrote within a vision of 'wonderland', but a wonderland of peace and plenty, akin to the Garden of Eden, which was the result of scientific discovery and atomic endeavour, not the relativistic, topsy-turvy world of *Alice*. She used domestic analogies, cooking atoms, atoms in the home, in the garden, to press home the message about embracing atomic energy without reservation. In her

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[59] e.g. Drs. Paul Aebersold, and C.J. Speas of Oak Ridge, Tennessee. She also accompanied Soddy to several of the reunions of Nobel Prize winners in chemistry at Mariau. The Soddy papers are held by the Bodleian, and have been extensively worked through by Thaddeus Trenn, who contributed the entry on Soddy in the *Dictionary of Scientific Biography* (New York: Charles Scribner's Sons, 1975), xii, pp. 504-9.

[60] Muriel Howorth, *Pioneer Research on the Atom: Rutherford and Soddy in a glorious chapter of science. The Life story of Frederick Soddy, MA etc.*, (London: New World Publications, 1958); *Atomic Gardening* (note 57).

[61] Muriel Howorth, *Impact of a Million Stars* (London: New World Publications, 1963). There were other similar novels written around this time, especially for children, for example, Angus McVicar, *The Atom Chasers* (London: Burke, 1956), about three boys who found an atomic bomb in a power station. McVicar followed this up with *The Atom Chasers in Tibet* (London: Burke, 1957), which had nothing to do with atomic power at all.

[62] Gamow also used the term 'Modern Alchemy' as the title of his first chapter in *Atomic Energy in Cosmic and Human Life* (note 21). One of the interests of atomic gardening was in plant mutation, and in stabilising mutations.

[63] See the acknowledgements in the epilogue of *Atom & Eve,* and in the *Atomic Gardening*, p.10. For an example of over-the-top language, see ch. 12 of *Atom & Eve*; Howorth also wrote poetry, and was apparently an attractive public speaker who could well hold the attention of an audience.

illustrations, atom appears in the guise of a genie, a comic book fairy, rather than the mysterious powers which haunt Alice's *Wonderland* (fig.7).

Soddy may have lent his name to the Institute, but by the 1950s he was something of a scientific outsider, who bore grudges against other scientists and writers whom he felt had failed to pay due respect to his work. His comments on the depiction of atomic science in the Festival of Britain were virulent.[64] Moreover he had cranky views on economics and the evils of a paper money system which allowed bankers to engineer artificial booms and slumps. Howorth accepted the view that he was a 'wronged man' in the history of atomic discovery, and was determined to defend his name.[65]

The Institute of Atomic Information and Howorth's publications were certainly of no lasting significance, and she represents the extreme end of the spectrum of opinion in her uncritical praise of atomic power. Given that she targeted women in particular, one has to ask why she was not successful in the same way that the Electrical Association for Women had been fifty years earlier in spreading the electric gospel of freedom from domestic toil? The answer is a combination of lack of money and backing from the industry, and the social context within which she operated. This was upper class, London based, and the Institute was one of those many organisations (which often had overlapping memberships) where people met for dinner, discussed some serious subjects and felt they had helped to put the world to rights. Such old-fashioned sociability, which was not firmly embedded in the relevant elites and did not have substantial funding, was unlikely to make an impact.

Conclusion

Let me return to the idea of speaking to the common reader, to the intelligent layman, and common assumptions about the nature of this audience. The very notion of

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[64] "There was nothing but a misbegotten advertisement at the taxpayers' expense of a local claque of physicists ramming down the throat of the public chemically ridiculous and physically long out-of-date imaginative speculations about electrons and atoms, which an old student of mine remarked would have been more in place in the Battersea Park Fun Fair", *Atomic Transmutation* (note 58), p.129. For a recent study of Soddy, see Linda Merricks, *The World Made New: Frederick Soddy, Science, Politics, and Environment* (Oxford: Oxford University Press, 1996).

[65] See her letter to *The Author* (1959), **LXIX**: 4, headed 'Facts at the Source'. Howorth and Soddy both also felt that the story of atomic discovery should be expressed in terms of contributions from across the British Empire - Bragg initially in Australia, Rutherford from New Zealand, joined in Canada by Soddy; *Atomic Transmutation*, pp.128-9.

the intelligent layman presupposed a generally cohesive audience, of educated non-specialists, which provided a convenient shorthand for authors and reflected too optimistic desires to rebuild a better world after the war. This in part accounts for the earnestness with which this audience was addressed. As Lancelot Hogben, editor of 'Primers for the Age of Plenty', sternly put it:

> [This book] does not set out to add to the number of popular books written to stimulate superficial interest among curio hunters, to promote unnecessary veneration for professors, to provide material for light conversation at cocktail parties, or to mitigate the inconvenience of insomnia.[66]

In the context too of postwar shortages, it is hardly surprising that this audience was addressed in measured tones and serious words, a contrast indeed to the cheap paper used for printing, often unrelieved by any visual representation or colour, except perhaps for one or two stock images and a bright chrome-yellow dust-jacket. The high seriousness of it all was of course an antidote to alarmist press stories, especially when hampered by official habits of secrecy. But atomic science put enormous strains upon the ability of both language and the available imagery to communicate at more than a superficial level.[67]

With regard to major museums and exhibitions such as the Festival of Britain, it is fair to conclude that they were important elements in helping to propagate official images of atomic power as largely benign. There were exceptions, such as the *Daily Express 'Atomic Age'* exhibition which did not flinch from showing unpleasant photographic images. But even here, there was considerable emphasis on Britain's part in the development of the bomb and concern to ensure that in a postwar world Britain would be able to achieve atomic capability. Museums, on the other hand, presented a fairly uncomplicated historical trajectory from research on atoms to present-day nuclear developments. Thus nuclear physics was presented as the almost inevitable conclusion of scientific research, of a long history, of the march of progress towards a better, modern world, of peace and plenty, and would play a key role in eliminating the threat of

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[66] Editor's foreword dated October 1941 to Frederick Bodmer, *The Loom of Language* (London: George, Allen & Unwin, 1944), pp. 11-12.

[67] This was compounded as the level of technical jargon became bewilderingly complex: see Lorna Arnold, "Radiation, Language and Logic: Some Language Problems", in Nicolaas A. Rupke, *Science, Politics and the Public Good: Essays in Honour of Margaret Gowing* (London: Macmillan, 1988), pp. 169-183.

shortages at home. For the Museum, there was a price to pay however in terms of complete independence, as it became more heavily dependent on information and exhibits from the atomic industry itself. In terms of communication, *Alice in Wonderland* provided a point of cultural reference, and was an inspired choice, giving both meaning and familiar comfort, for Alice of course returns to the real world just the same child as before.

Among writers generally, atomic science provided opportunities for many to contribute to creating a climate of opinion, to join in debates, or simply establish a niche for their enthusiasms, as in the case of Muriel Howorth and the Institute of Atomic Information. This has inevitably been a broad-brush survey, but despite very different groups or types of author involved, the great majority were concerned to present atomic science in the most positive light, and to make complex concepts intelligible. The benefits were emphasized, for example for medical science, which were constantly invoked as one of the reasons for pursuing research. 'Big science' however was not so convincing in a more domestic context, though atomic gardening did have a brief vogue. For the established scientist, texts could be reissued and updated. There was obviously considerable variety of themes and treatments, but atomic power was more often than not presented as the essence of modernity, of the latest discoveries, which would in due course solve numerous problems - an attitude which reached its apogée in the great metallic atomium of the Brussels World Fair in 1958, a sort of Tweedledum of atomic imagery.[68]

Nonetheless throughout the 1950s levels of anxiety rose, as it became evident that the politics of atomic competition and the arms race created a more complicated and uncertain world. Around 1958 a change in sensibility may be discerned. 1958 was the year that CND (the Campaign for Nuclear Disarmament) was founded; this provided a focus for the growing belief that atomic power was not necessarily benign, but politically and militarily dangerous. In addition, the immense investment in the nuclear energy industry could be questioned. Furthermore, it may be argued that there was also a

[68] *Paris Match: Special Expo 58 Bruxelles*, Mai-Octobre 1958, pp.86-87. And the Atomium in Brussels was the scene of that most domestic of functions, a wedding, as *Paris Match* described it, 'Pour les mariés de l'Atomium ce fut l'Expo du bonheur', as the young couple left by télépherique. For a general study of

certain loss of belief in the ability (or willingness) of the educated layman to address complex scientific issues in a knowledgeable way, as set out by C.P. Snow in his vastly influential *Two Cultures* (1959), which helped to undermine confidence in the idea of the intelligent layman. And finally, there was a new sensibility in design, in the representation of the modern world in a much more hard-edged manner. This can be illustrated through the new attention being paid to identity, particularly to corporate identity. When the UK Atomic Energy Authority was established in 1947, it adopted a traditional coat of arms, just like any bank or corporation - a shield with supporters (star-spotted dogs), helm and mantling, surmounted by a shield bearing a blackbird surrounded by a shining sun, with a Latin motto beneath '*e minimis maxima*'. Likewise the Association of Atomic Scientists also had a corporate logo, but simpler, a Maltese cross with Aesculapian staff and entwined serpent, nicely encapsulating the idea of atomic power for healing, for the benefit of all. But in 1958 CND adopted an infinitely more powerful symbol, white on black, the most abstracted representation of the organisation's initials in semaphore form, which brooked no argument and has survived unchanged since then.[69] Here was brutal simplicity rather than some sophisticated notion of order in complexity. Good-bye wonderland.

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Proposed pictures:

1. Daily Express exhibition guide cover

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this fair see B. Schroeder-Gudehus & David Cloutier, 'Popularizing Science and Technology during the Cold War: Brussels 1958', in R.W. Rydell & N.E. Gwinn, *Fair Representations* (note 1), pp. 157-180.

[69] According to the symbol's designer, Graham Holtom, a professional artist, the symbol was intended to get over the difficulty of representing the cumbersome phrase 'Unilateral Nuclear Disarmament', by making a composite of the semaphore signal for N and D. He also saw the central motif as a human being in despair, within the white circle of the world, against the black background of eternity; see *The CND Story* (London: Allison & Busby, 1983), p.16.

2. Harwell, main entrance

3. Harwell, pile control room

4. Windscale. Completed primary separation plant

5. Windscale. A bed-sitting room in a staff hostel

6. John Hookham, illustration from George Gamow, *Mr. Tompkins* (if copyright permission can be tracked down)

7. The atom genie: illustration from *Atom in Wonderland*