

SCIENCE COLLECTION, EXHIBITION, AND DISPLAY
IN PUBLIC MUSEUMS IN BRITAIN FROM WORLD
WAR TWO THROUGH THE 1960s

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Short Abstract:
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Thad Parsons - St Cross College - D.Phil - Trinity - 2009

Science and technology is regularly featured on radio, in newspapers, and on television, but most people only get firsthand exposure to 'cutting-edge' technologies in museums and other exhibitions. During this period, the Science Museum was the only permanent national presentation of science and technology. Thus, it is important to acknowledge the Museum's history and the socio-political framework in which it operated. Understanding the delays in the Museum's physical development is critical, as is understanding the gradual changes in the Museum's educational provision, audience, and purpose. While the Museum was the main national exhibition space, the Festival of Britain in 1951 also provided a platform for the presentation of science and technology and was a statement of Britain's place within the new post-War world. Specifically, within its narrative, the Festival addressed the relationship between the arts and the sciences and the influence of science and technology on daily life. Another example of the presentation of science was the quest for a planetarium in London - a story that involves the Science Museum, entrepreneurs, and Madame Tussauds. Comparing the Museum's efforts with successful planetarium schemes isolates several of the Museum's weaknesses - for example, the lack of consistent leadership and the lack of administrative and financial freedom - that are touched on throughout the work. Since most of this history is unknown, this work provides a fundamental basis for understanding the Museum's current position, for making connections and comparisons that can apply to similar problems at other institutions, and for learning lessons from the struggles that can, in turn, be applied to other institutions.

Long Abstract:
***Science collection, exhibition, and display in public museums in
Britain from World War Two through the 1960s***

Thad Parsons - St Cross College - D.Phil - Trinity - 2009

Throughout the first half of the twentieth-century, the daily life of the average British citizen experienced great upheavals. The Second World War acted as a catalyst on many of the historical processes that had previously begun. From Britain's imperial involvement to scientific and technological advances, things had changed. Perhaps most importantly for the average British citizen, Britain's political power had drastically declined and it was left to find a new place for itself within the post-War world. To define its place within the new world order, Britain was forced to identify why it was still relevant. One of the main tactics used was to emphasize the British heritage of discovery and academic talent in science, industry, literature, and international affairs. Institutions, like the Science Museum, were key in connecting the past with contemporary developments and showing the British influence on those developments.

Many of the developments used to show Britain's place as the world's intellectual leader were scientific. During the War and immediately afterwards, science and technology experienced unprecedented changes. From computing to jets, major advances were made, and most people only got firsthand exposure to 'cutting-edge' technologies in museums and other exhibitions. Therefore, the presentation of modern technologies as integral to daily life was an important function for the institutions that claimed to present science and technology to the British public. During this period, science was regularly featured on radio, in newspapers, and on television, but their presentation was fleeting. It was only at the Science Museum where a permanent national presentation of science and technology could be found.

To understand the contemporary history of the Science Museum, it is critical to understand its earlier history. Many of the difficulties faced by the Museum are deeply rooted in its history, and an understanding of the basic chronology and the factors that led to its foundation is essential. This work will summarize the early history through the Bell Report in 1912 and its early implementations, which have been covered extensively by several other authors. Starting with the preparations for the Second World War, this work will explore the Museum's actions and developments in more detail because of the inadequacy of previous coverage. Post-War, this work will attempt to place the Museum within the socio-political

framework of cultural institutions in which it operated and how that framework constricted the Museum's physical and philosophical development.

After providing a potted history of the Museum, the work will examine two important aspects of the Museum's post-War history: its educational provision and its plans for the use of the Centre Block space. While the Museum has always been seen as an educational institution, the development of the related provisions have not always been given top priority. This work pulls together two separate narratives - the history of the Children's Gallery and Frank Sherwood Taylor's tenure as Director - concerning education at the Museum to show how they influenced the Museum's broader development. The Children's Gallery (and its successors) have always been a key feature of the Museum's educational provision since it opened in 1931 and therefore has shaped the Museum's view of its self as an educational institution. Under the guidance of Taylor, the Museum's facilities gradually improved and, because of his unique background, he was deeply involved with the development of a plan for the education of children within the Museum. Taylor's influence changed the Museum's relationship with visitors and moved it beyond the traditional roles as a place for preservation and specialist learning. This shift occurred contemporaneously with the Museum's turn away from technical and scientific education and towards a presentation of the social aspects of science and its history. Thus, this work uses the development of the educational provision as a microcosm for understanding the shift that was occurring throughout the whole institution. Interrupted by Taylor's death but completed under Follett, this move would make the Museum the science and technological equivalent to the V&A. Also at the same time, the Museum was constantly planning for the eventual opening of the long-awaited Centre Block, when it could reorganize and redisplay large portions of the Collections. Starting in the early 1950s, the first plans were implemented, but it would take the entire decade to gain approval and have the section constructed. Throughout the delay, the Museum continued to formulate new ideas for its development. The schemes developed show the struggles that the Museum was involved in about its place and purpose as a Government department and as a cultural institution. Beyond the grand questions about its ideal form, practical questions about modern display practices were constantly raised both internally and externally. Finally, questions about the Museum's guiding plan and the Western Block provide a point of reflection on the developments during the two decades immediately after the Second World War.

While the Science Museum was the main national exhibition of science and technology, the Festival of Britain in 1951 also presented science and technology to the wider British and international public. It was a major undertaking for the British government as a visible sign of Britain's post-War recovery and used science and technology to make an important statement about Britain's post-War position in the world. It constructed an alternative historical narrative based around Britain's history of discovery and technological development. This required the Festival's organizers to tackle two of the larger issues of contemporary life: the relationship of the arts and sciences and the influence of science on daily life. The Festival, while it left a very small physical legacy since the majority of its buildings were removed, did leave a very large artistic and cultural legacy that can be used to examine contemporary views of science and technology. Additionally, because of its unique and well-formed presentation of science, it provides a useful comparison for the presentations made at the Science Museum throughout the 1950s and early 1960s. Therefore, within this work, the Festival is useful because it provides an important contrast with the Science Museum, its organization, and its presentation of science and technology.

Another example of the presentation of science (and, to a lesser extent, technology) was the discussions surrounding plans to open a planetarium in London. This work covers the reasons why individuals wanted to build one, the lengths to which the Science Museum went, and why several other plans did succeed. The Science Museum wanted to install a planetarium from shortly after its invention until the late 1950s and by the time that it was removed from the Museum's plans, several other planetariums had opened in the United Kingdom. Additionally, this work will also examine the gradual questioning of the assumptions made about planetariums' educational and scientific credentials. The Museum's quest for a planetarium illustrates the lengths that the Museum went to acquire an instrument and many of the Museum's weaknesses. When compared to the variety of successfully opened planetariums, the difficulties faced by the Museum are easy to isolate and examine. While the planetarium saga was the Museum's 'perfect storm,' the weaknesses showcased by it are found throughout the Museum's history during this period.

Since most of this history is unknown, this work provides a general narrative of the presentation of science and technology in the UK after World War Two. While it provides a fundamental basis for understanding the Museum's current position, it also draws out many of

the contentious relationships - personal, professional, and institutional - that delayed the growth of the Museum throughout the period. This work's examination of the Museum's failures, as much as its successes, moves its history beyond a bland recitation of gallery openings and similar milestones. Especially by scrutinizing its failures, this work highlights the difficulties faced by the Museum, including the lack of financial independence, its position under civil service control, the lack of a strong and long-term Director, a failure to (re)plan for the future, problems with the consistent implementation of ideas, and, more generally, a sense of inertia and traditionalism from within portions of the institution. Furthermore, through comparisons with other institutions, this work shows how those issues were overcome and how the lessons learned from the Museum's struggles can, in turn, be applied to the Museum's current position and other institutions.

Finally, this work discusses the Museum's biggest problem, the lack of any guiding master plan. Without a unifying narrative, each new gallery in the Museum defined its own narrative, relying on curator's view of the knowledge of specialist visitors or on limited connections with other exhibitions. Since the Museum missed the opportunity to provide itself with a guiding narrative when it filled the Centre Block, it quickly became filled with short stories instead of a greater narrative and only much later did it try to enforce a narrative across its existing exhibitions. Throughout this work, it became clear that science requires more thought to organize into a narrative. Unlike art and natural history, science does not have a natural narrative. Science's narrative is therefore more speculative because it lacks a 'Grand Narrative'. Additionally, developing a narrative of science exposes the problem of its very essence; there is no one 'science' but there are many. Art narratives can be constructed along a stylistic continuum, with one style leading into another, and each style covering a variety of media - painting, sculpture, architecture, and design. Natural history narratives can also be constructed along easy to follow narratives based on evolution, taxonomy, or ecology. Science does not follow any such pattern of development - chemistry did not develop from physics and technologies mature before science can explain them - and the co-existence of different branches of science complicates any attempt at a coherent narrative. Yet, as this work shows, the creation of a narrative of science is possible, despite the continued failures at the Science Museum.

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ABBREVIATIONS

AC	Advisory Council of the Science Museum Report
BFI	The British Film Institute
BM	British Museum
COID	Council of Industrial Design
CUP	Cambridge University Press
DNB	Oxford Dictionary of National Biography
FPG	Festival Pattern Group
HMSO	His/Her Majesty's Stationary Office
IWM	Imperial War Museum
MHS	Museum of the History of Science, Oxford
MHS FST	Frank Sherwood Taylor Archive at the MHS
MoW	Ministry of Works
NA	National Archives, Kew
NMM	National Maritime Museum, Greenwich
OUP	Oxford University Press
ScM	Science Museum, London
SKM	South Kensington Museum
V&A	Victoria and Albert

CHAPTER 1:INTRODUCTION

By the end of World War Two, great changes were wrought on social, political, and economic activities throughout the United Kingdom. The effects of war had reached into every aspect of people's lives and had upset many of the previous certainties of British life. Things - political alliances, industrial organization, food production, labor relations, women's status, economic policy, scientific development, communication technologies, and museological practice - had visibly changed. The War was a catalyst in all of the historical processes that were gradually changing Britain. During the aftermath of War, additional changes - nationalized industries, centralized health services, educational reforms, imperial changes - made by the Labour party - incorporated many of the War's lessons into a new type of government involvement in people's daily lives. The goal of the new Welfare State was to provide for people 'from the cradle to the grave' and was created by a series of major Acts of Parliament.¹ After the major Acts were passed,² change continued to happen at, for many, an alarming rate.

While many of these changes were the direct result of the War's influence on society, some of the changes that occurred after 1945 were a result of political changes. The period under discussion in this thesis runs roughly from Labour's 1945 victory to its 1964 victory. After the 1945 victory, Labour quickly worked to create its 'new Jerusalem' with the series of Acts mentioned above and a raft of other measures - ranging from nationalization projects (the Bank of England, coal, civil aviation, telecommunications, railways, canals, etc.) to the creation of entire new towns.³ At the same time that Labour was trying to rebuild the nation, the National Collections were trying to rebuild themselves - a question that has been overlooked in most histories of this period. By 1951, the political landscape had changed and Labour lost control of the Government for the next thirteen years. This period is best summed up by Macmillian's boast that people had "never had it so good" and the Conservative Government's attempts to increase household incomes and secure 'full' employment. While it may have been an age of affluence for many, the Conservatives kept public expenditure at a constant level for most of the

¹ Field, F, *Enter Beveridge (Page 5 of 6)*, BBC, 1999, retrieved 1 June 2009 <http://www.bbc.co.uk/history/british/modern/field_03.shtml>.

² The four largest acts are: 1944 Butler Act (on education), 1945 Family Allowance Act, 1946 National Insurance Act, and 1948 National Health Act.

³ Morgan, KO, *Twentieth-century Britain: a very short introduction*, OUP, 2000, pp. 61-3; Burk, K, *The British Isles since 1945*, OUP, 2002, p. 23.

1950s.¹ The lack of budgetary increases was felt by institutions such as the Science Museum because their stable budgets were competing for items and personnel with the increasing budgets of individuals and other institutions. Finally, Labour was able to win the 1964 election behind the ‘white heat of technology’ rhetoric of Harold Wilson. This new government took steps to create a modern technocratic state based on the reform of secondary education and the creation of new universities to train large numbers of scientists and technologists.² This change in focus provides the end point for the story presented here and, on the national level, provides a turning point in the view of science and technology.

Economically, the United Kingdom was undergoing dramatic changes. Sterling, once the “absolute symbol of economic value” and a key international reserve currency, underwent a consistent and constant decrease in value during the last half of the twentieth-century. More than anything else, the value of sterling was destroyed by both world wars and the rise of the industrial might of the United States. By 1945, it had been replaced by the dollar as the premier international currency. Additionally, during the period under consideration, it underwent several crises because it was being sold from foreign reserves, with significant emergencies occurring in 1947, 1949, 1951, 1955, 1957, and 1961. Of these, the most severe was the 1949 crisis, when devaluation took the pound from \$4.30 to \$2.80.³ Each of these shocks was felt throughout the United Kingdom and forced individuals to confront their perception of Britain’s place in the post-War world. Furthermore, despite the economy presenting a picture of impressive recovery between 1945 and 1951, it quickly became apparent during the 1950s that the British recovery was not keeping pace with its competitors. The reasons behind this are numerous, but the steel industry illustrates many of the problems experienced. On the home front, many of the mills and furnaces were outdated and worn-out in 1939 but were forced to operate at full capacity throughout the War, with little time for maintenance or refitting. This state of affairs was maintained after 1945 because the Government needed exports to reduce their dollar deficit. Overseas, many competitors, such as America and Germany, were able to apply technological advances to their steel manufacturing. In America, these were applied as early as possible during the War, and the USA was widely recognized as a leader in

¹ Burk, *The British Isles since 1945*, p. 27.

² H Wilson, ‘Speech opening the Science Debate at the Party’s Annual Conference, Scarborough, 1963’ in *Purpose in Politics: Selected Speeches*, Weidenfeld and Nicolson, London, 1964, pp. 14-28; Burk, *The British Isles since 1945*, p. 32.

³ Burk, *The British Isles since 1945*, p. 11.

manufacturing efficiency, especially through the use of continuous strip mills. In Germany, the Marshall Plan money was spent on the construction of new mills, built to the most modern specifications. In general, British industry was trying to challenge modern and technologically advanced competition with worn and, in some cases, antiquated machines and techniques. Even in cases, such as the motor and aviation industries, where War had provided them with a windfall of modern production facilities, the industrial organizations were too insular to realize the needs of the greater export market, particularly the United States.¹ While these are only two of the reasons for the decline of many traditional British industries, they illustrate the difficulties faced by British industry during the years immediately following the Second World War.

Decline was a word that was used regularly in post-War Britain. Declinism - the idea that the British economy was in a long-term, systemic malaise - became a pervasive ideology across the political spectrum. The declinist literature was vast and diverse, but much of it followed the pattern of the 1961 Penguin paperback, *The Stagnant Society* by Michael Shank. This version of the argument was as much a sociological argument as it was an economic one. It challenged the leadership of trade unions, inefficient/ineffective management, the 'old-boys' network, and many other traditional British institutions.² This type of 'What is Wrong with Britain' material focused on ways to improve the country and some of it is amazing in its foolhardy statements.³ Another large section of the literature, which was equally as silly, was historically focused and found the high-point of Britain in the late Victorian period.⁴ Declinist accounts have always been able to locate evidence of economic contraction within limited portions of the greater economy, like the process of de-industrialization. Additionally, many of the accounts focused on Britain's *relative* decline because its economy grew at a slower rate than many other European countries (particularly, West Germany, France, and Italy) during the 1950s and 1960s. In other words, other previously less-developed areas (or ones that experienced heavier wartime damages) were catching up with the country that was most heavily

¹ Addison, P, *Now the war is over: a social history of Britain 1945-51*, BBC & Cape Ltd, London, 1985, pp. 193-5; Hennessy, P, *Never again: Britain 1945-51*, Vintage, London, 1993, pp. 104-8.

² Shanks, M, *The Stagnant Society: A Warning*, Penguin Books, Baltimore, 1961.

³ For an example of the type of temerarious arguments, see Kennedy, PM, *The Rise and Fall of British Naval Mastery*, Lane, London, 1976.

⁴ Morgan, KO, *Britain since 1945: the people's peace*, 3rd edn., OUP, 2001, p. 199; Burk, *The British Isles since 1945*, pp. 70-1.

developed before the War. While evidence does exist that the United Kingdom could have done better, it remained one of the world's richest countries throughout the century.

Perhaps more importantly, Britain's political power on the world stage had declined drastically since the outbreak of the First World War and was set to decline even further as it lost the remainder of its empire. Without the empire, the United Kingdom was left to find a new place for itself within the post-War world. So, the country was forced to reexamine why it was unique and relevant in the new world order that emerged. One tactic that was used effectively was to emphasize the British heritage of discovery and academic talent. In science, industry, literature, and international affairs, many tried to position Britain as the source of contemporary culture and technology. Institutions, like the Science Museum, were key in trying to connect the past with contemporary developments and showing the British influence on those developments.

The War also brought about great social and cultural changes that continue to influence the world. From women in the workforce to changes in entertainment, the War and the period that immediately followed it was when many of the important developments of contemporary life occurred. Women had entered the workplace in larger numbers than ever before, and many stayed or were quickly recruited back into the workforce.¹ On 12 February 1947, the Parisian fashion designer Christian Dior launched his first couture collection. Post-War fashion, for both sexes, was based on military uniforms and cloth rationing. For women, this meant that skirts were plain and ended an inch or two above the knee, to preserve cloth. Dior's New Look was much more glamorous, with longer skirts, decorative embellishes, beautiful fabric, and a more romantic silhouette. This *Belle Epoque*-inspired style was denounced by the majority of British critics, but women gradually followed the new style as it became widely popular in Europe and the USA.² Radio and the cinema were the two most popular forms of entertainment during the 1940s, with cinema reaching its peak in the late 1940s, with an attendance of 1635 million in 1946 and an average of 1400 million for the decade (compared to 162 million in 2007/8).³ Television, the defining medium of the last half of the twentieth century, was still in its infancy

¹ Hennessy, *Never again: Britain 1945-51*, p. 186.

² Anonymous, *Christian Dior: Fashion Designer (1905-1957)*, retrieved 12 June 2009 <<http://www.designmuseum.org/design/christian-dior>>; Addison, *Now the war is over*, pp. 51-2.

³ UK Film Council, *Statistical Yearbook 2007/08, Chapter 1: The Box Office*, retrieved 12 June 2009 <<http://rsu.ukfilmcouncil.org.uk/?pf=&low=&c=1&y=2007>>; Addison, *Now the war is over*, pp. 129-30; Anonymous, *The changing face of UK cinema, 2004*, retrieved 12 June 2009 <<http://news.bbc.co.uk/1/hi/entertainment/film/4051741.stm>>.

during the immediate post-War world. On 7 June 1946, television broadcasts resumed in the UK with the same Mickey Mouse cartoon that had been interrupted on 1 September 1939.¹ Yet, by the time of the Festival of Britain, the future place of the television as a main source of entertainment and information was secure. The 1952 US Presidential Election featured the first televised political commercials by Eisenhower and the famous Checkers speech by Nixon, as vice-presidential candidate. In the UK, the appearance of television across the nation was launched by the coronation of Elizabeth II in 1953 - an event that, for many British people, was their first experience of television.² Throughout the 1950s, the influence of television increased and all aspects of society were forced to respond. Politicians were obliged to think about their appearance. The cinema, theatre, and radio faced increased competition for their audience and even institutions such as the Science Museum needed to react to the increasing presence of television in daily life.

Science and technology experienced similar upheavals. Whether one is discussing communication technologies, transportation technologies, or the theoretical sciences, major advances were made during the War and in the years immediately after it. From computing to jets, many people had their first experience of these technologies when they were presented in exhibitions. Whether it was at the Festival of Britain or the Science Museum, people's exposure to many 'cutting-edge' technologies was mediated by their public presentation. Therefore, the presentation of modern technologies as integral to daily life was an important function for the institutions that claimed to present science and technology to the British public. During this period, science was regularly featured on radio and on television, although the presentation made was fleeting. It was only at the Science Museum where a permanent presentation of science and technology could be found.

To understand the contemporary history of the Science Museum, it is important to understand its earlier history. *Chapter 2: History of the Science Museum* will cover the foundation of the Museum and provide the basic chronology of the Museum's development. This section will summarize the early history of the Museum, but pay closer attention to the upheaval caused by the Second World War because of its relevance for the period covered and because it has not been covered elsewhere. The post-War section of the chapter will also attempt to place the

¹ Hennessy, *Never again: Britain 1945-51*, p. 110.

² *Television: An International History*, 1995, pp. 123, 170.

Museum within the socio-political framework of cultural institutions in which it had to operate. Furthermore, it will provide the context for the expanding physical premises, of which the use will be discussed later in the thesis. Overall, this chapter provides a potted history of the Museum from its beginnings until the construction of the Centre Block.

While the Science Museum was the main national exhibition of science and technology, it was not the only one. *Chapter 3: The Festival of Britain, 1951* outlines the Festival's purpose, organization, presentation, and legacy. The Festival was a major undertaking for the British government immediately after the War. Its presentation of science and technology was an important post-War statement about Britain's position in the world and an account of an alternative historical narrative that could be applicable in a changing world. This required the Festival's organizers to tackle two of the larger issues of contemporary life: the relationship of the arts and sciences and the influence of science on daily life. The Festival, while it left a very small physical legacy since the majority of its buildings were removed, did leave a very large artistic and cultural legacy. Today, those who lived through the Festival, whether they were supportive or not, remember it as a pivotal visible sign of Britain's post-War recovery. Additionally, because of its unique and well-formed presentation of science, it provides a useful comparison for the presentations made at the Science Museum throughout the 1950s and early 1960s. Therefore, the Festival is useful because of the principles illustrated by its organization and exhibition styles and because many contemporaries viewed it positively.

Another example of the presentation of science (and, to a lesser extent, technology) was the quest for a planetarium in London. *Chapter 4: A Planetarium in London* covers the reasons why individuals wanted to build one, the lengths to which the Science Museum went, and why several other plans did succeed. The Science Museum sought to install a planetarium in South Kensington for approximately thirty years before it was completely removed from the Museum's plans. By the time that occurred, several other planetariums had been opened throughout the United Kingdom and many of the reasons to build one had been called into question. The Science Museum's quest for a planetarium illustrates both the lengths to which the Museum went to acquire an instrument and the Museum's weaknesses that caused it to fail. The difficulties faced by the Museum are easier to isolate because of the variety of planetariums that did open during the late 1950s and early 1960s. These institutions contrast with the Science

Museum in many important ways and help to identify the Museum's social, cultural, and political importance.

Throughout its history, the Science Museum has always been seen as an educational institution. *Chapter 5: Education at the Museum* pulls together two separate narratives concerning education at the Museum to show how they influenced its development. The two main narratives are those surrounding the Children's Gallery and Frank Sherwood Taylor. The Children's Gallery (and its successors) has been an attractive feature of the Museum since the gallery was first opened, but it was only the beginning of the Museum's educational provisions. Under the guidance of Taylor, the Museum's facilities gradually improved and, because of his unique background, he was deeply involved with the development of a plan for the education of children within the Museum. The range of developments that occurred during and immediately after Taylor's directorship aimed at developing a relationship with visitors beyond the traditional roles as a place for preservation and specialist learning. This shift away from technical and scientific education occurred at the same time as the shift within the general aims of the Museum towards a presentation of the social aspects of science and its history. The development of the educational provision is a useful microcosm for understanding the shift that was occurring throughout the whole institution. Eventually, under Follett, the Museum would become the science and technological equivalent to the V&A, but not before a long delay.

Finally, as the Science Museum looked forward to gaining the space promised by the Centre Block, it was able to redisplay collections and make plans for the new buildings. *Chapter 6: Planning a new Science Museum* deals with all of the issues surrounding the creation of the ideal museum. Starting in the early 1950s, the Museum started to plan and implement the reorganization and redisplay of the Collections in advance of the opening of the Centre Block. Unfortunately, it would take the entire decade to gain approval and have the section constructed. During that time, the Museum continued to formulate new plans and ideas for its sustained development. Taken together, these schemes and changes to Museum priorities show the struggles that were taking place within the Museum about its place and purpose as a Government institution and as a cultural institution. Finally, the questions of a guiding plan and the Western Block provide a point of reflection on the developments during the two decades immediately after the Second World War.

Since the vast majority of this history is unknown, this work provides a general narrative of the presentation of science and technology in the UK after World War Two. While it chronicles the development of the Museum into its contemporary form, it also draws out many of the contentious relationships - personal, professional, and institutional - that delayed the growth of the Museum throughout the period. Without an examination of both its positive developments and the challenges it faced, any history of the Science Museum becomes a bland recitation of gallery openings and similar milestones. Scrutiny of those challenges not only enriches the Science Museum's narrative but allows connections to be made beyond it. The effects of similar problems on other institutions can be studied, the Museum's current position can be better understood, and lessons learned from its struggles can, in turn, be applied to other institutions.

CHAPTER 2: HISTORY OF THE SCIENCE MUSEUM

The Museum's Origins

According to the canonical history of the Science Museum, it opened in 1857, but it is not that simple. In reality, the Science Museum has its origins deep in the history of the Victoria & Albert Museum (V&A).¹ The South Kensington Museum of Industrial Art (SKM), now known as the V&A, opened on 24 June 1857 and combined several collections, some from the Great Exhibition.² In 1849, Prince Albert announced that the Great Exhibition would cover “all branches of science, industry and art” and would be “a living picture of the point of development at which the whole of mankind has arrived.”³ It was to provide education to the working classes and to benefit the prosperity of the nation. Under the direction of Henry Cole, it proved astonishingly successful. Between April and October 1851, more than six million visitors passed through the Crystal Palace in Hyde Park to see the range of international industrial exhibits. As it closed, both Prince Albert and Cole wanted the Exhibition's educational work to continue. Luckily, the Royal Commission for the Exhibition of 1851, which was responsible for administering the Exhibition, made a profit of £186,436⁴ and Prince Albert, to use that income, called for the creation of an institution to educate the working class with the purpose of increasing productive industry. To this goal, the Commissioners purchased land south of Hyde Park, in Brompton. While this is the beginning of the institution that became both the V&A and

¹ Much of the history that follows depends on the following sources. Concerning the early history of the V&A Museum, see *A Grand Design: the Art of the Victoria and Albert Museum* (1997) edited by Malcolm Baker and Brenda Richardson; *Vision & Accident: the Story of the Victoria & Albert Museum* (1999) by Anthony Burton; and *The Burlington Magazine*, vol. 120, no. 902, Special Issue Devoted to The Victoria and Albert Museum (May, 1978). Additionally, *A Grand Design* is online at http://www.vam.ac.uk/vastatic/microsites/1159_grand_design/ and the V&A website has a history section, available at http://www.vam.ac.uk/collections/periods_styles/history/. For references specifically concerning the Science Museum, see *A Short History of the Science Museum* (1951) by Frank Greenaway; *The Rise of the Science Museum under Henry Lyons* (1978) by David Follett; first two chapters of *Science and Technology Museum* (1992) by Stella Butler; and *The Changing Role of History in the Policy and Collections of the Science Museum, 1857-1975* (1996), which is an MSc Thesis by Xerxes Mazda at Imperial College. Like the V&A, the Science Museum's website has a history section, available at http://www.sciencemuseum.org.uk/about_us/about_the_museum/history.aspx. Finally, a new volume is being published by the Science Museum in 2010, called *Science for the Nation: Perspectives on the History of the Science Museum*, of which I have written the chapter on World War Two and the 1950s.

² The full name of this exhibition is “The Exhibition of the Industry of All Nations”, but was commonly known as the “Crystal Palace Exhibition”, or simply as “The Great Exhibition” and it is that name that will be used here.

³ 'The Exhibition of 1851: The Speech of H.R.H. The Prince Albert, K.G., F.R.S., at The Lord Mayor's Banquet, in the City of London, October 1849', *The Illustrated London News*, 1849.

⁴ Butler, SVF, *Science and technology museums*, Leicester University Press, Leicester, 1992, p. 18.

the Science Museum, they were more than just a by-product of the Great Exhibition. Their foundation and development resulted from a combination of disparate origins and competing philosophies.

On 24 June 1857, the SKM opened on the land in Brompton. It combined the Museum of Ornamental Art, which included both contemporary manufactures and objects from collectors covering the full range of materials, with the “Trade Collections” – a group of exhibitions donated, under the influence of Cole, by exhibitors from the Great Exhibition and housed at Kensington Palace after the Great Exhibition. This combination created an incredibly varied collection. It included eight separate collections – five art collections (including architectural and cast collections) and three ‘science’ collections, which were the Educational Museum, the Animal Products Museum, and the Museum of Construction and Building Materials. Besides the SKM, the Patent Museum was also opened in the same buildings in Brompton. While it is obvious where the majority of the “Trade Collections” came from, the other collections had unique beginnings.

The Museum of Ornamental Art had its origins in the School of Design that was created in 1836 as a result of a government inquiry into the state of industrial design. Immediately after its creation, it started to accumulate a collection of busts, casts, and art objects at Somerset House, its original home. This collection was used as an educational tool within the School and was well established in January 1852 when Henry Cole was appointed as the General Superintendent of the School - a post that enabled him to continue the Exhibition’s educational program. Cole’s first move was to appeal to Prince Albert to help move the School out of its cramped facilities at Somerset House.¹ By May 1852, the School of Design had moved to Marlborough House and this move also marked the creation of the Department of Practical Art, of which Cole became the Head. This new department combined the provincial schools of design, the central school, and the new Museum of Manufactures, which was opened on 19 May 1852 at Kensington Palace. To fill the Museum, Cole had arranged a Board of Trade grant to purchase items from the Great Exhibition in late 1851. Later, in 1853, both the Department and the Museum changed names. They became the Department of Science and Art, and the Museum of Ornamental Art. Then, in 1856, the department was transferred from the Board of

¹ Oddly, this portion of the early history of the two museums is often missing, but it is covered by Butler (1992) on page 19-20; Greenaway (1951) on page 3; and Burton (1999) on page 9.

Trade, under whom it was founded in 1853, to the Privy Council on Education, later the Board and then Ministry of Education - which administered both museums until 1984. So, despite the numerous name changes, the first embryonic collection was created in 1836.

Quite separately from the art and manufactures collections, the Patent Office Museum was created by the Patents Law Amendment Act of 1852, with the express purpose of being a repository of models.¹ Despite sharing accommodation, it was administered independently from the Department of Science and Art by the Commissioners of Patents and was overseen by Bennett Woodcroft, the Superintendent of the Patent Office. It was Woodcroft's personal interests that led to the assemblage of contemporary and historical models and apparatus for which the Patent Museum became famous. It included many of the items for which the Science Museum is today famous, including "Puffing Billy" (Inv. 1862-002), Stephenson's "Rocket" (Inv. 1862-005), and the Watt engine of 1788 (Inv. 1861-0046). Woodcroft designed the display to inspire, not educate, the visitor.² The main aims of the collection were to preserve models and full-size items for reference and for their historical interest. These purely technical collections were developed without any reference to the Great Exhibition and, in the design of their display, countered the Exhibition's ethos.

Over the next few decades, both the SKM and the Patent Museum expanded. They were always short of space, and the SKM, in particular, was considered to be too crowded and chaotic to accomplish its stated purpose. In addition, the decades brought about many significant changes to the Museums - ranging from their accommodation and organization to their purpose and audience.

The South Kensington Ideal

The experience of the Great Exhibition shaped the opinions of many of those involved with the Museum. Coming out of the exhibition, its organizers felt that much of British industry was backward, either in its methods or its design. The best solution, it was argued, was education. This education had three target audiences: the working class (as producers/artisans), the middle class (as consumers), and the upper class (as factory owners). Through the displays at other exhibitions, manufacturers would learn of new improvements, such as the "American

¹ *History of the UK Intellectual Property Office*, Intellectual Property Office, 2007, retrieved 27 Mar 2008 <<http://www.ipo.gov.uk/about/history/history-office.htm>>.

² Mazda, *The Changing Role of History in the Policy and Collections of the Science Museum, 1857-1973*, p. 16.

system” of manufacture, consumers would develop an improved taste for products, and artisans would be influenced by the design on display. It was hoped that this mass education would correct many of the deficiencies in British industry.¹

Directly following on those hopes, Cole believed museums were the best means of educating adults. The ideals brought forward by the Great Exhibition and the beliefs of those involved with the Museum led to the creation of a “South Kensington Ideal.”² The idea was that the Museum would operate in the public interest, that objects should convey an educational benefit to visitors, and that the information gained could be a means to economic reward.³ Unfortunately, this ideal was a lot harder to implement than many realized.

At the Great Exhibition, the emphasis was on the display of contemporary items. Within a museum, questions about the balance between historical and contemporary materials became pertinent. Cole, shortly after opening the Museum of Manufactures, questioned whether displays of contemporary or historical material would prove best.⁴ Additionally, Cole and others had questions about which arrangement – by material or by artistic style – was best. When the Museum of Manufactures first opened at Marlborough House, it had a clear educational purpose and was arranged following a materials-based approach. Upon opening in South Kensington, the Museum was very crowded and the materials-based display disappeared until the North and South Courts opened in 1862. Questions about the balance of contemporary versus historical material and issues of the arrangements of the collection would not go away as the Museum developed. As will be discussed below, the hodge-podge of ‘mini-museums’ that were acquired varied greatly both in the type of materials displayed and in their style of display. The lack of a guiding plan for acquisitions caused issues with displays because it translated into a confused plan of exhibits.⁵ From the antiquarian-feel at Marlborough House to the confusing jumble of

¹ The secondary literature covering the educational expectations of those who organized exhibitions is quite extensive for example, see *The Great Exhibitions* (1977) by John Allwood; *Ephemeral vistas: the Expositions Universelles, Great Exhibitions and World's Fairs, 1851-1959* (1988) by Paul Greenhalgh; the first chapter of *Science and Technology Museums* (1992) by Stella Butler; and “Technical Museums and International Exhibitions” by Eugene Ferguson in *Technology and Culture*, vol. 6, no. 1 (Winter, 1965).

² This phrase and references to the ideal are present in the secondary literature but it is slightly unclear as to the origin of the actual phrase.

³ Baker & Richardson (eds), *A grand design: the art of the Victoria and Albert Museum*, Baltimore Museum of Art, Baltimore, 1997, <http://www.vam.ac.uk/vastatic/microsites/1159_grand_design/>, p. 11.

⁴ Burton, A, *Vision & Accident: the story of the Victoria and Albert Museum*, V&A Publications, London, 1999, p. 36.

⁵ For a description of the SKM written less than 20 years after it was opened, see Jevons, 'The Use and Abuse of Museum' in *Methods of social reform, and other papers*, Macmillan & Co, London, 1883, pp. 53-81.

displays seen in the late nineteenth-century, the Museum had become a difficult series of exhibitions for visitors to navigate and the need for a unifying proposal was recognized by many important individuals.

The “Science” Collections

The roots of the Science Museum can be found in both some of the original collections and in the expansion that occurred in the early decades of the Museum. Besides the original three science collections and the Patent Museum, there were several other collections that coalesced in South Kensington. In 1858, the Food Museum was added. Then, during the early 1860s, the Buckland Fish Collection and the beginning of the collections of Naval Models and Marine Engines were added to the list of ‘mini-museums’ at South Kensington. In 1867, another machinery collection was added to the Museum. Finally, in 1876, the Special Loan Collection of Scientific Instruments was created.

The Educational Museum was a disheveled collection of educational items from the ‘Trade Collections.’ It included books, maps, diagrams, models, and scientific apparatus. The defining characteristic of the material is that it was designed as educational equipment and its display highlighted that fact. Throughout the early years, manufacturers of educational equipment presented equipment and any deemed acceptable were displayed. To accompany the display, price lists were bound into the Museum catalogue. The purpose of this, according to the administration of the Museum, was that teachers could study the development of educational equipment and, if they desired to purchase any object, all relevant information was provided. In short, this collection was not designed to educate, but instead, it was designed to aid the educator. In 1888, this collection was pruned. Most apparatuses were deaccessioned, but the majority of the books were transferred to the recently formed Science Library.

The Animal Products Museum and the Food Collection, added in 1858, both started as displays from the Great Exhibition. The Animal Products Museum was designed to show specimens, such as wool and leather, which were of economic importance. Likewise, the Food Collection was designed to show both the best and cheapest foods through specimens and analysis. Yet, despite the economic and scientific merit of these collections, they were transferred to the Bethnal Green Museum when it was opened in 1872 and never became part of the Science Museum.

Finally, of the original SKM collections, the Museum of Construction and Building Materials could be considered the embodiment of the “South Kensington ideal.” This collection was used as an educational tool by the building trades,¹ thus fulfilling the ideal by educating tradesmen about the scientific and technical principles of construction and enabling them to apply the new knowledge to the betterment of their trade. A great range of materials were displayed, from information about the manufacturing process of bricks, to a wide-range of models, including Windsor Castle and the Holy Sepulchre in Jerusalem. Interestingly, despite its early importance, this collection gradually faded into obscurity. As a collection, it was dispersed in 1888, but calls were made for the return of a Structural Collection the following year.²

In 1864, the Admiralty established the Royal School of Naval Architecture and Marine Engineering at South Kensington, and at the request of the Council on Education, the Admiralty also created an accompanying collection. At first, it consisted of ship models from the Admiralty but it was quickly supplemented, mainly through loans and gifts from engineering firms, shipbuilding companies, and shipping firms. In 1873, the Admiralty withdrew its models to Greenwich, but the remaining models left in South Kensington were numerous enough to form a considerable collection. Over the years, this collection was gradually expanded by the addition of models representing both contemporary and historic shipbuilding and marine engineering. Additionally, this collection was the source of repeated conflicts, starting in 1873, between the Science Museum and the organizations that would eventually be known as the National Maritime Museum (NMM).³

From the beginning, scientific instruments were poorly represented. In 1875, as a way to counter the perceived lack of scientific knowledge, the Council on Education provided their support to a Special Loan Collection of Scientific Apparatus. To organize it a very powerful committee was formed. It was chaired by the Lord Chancellor and had 135 members, who were the leading men of science, engineering, and industry. The members included individuals such as Clerk Maxwell, Lord Rayleigh, Sir G B Airy, Thomas Huxley, and C W Siemens. The

¹ 1872-1875 minutes of evidence, p 374 cited in Mazda, *The Changing Role of History in the Policy and Collections of the Science Museum, 1857-1973*, p. 15.

² Follett, *The Rise of the Science Museum under Henry Lyons*, Science Museum, London, 1978, p. 5.

³ For a detailed history of the National Maritime Museum and the conflicts that it engaged in with the Science Museum and other established National Collections, see Littlewood & Butler, *Of ships and stars: maritime heritage and the founding of the National Maritime Museum, Greenwich*, The Athlone Press, London, 1998.

exhibition was to be international in scope, but not international in style. In contrast to the usual International Trade Fair style, the exhibits at the Loan Collection would be grouped according to a general subject classification, disregarding the item's nationality. Opened in May 1876 by Queen Victoria, the exhibition was "a great occasion."¹ It succeeded in bringing together a wide range of scientific instruments from several European countries and the United States. For the first time, the public could see the "instruments and paraphernalia of pure science" presented systematically.² Upon its closure, a large portion of the objects remained in South Kensington and they formed the basis of today's extensive collection of scientific instruments at the Science Museum.

Finally, after the death of Woodcroft in 1879, things changed at the Patent Museum. In 1883, a new Patents Act was passed. It transferred the collections of the Patent Museum to the Department of Science and Art and the collection officially became part of the SKM. This broke the institutional separation that had developed between pure and applied science in South Kensington, but it also created the conflict between pure and applied science that is still present in the Science Museum.

As shown, the Science Collections of the SKM grew by coincidence rather than any central planning. The strangest addition, and the one that highlights the lack of any plans for the Collections, was the addition of the Buckland Fish Collection in 1864. Frank Trevelyan Buckland, an Inspector of Salmon Fisheries, was requested by the SKM to report on the Animal Products and Food Collections. Instead, he produced a collection on the economics of fish and fisheries.³ It is a peculiar collection because it not only included models, but it also contained living specimens and produced fry, which the Museum sold each year. For instance in 1873, more than a dozen types of salmon and trout fry were hatched.⁴ Despite its strange nature, parts of this collection have survived at the Science Museum to this day.

So, without any guiding plan, the Science Collections changed forms repeatedly over the first 25 years of the SKM. Entire 'mini-museums' were added, removed, or greatly expanded

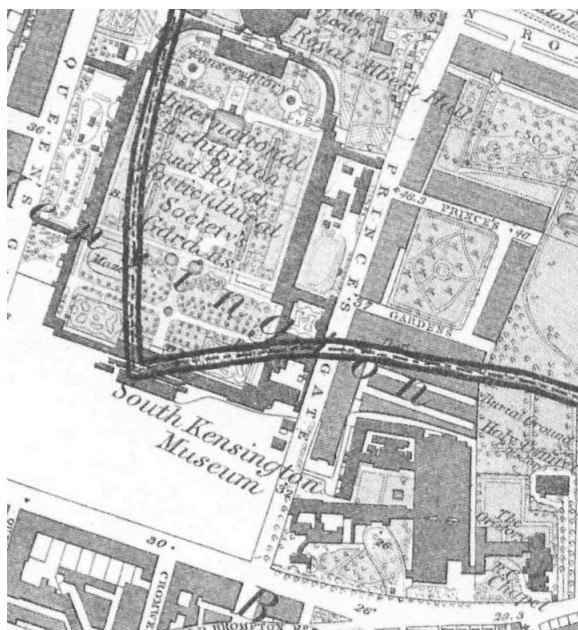
¹ Greenaway, *A Short History of the Science Museum*, HMSO, London, 1951, p. 8.

² *Ibid.*

³ Buckland also published many of the results of his investigations into the fishing industry of Britain. Originally published as the *Familiar History of British Fishes* (1873) (later published as the *Natural History of British Fishes* (1880), which was reprinted by Elibron Classics in 2001), this book references many of the items in the Collection and includes a discussion, starting on page 381, of the Collection and its purpose.

⁴ For more information about the production of fry by the Collection, see Chapter 14 in Bertram, *The Harvest of the Sea: Including Sketches of Fisheries & Fisher Folk*, John Murray, London, 1873.

over the period. Yet, by the mid-1880s, a National Museum of Science was beginning to take form.



This 1885 map shows the SKM and the full range of galleries built for 1862 surrounding the gardens. (From the Report of the Boundary Commissioners for England and Wales, London, 1885)

Towards Independence & the Early Years

As more and more collections coalesced under the banner of the Science and Engineering Collections, the pressure for an independent Science Museum, a name in regular use from the mid-1880s, increased. Yet, beyond the growing collections, there were several other developments within the SKM that prepared the way for an independent Science Museum. The first major change was the physical separation of the growing scientific and technical collections from the art collections. During the mid-1860s, the scientific and technical collections

moved across Prince's Gate (now Exhibition Road). Their new home was the Southern Galleries, which were previously used as the refreshment rooms of the International Exhibition of 1862, and those originally temporary structures would be home to the Science Museum until World War Two.

Furthermore, to complement the growing scientific collections, the Science Library was created in the early 1880s to serve the needs of staff, students, and the general public – much the same audience that it serves today. The books came from two main sources. Books from the Education Collection were combined with all of the books in the Library of the Museum of Practical Geology that were not needed by the Geological Survey. This amalgamation of books has since been known as the Science Library.

The first calls for an independent Science Museum occurred after the Special Loan Collection of 1876, when the scientific community felt that the time was right to press the Government on the recommendations of the Royal Commission on Scientific Instruction and the Advancement of Science and the offer of the Commissioners of the Great Exhibition of funds for a building. In 1874, the Royal Commission in their Fourth Report recommended that the Science Collections, the Patent Museum, and any collections that may result from the Special

Loan Collection be combined. This recommendation impressed the Commissioners of the Great Exhibition and they guaranteed £100,000 for a building, if the Government would meet a few conditions. Unfortunately for the Science Museum, the Government took no beneficial action. In 1881, 1882, and 1884, more committees were appointed to look into the importance of having a National Museum of Science. Again, the Government took no action on the recommendations received. The next major push came in 1891 when Sir Henry Tate offered £80,000 to build an art gallery and the Government offered South Kensington as a site. The scientific community greeted this proposal with great acrimony because of the threat that it posed to both the Science Museum and the Royal College of Science. Luckily for the Museum and College, the Government responded to the extensive campaign, which included the involvement of men such as Sir William Thomson (later Lord Kelvin), and dropped the proposal to build in South Kensington.¹ This scare caused great concern among the scientific community about the future of a Science Museum in South Kensington.

The next important step occurred in 1893 when the Science and Engineering Collections were given a separate Director, after the retirement of Sir Philip Cunliffe-Owen as Director of the SKM. The Collections, however, were still administered as a unit of the SKM. This created a strange situation of having two Directors within one Museum, and it only furthered the arguments for an independent and adequately housed national museum of science and technology.

Building changes were also under way. In 1890, the Government decided to expand the premises for the Museum, or more precisely, the accommodation for the art collections of the Museum. Ashton Webb won the competition for the project, but construction did not begin till 1899, when Queen Victoria laid the corner stone for the new building. The most important part of the process, for the Science Museum, was the report of the 1897 Select Committee, which recommended a complete separation of the Art and Sciences, with the Arts being housed east of Exhibition Road and the Sciences on the west. Additionally, the report drew attention to the inadequacy of the buildings, including the risk of “uncontrollable fire.”² But, both parts of the Museum would have to wait for a few years before either got new buildings.

¹ Follett, *The Rise of the Science Museum*, p. 5.

² Greenaway, *A Short History of the Science Museum*, p. 9.

It was also in 1899 that the institution was renamed the Victoria & Albert Museum – a name that also referred to the Science and Engineering Collections until 1909. As far as the collections were concerned, the institution could not determine how to organize itself. Besides having separate directors from 1893, the museum also reorganized the curatorial departments repeatedly, with the final two reorganizations before the separation of the Science Museum happening in 1896 and in 1905. The 1905 reorganization resulted in five curatorial departments – ceramics, woodwork, metalwork, textiles, and sculpture – not including the Science and Engineering Collections. This reorganization foreshadowed the events of 1909.

1909 was a busy year in South Kensington. The Ashton Webb Building, which is still the main entrance of the V&A, opened after a decade of construction. This allowed for a major rearrangement of the V&A. It was also the year that administrative independence was granted to the Science and Engineering Collection, officially creating the Science Museum, and confining the V&A name to the art collections. So, by the end of 1909, the V&A had a new building and display; and the Science Museum had achieved independence. The completion of the Ashton Webb Building and developments at Imperial College¹, focused attention on the inadequacies of the accommodation provided for the Science Museum.²

The Bell Committee and its Report

On 26 March 1910, the Departmental Committee on the Science Museum and the Geological Museum, commonly known as the Bell Committee, was created. Its terms of reference were:

To consider and report upon various questions in regard to the present condition and the future development of the valuable Collections comprised in the Board's Science Museum at South Kensington and Geological Museum in Jermyn Street. In particular the Committee are asked to advise (a) as to the precise educational and other purposes which the Collections can best serve in the National interests; (b) as to the lines on which the Collections should be arranged and developed, and possibly modified, so as more effectively to fulfill these purposes; and (c) as to the special characteristics which should be possessed by the new buildings which it is hoped will shortly be erected on the South Kensington site to house these Collections, so as to enable the latter to be

¹ The various science schools in South Kensington were incorporated into Imperial College, upon its foundation in 1907. For a full version of these events, see the first three chapters of *The History of Imperial College London, 1907-2007* (2007) by Hannah Gay.

² Greenaway, *A Short History of the Science Museum*, p. 10.

classified and exhibited in the manner most fitted to accomplish the purposes they are intended to fulfill.¹

In short, the Committee's aim was to provide the new Science Museum with the type of overriding plan that was lacking throughout the early years of the V&A. To undertake this task, the committee was filled with highly respected individuals who had wide-ranging industrial and scientific experience.

Sir Hugh Bell chaired the Committee. His industrial experience was wide-ranging. He was involved, as chairman or director, in industries ranging from steel and coal to ferries and railroads. His public work was also extensive, both locally and nationally. He was involved with local politics in Middlesbrough, was a driving force in the creation of the Tees Valley Water Board, and helped develop Tees-side's industrial works through his work with the Tees Conservancy Commission. Nationally, he was President of the Iron and Steel Institute while chairing the Committee and from 1912, he chaired the Museum's Advisory Council.²

The rest of the Committee was equally as distinguished. JJ Dobbie, while serving on the Committee, was also the Principal of the Government Laboratories.³ Sir Archibald Geikie was the President of the Royal Society - the only geographer to hold the position.⁴ Sir RT Glazebrook was the first Director of the National Physical Laboratory, from 1899 to 1919, and was one of the foremost physicists of his day.⁵ Andrew Laing was considered one of the two greatest marine engineers of the period and was responsible for the engines on several famous ships, including the *Mauretania*.⁶ Sir Schomberg McDonnell was the private secretary to Lord Salisbury from 1888 until Salisbury's death in 1903, at which time he became Secretary to the Office of Works until 1912.⁷ Sir William Ramsay, at his retirement in 1912, was the most famous British chemist of his day, a Nobel Prize winner, and was interested in both science education and popularization.⁸ William Ripper was Professor of Engineering at Sheffield University.⁹ Sir

¹ Bell, et al., 'Report of the Departmental Committee on the Science Museum and the Geological Museum [CD. 5625]' (Part 1), *HMSO*, London, 1911, p. 3.

² Bone, 'Obituary Notices: Sir Hugh Bell, Bart., C.B., D.L., LL.D., D.C.L., 1844-1931', *Journal of the Chemical Society* 1932, pp. 1325-30.

³ 'Obituary Notices: James Johnston Dobbie', *Journal of the Chemical Society* vol. 125, 1924, pp. 2681-90.

⁴ Oldroyd, 'Geikie, Sir Archibald (1835-1924)' in *DNB*, OUP, 2008.

⁵ Moseley, 'Glazebrook, Sir Richard Tetley (1854-1935)' in *DNB*, OUP, 2008.

⁶ Ritchie, 'Laing, Andrew (1856-1931)' in *DNB*, OUP, 2004.

⁷ Huddleston, 'McDonnell, Sir Schomberg Kerr (1861-1915)' in *DNB*, OUP, 2008.

⁸ Watson, 'Ramsay, Sir William (1852-1916)' in *DNB*, OUP, 2004.

⁹ Follett, *The Rise of the Science Museum*, p. 20.

William White was a leading naval engineer who lectured at the Royal Naval College from 1870 to 1881, and then was Director of Naval Construction and Assistant Controller of the Royal Navy from 1885 until 1902.¹ The final member was the Committee's Secretary, Francis Ogilvie. He was also the Board of Education's Secretary for the Science Museum, Geological Museum, and Geological Survey, and would, after the death of WI Last, take on the duties of Director of the Science Museum, in addition to his position as Secretary.

The Bell Report² was both a philosophical and a physical blueprint for the development of the Museum. Part I of the Report covered the purpose of the Museum, the expansion and development of the Collections, and ways to promote use of the Museum.³ Part II of the Report set out the physical expansion plan for the Museum.⁴ These recommendations were actively pursued for at least sixty years. Additionally, it has been called "the greatest and most significant single influence in the history of the Science Museum"⁵ and therefore requires special attention.

Within the first part of the Report, the most important section was entitled "Purposes the Science Museum Should Serve" and contained a statement that is still very close to the Museum's stated purposes today. The statement is so well written and central to the development of the Museum, it is reproduced in full:

So far as is possible by means of exhibited scientific instruments and apparatus, machines and other objects, the Collections in the Science Museum ought to afford illustration and exposition of the various branches of Science within its field and of their applications in the Arts and Industries. The Museum ought also to be a worthy and suitable house for the preservation of appliances which hold honoured place in the progress of Science or in the history of invention. Where objects that fall under these various categories are suitably arranged and displayed, visitors of widely different types find advantage in examining them. Young students who are prosecuting definite studies may derive much benefit from systematic examination of special sections or groups of objects. So too the Museum should serve others who on particular occasions wish to obtain from the Collections information regarding recent advances in Science or in Industries, or about some subject which, at the moment, is either of general

¹ Watts, & McConnell, 'White, Sir William Henry (1845–1913)' in *DNB*, OUP, 2004.

² The Report of the Departmental Committee on the Science Museum and the Geological Museum (commonly known as the Bell Report) was released in two sections: the first section, which addressed the first two terms of reference, in 1911, and the second section, which addressed the specific building needs of the museums, in 1912. This division sometimes causes issues because few individuals/works specify the section being referenced. In the footnotes, I will reference the pertinent section of the Report but will follow the traditional form by referencing the report as a single entity within written sections.

³ *Bell Report (Part I)*.

⁴ Bell, et al., 'Report of the Departmental Committee on the Science Museum and the Geological Museum (Part 2) [Cd. 6221]', *HMSO*, London, 1912.

⁵ Follett, *The Rise of the Science Museum*, p. 21.

public interest or of professional importance to themselves. Again the objects exhibited or otherwise preserved in the Museum should be accessible for close inspection by accredited visitors who are engaged upon investigation related to Science or invention. A large portion of those who visit a Museum have, however, no such definite enquiries in view, and it is of much importance that objects should be so selected and exhibited as to arouse the interest of these visitors, and to afford them in as simple and attractive a form as possible an opportunity of obtaining at least general ideas on the subjects which the Collections illustrate.¹

Within this statement are several important pieces that shape the Museum through its history. First, it codifies the very problem that Cole dealt with in the 1850s; it specified that the Museum should cover both contemporary and historical science. Beyond that, it defines the Museum's audiences. It defines a total of four types of visitors – students, the general public, and two types of specialist visitors – those who will use galleries to find answers and those who will use the close inspection of objects to find answers. In addition to the variety of visitors that the Museum was supposed to cope with, each of these visitors was supposed to be catered for in their own way. Overall, the statement of purpose, mainly because of its specificity, created conflicts for later developments at the Science Museum.

As an introduction to the rest of the Report, the section entitled “Need for Expansion of the Collections and for Greatly Increased Exhibition Space” laid out the Committee's basic arguments. First, that double the space was needed to show the Collections properly. Second, that there were “comparatively few” eliminations that could be made from the collection. Finally, that there were numerous deficiencies within the Collections that needed to be rectified.²

The first part of the Bell Report focused on the development of the Collections and the use of the Museum. Concerning collection development, the Committee felt that many of the sections needed attention and that several new sections needed to be created, including electrical engineering, structural engineering, geography, and agriculture, to bring the Museum into line with the statement of purpose. Furthermore, the Committee ventured into discussing how the Collections would be displayed. They recognized that large halls would be needed to display some of the Collections, but outside of those items, regular sized³ side- or top-lit⁴ galleries would

¹ *Bell Report (Part 1)*, pp. 4-5.

² *Bell Report (Part 1)*, p. 5.

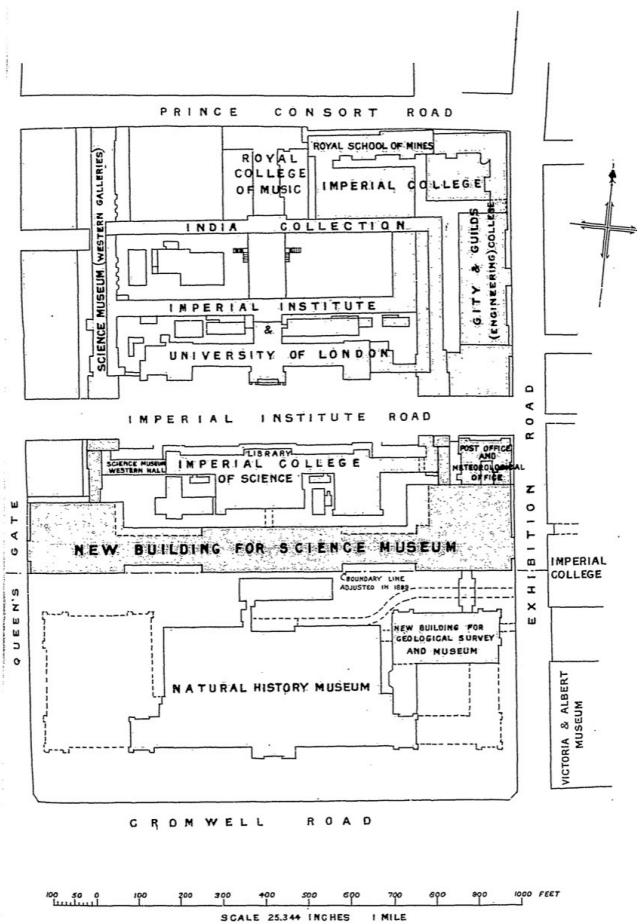
³ Specifically, they thought that 35 feet wide and 20 feet tall would be the right size.

⁴ Most modern display practices forget, or purposely exclude, natural lighting from exhibitions but until after World War Two, galleries were designed to take advantage of natural lights as much as possible, especially considering the dangers of gas-lighting, the only real alternative for much of the pre-War period.

be appropriate. Their ideal building would allow the Collections to be endlessly rearranged without requiring structural changes. Within that flexible space, they hoped that displays could be designed to raise both technical and historical interest in the visitors. The Committee was also

PLAN A

APPENDIX VII.



From *Bell Report (Part 2)*

interested in increasing the use of the Museum. Their main focus was on teachers and students, but they were also interested in the general public, embodied in the provision of a gallery for temporary exhibitions. Also in the plans were enhanced educational provisions, including a lecture hall and a demonstration room. Besides physical provisions, the Committee was interested in how the Collections could benefit students and teachers. They defined four earlier uses: 1) the illustration of scientific discovery/invention and its application to industry, 2) the exhibition of teaching and research apparatus, 3) facilities for closer study of objects, and 4) loans to schools. The Committee felt that the first three should be encouraged and

“everything possible should be done to make the collections more and more complete and representative both on the historical and teaching sides.”¹

The second portion of the Bell Report focused on the buildings of the Science Museum and was published in 1912 after the boundary dispute with the British Museum (Natural History) was settled. The result was that a site for the Geological Museum was secured next to the Science Museum and the Committee was able to make very precise recommendations for both Museums. The ultimate Science Museum, as envisaged by the Committee (see Plan A above), would extend east to west from Exhibition Road to Queens Gate, a length of about 1150 feet, and would be 190 feet wide on the east end, 170 feet wide on the west end, and about 100

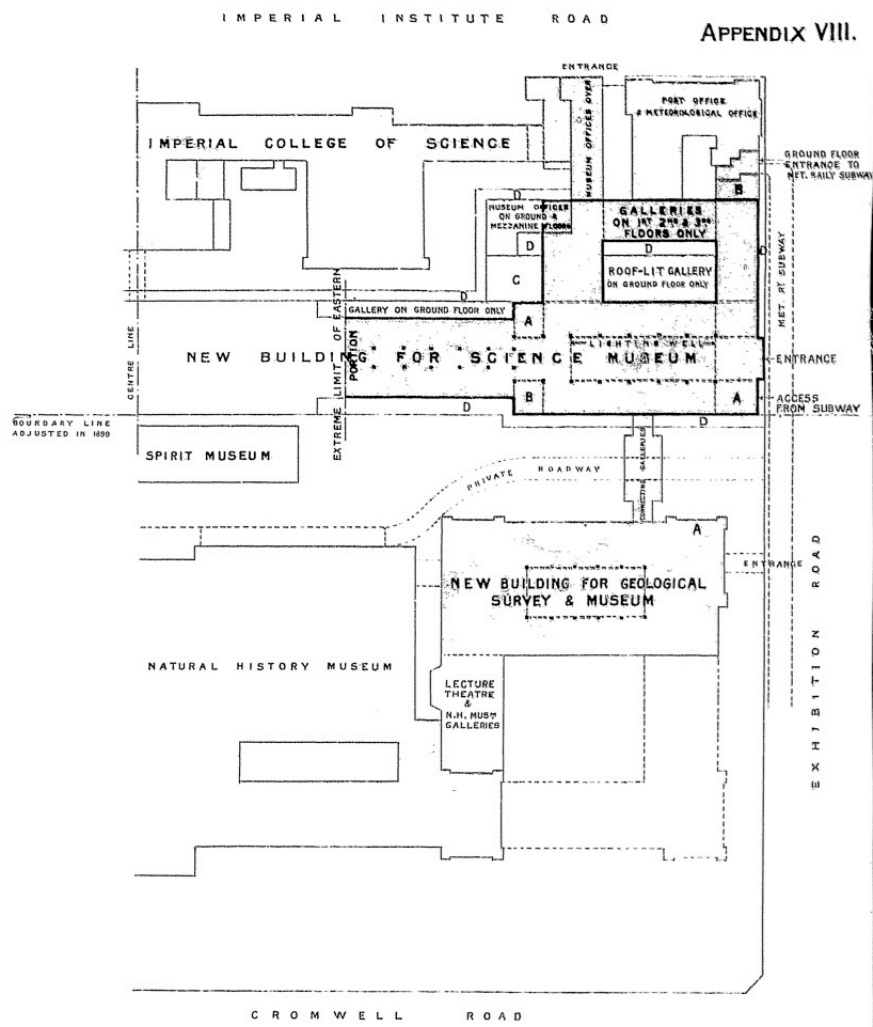
¹ *Bell Report (Part 1)*, pp. 5-11.

feet wide in the middle. The majority of the building would have five stories – basement, ground floor, and three upper floors. Their vision also divided the building into three sections: Eastern, Central, and Western. The Eastern block was to be erected immediately (see Plan B below), with the Central (or Centre) Block to follow closely, fulfilling the immediate needs of the Museum. The timing of the construction of the Western block was uncertain. At points, it seems to be tied to the Centre Block and at other times, it is to be postponed until the space was needed. In total, the three sections would provide about 377,000 square feet of space. The Committee estimated that it would require approximately 265,000 square feet to accommodate the Museum's current exhibition, and their plans provided an excess of 42% for expansion. Beyond those estimates, the Committee also determined that if the Museum followed their plans, they would require around 300,000 square feet within ten years and would in the future, use up to 450,000 square feet of accommodation, including not just exhibition space but also offices, workshops, and other facilities.¹

PLAN B

From *Bell Report (Part 2)*

- REFERENCE**
- A. INDICATES STAIRS & LIFT
 - B. " DEMONSTRATION ROOM
 - C. " CONFERENCE ROOM
 - D. " AREA
- NOTE THE THICK LINE ON PLAN INDICATES
EXTENT OF SCIENCE MUSEUM
GALLERIES ON 1ST 2ND & 3RD FLOORS



¹ *Bell Report (Part 2)*, pp. 4-8.

And the result of this impressive building scheme? Work began in 1913 on the East Block; the First World War interrupted it; and it was not officially opened until 1928. At the end of the Second World War, the old galleries built in 1862 were finally demolished and in 1949, the Centre Block was begun. After the Festival of Britain, construction was halted and the galleries were not completed until 1969. The Western Block, as envisaged, was never completed, but expansion continued in 1996. The Queen opened the westward expansion, known as the Wellcome Wing, in June 2000 – 88 years after it was first proposed. The reasons for these delays will be discussed later.

The Early Independent Museum

When the Departmental Committee on the Science Museum and the Geological Museum was granted independence in 1909, the Science Museum was divided into four sections – Naval and Marine Engineering, Machinery and Inventions, Scientific Apparatus, and the Buckland Fish Collection. The Collections drew an audience of more than 400,000 visitors into buildings that were dramatically overcrowded.¹ It was, as described by Greenaway, a Museum “of great popularity, cribbed and confined in unsuitable buildings.”²

The Naval and Marine Engineering section consisted of mainly models – everything from fighting sailing ships to marine engines to lighthouses. In addition to the models, it also consisted of a large number of two-dimensional materials, such as illustrations, and technical drawings. The collection also included a few actual items, including a Welsh coracle and the engine of Bell’s PS *Comet*. In addition to those items, this collection also held the beginnings of the Museum’s aeronautic section. In 1910, there were eight aeronautics exhibits, all models.

The Machinery and Inventions section consisted of a mish-mash of locomotive³ and manufacturing technologies. It was the home of much of the Patent Museum’s inventory, especially the early steam and rail engines. In addition to the locomotive technologies, it included mining, metallurgical, textile, agricultural, pumping, lighting, and communication technologies. Again, like in the Naval and Marine Engineering section, this section relied heavily on models to illustrate many industrial developments and complexes.

¹ *Bell Report (Part I)*, p. 5.

² Greenaway, *A Short History of the Science Museum*, p. 10.

³ At this point in the organization of the Collections, the phrase “locomotive” included all forms of transportation technologies.

The two engineering sections also relied on models as one of the primary methods of demonstration and education. Working models, mostly created by the Museum's workshop, were designed to educate visitors in the construction and operation of items in the Collections. These models could be operated either by attendants or visitors by either compressed air or handles. The models were seen as a way to "fill a gap in the Museum which is very obvious to those who are concerned with engineering affairs,"¹ and therefore they greatly improved the instructiveness of stationary exhibits, much to the benefit of the layman visitor, among whom the engineering collections were very popular.

The Scientific Apparatus Collections were divided into seven headings: 1) Mathematics and Measurement, 2) Physics, 3) Chemistry, 4) Metallurgy, 5) Physiography,² 6) Mineralogy, and 7) Biology. Physics was the largest, while Metallurgy was the smallest, but as mentioned above, all the materials related to production of metals were in the Machinery and Inventions section. Chemistry was similar, it was small, consisting of mainly teaching apparatus, but materials related to chemical manufacturing were in the Machinery and Inventions section. Biology, on the other hand, was mainly microscopes and the remainder was zoological and botanical teaching apparatus. In short, this section was for the pedagogical and the theoretical, not the practical or applied.

The final section was the Buckland Fish Collection. In 1910, it was presented in conjunction with the collection of fishing vessel models and it consisted of models of fish, fishing nets, other fishing equipment, and tanks of living fish. Besides the Collection, its main purpose was to hatch fish. In 1910, it was reported that several thousand fry were hatched and sold. The Collection was of "little or no economic or educational value" and it did little more than waste space in the Museum.³ Overall, the Buckland Fish Collection was useless for the Museum.

The Museum, as always, was more than its Collections. Its Library was accommodated in new premises within Imperial College and, overall, had more adequate provisions than any other department. Concerning space, it was thought that without any culling, it could accommodate acquisitions for "more than 20 years" at the current rate, but if books "which have no relation to the purposes the Library now serve" were culled, expansion might be "indefinitely

¹ *Bell Report (Part 1)*, p. 7.

² This section was also known as Physical Geography.

³ *Bell Report (Part 1)*, pp. 25-6.

postponed.”¹ Beyond that, the Museum’s publications and services were extensive. There were catalogues, which beyond being lists of objects were actually descriptions of the objects – often, just reprints of the labels – and were regularly updated. Additionally, the Engineering catalogues all contained introductory surveys that outlined historical and technical developments. They were considered useful reference works. Besides the publications, the Museum also offered numerous services. There was a catalogue of 1000 photographs for purchase and about 1000 lantern slides for loan.² Plus, additional facilities were available to schools that wanted to enhance their visit to the Museum.

In the early years of independence, it can easily be said that despite the great historical interest and value, the exhibition of the Collections was far below the standard of other National Museums.³ In addition, it was housed in a building that was inappropriate to the needs of a museum. Finally, because of the state of the exhibitions and the building, the Museum was unable to expand its Collections to fill historical gaps or keep up with current developments. In short, the Museum was in a difficult predicament.

Fulfilling the Bell Report

F.G. Ogilvie became director of the Science Museum on 7 August 1911, a few months after the publication of the first part of the Bell Report. Ogilvie and his co-worker and successor, Henry Lyons, were responsible for implementing the recommendations of the Bell Report, and, in the opinion of many, established the modern form of the Science Museum. Ogilvie was a distinguished academic, he was the first Principal of Heriot-Watt College, Edinburgh, where he was also a professor of Applied Physics, and he was the Director of the Edinburgh Museum of Science and Art from 1900-1903. After that, he left Scotland for London and the Board of Education. In London, he became the Principal Assistant Secretary for Technology and Higher Education in Science and Art – where one of his responsibilities was the Science Museum. In 1910, he became Secretary for the Science Museum, Geological Museum, and Geological Survey; and acted as Secretary for the Bell Committee. His appointment as Director of the Science Museum was in addition to these responsibilities and because of this, he was able to secure funding for an assistant. Into this post, he lured a man that he had never met

¹ *Bell Report (Part 1)*, p. 10.

² Follett, *The Rise of the Science Museum*, pp. 11-7.

³ *Bell Report (Part 1)*, pp. 13-4.

and only knew from his work, Henry Lyons.¹ Lyons also came to the Science Museum from Scotland, where he had been a University lecturer in Geography at Glasgow until 1911. He gained the post in Glasgow through his work in the Army while posted in Egypt, which included the foundation of the Egyptian government's Geological Survey. At the outbreak of hostilities in 1914, he was recalled to military duty and posted to the Meteorological Office. After another stretch of distinguished military service, he returned to the Science Museum in 1919 and was appointed Director in May 1920.² Lyons came to the Science Museum, unlike Ogilvie, with no collections or exhibition experience, instead he was well known as a scientist and as an administrator.

Despite being overshadowed by Lyons, Ogilvie did make some progress towards fulfilling the recommendations of the Bell Report, but he was severely hampered by the First World War. In addition, personal issues with superiors at the Board of Education handicapped him in his dealings with the Board.³ Despite the problems, he worked on implementing all the major recommendations of the Bell Report, but focused most of his attention on developing the collections, the exhibition, and its accommodation.

One of his first official acts as Director was to issue an internal memorandum expressing general principles and specific instructions for the nine curatorial staff members to follow in the preparation of schemes of development of their sections. These schemes were to be prepared by 1 November and were to be in accordance with the ideas of the Bell Report, of which he assumed they were knowledgeable. These schemes were to be put into effect immediately, as accommodation and reorganization permitted.⁴ Ogilvie's request was the beginning of the Museum's tradition of constantly evolving development schemes – a tradition that developed to the extent that they now occupy a large portion of the archive of the Museum's activities.

The first steps toward fulfilling the recommendations for accommodation were taken towards the end of 1911, when Imperial College vacated a portion of the Western Galleries. The extra 16,000 square feet compensated for losses to the Southern Galleries that would be sustained when construction of the Eastern Block started. Throughout 1912 and 1913, the Collections were removed from the section of the Southern Galleries that were to be demolished

¹ Follett, *The Rise of the Science Museum*, pp. 41-3.

² Baigent, *Lyons, Sir Henry George (1864–1944)* in *DNB*, OUP, 2004.

³ Follett, *The Rise of the Science Museum*, p. 42.

⁴ Follett, *The Rise of the Science Museum*, p. 43.

and rearranged as best as possible in the remaining space of the Southern and Western Galleries. Demolition of the old buildings started in 1913, but the War slowed building work dramatically. By 1918, only the basic structure was completed and it was another decade before the royal opening would occur.

Meanwhile, Ogilvie tried to fulfill other recommendations of the Bell Report. He was the first Director to hold Museum-based temporary (or special) exhibitions. In 1912, he held two such exhibits – one about optics and one about aeronautics. As far as the permanent collections were concerned, planned acquisitions to fill gaps in the collection were made, models were constructed, and objects on loan of no value to the Museum were returned to their owners. Within the new permanent exhibition, despite the cramped conditions forced by construction, objects were arranged as best as possible and some objects removed from display were available for visitors to examine. Overall, Ogilvie and his staff made significant progress through difficult times, especially since he insisted that the routine work of the Museum must not be neglected.

Lyons Takes Charge

After the end of hostilities, Colonel Lyons took over a very depressing institution. Accommodation had been stretched before the East Block was begun, and the rapid technological change of the Great War spurred substantial acquisitions. This was coupled with constantly shifting exhibition space – a high of 88,000 square feet in 1921, to a low of 54,000 square feet in 1923, and back up to 87,000 square feet in 1924 when the ground floor of the East Block was opened. Progress on the East Block was slow. From the end of the War until 1922, the unfinished building was used as Government offices, then after 1922, when work was resumed, it progressed slowly – due to strikes and the replacement of sub-standard works. By October 1924, when the building was supposed to be completed, only the ground floor could be opened to the public. Eventually, the building was certified complete towards the end of 1925, but this was not the end of work on the East Block. Problems with defective work, including major problems with the glass roof, continued to plague the building. Work to correct these issues continued throughout the next few years and all galleries were finally handed over in January 1928. The royal opening occurred on 20 March 1928, but that was not the end of construction of the East Block. The last two outstanding items were the Museum's Conference

Room and a run of offices, which were not completed until 1934.¹ Finally, the museum had an appropriate frontage on Exhibition Road and some modern exhibition space to show the collection, especially some of the larger and more spectacular pieces of engineering.

The quest for space did not end there. The East Block provided 150,000 square feet and the fire-hazard and (dry-)rotting Southern Galleries provided another 40,000 square feet of exhibition space. So, with less than 200,000 square feet, the Museum had less exhibition space than the Bell Report said was necessary in 1912, but the Museum had made one large mistake during the dealings with the construction of the East Block. Ogilvie, Lyons, and others never forced the point that the East Block was only the first stage of the Museum's building program, as laid out by the Bell Committee. Instead, they treated them as independent projects. The first scheme for the Centre Block was not created until 1925, but this scheme failed to produce any results because of inactivity from the Advisory Council and others. Then in 1927 the Royal Commission on National Museums and Galleries was created with special reference to the conditions of the buildings containing the National Collections. This Commission blocked any action from the Museum or its Advisory Council until the final portion of its Report was published in January 1930. At this point, the Centre Block was considered an urgent national need. Finally, towards the end of Lyons' time at the Museum, it appeared that major progress was going to be made on the Centre Block.² So, nearly 20 years after the Bell Report, it appeared that the Centre Block was going to be built, but it was not be.

Yet again, expansion at the Science Museum fell at the final hurdles. In October 1933, the Treasury agreed, in principle, to the construction of the Centre Block, but questions were raised about whether it would be financially possible to begin in 1934-5.³ Issues concerning the inclusion of the planetarium in the Centre Block further delayed construction. In July 1935, the previously unsettled position of the planetarium within the Museum, specifically on top of the Centre Block, was agreed, but it took until November 1935 to finalize the position of the planetarium. Then in January 1936, the First Commission of Works placed an "impossible deadline" on the Museum to find funding.⁴ This situation was not resolved and in 1937, the whole scheme was re-examined by the Office of Works in relation to the redevelopment of the

¹ Follett, *The Rise of the Science Museum*, pp. 54, 75-83.

² Follett, *The Rise of the Science Museum*, pp. 89-94.

³ Follett, *The Rise of the Science Museum*, p. 94.

⁴ ScM Ed79/38.

entire South Kensington Site. Quite to the surprise of the Director, Col. Mackintosh, a plan for the redevelopment of South Kensington was drafted before he was informed of the discussions. The plan was a large and complicated scheme involving seven institutions – Royal College of Art, the V&A Museum, the Science Museum, Imperial Institute, Imperial College, British Museum (Natural History), and the Royal School of Music. Within the plans, the Science Museum was provided with approximately the space allocated by the Bell Report, but they were dissatisfied for two reasons. It changed the layout proposed by the Bell Report and allowed for no future expansion.¹ The re-examined scheme also ground to a halt when rearmament became an issue, and it was not seriously resurrected until the beginning of the organization of the Festival of Britain in 1949.

The struggle with accommodation was further complicated by continually expanding attendance numbers.² As mentioned above, upon independence, the Museum was attracting between 400,000 and 500,000 visitors every year. This situation continued until 1926, when the 500,000 mark was broken for the first time. In 1929, when the one million visitor mark was passed, it became the second national museum to attract those numbers and in 1932, it passed the British Museum in annual attendance, with an attendance just under 1.25 million.³ In 1933, the 1.25 million visitor mark was broken and an attendance of between 1.1 and 1.3 million visitors per year was maintained until the Second World War. This is a remarkable upsurge because this was a period over which many national museums had falling attendance. To achieve these numbers, the Science Museum did have one advantage – the opening of the new building in 1928 – but when compared to the British Museum and V&A, it had a very small footprint for so many visitors.

¹ Z188

² The official attendance figures from the Museum are contained within the Advisory Council's Annual Reports. They, rounded off to the nearest thousand, are:

1920	477000	1928	900000
1921	445000	1929	1062000
1922	494000	1930	1133000
1923	474000	1931	1171000
1924	438000	1932	1242000
1925	430000	1933	1256000
1926	577000	Last year before World War 2:	
1927	709000	1938	1138000

During the period from 1933-38, the average was about 1.2 million and numbers did not return to those levels after World War Two until 1955, when the official number was 1,200,394. Throughout the rest of the 1950s and early 1960s, attendance numbers varied between 1.1 and 1.3 million visitors.

³ Follett, *The Rise of the Science Museum*, p. 55.

Lyons' Own Ideas

Lyons' ideas about the purpose and aims of the Science Museum went beyond the guidelines laid out in the Bell Report. When Lyons took over in 1920, there was no systematic attempt to show the Collections, and Lyons' challenge was to create a scheme to present each Collection as a coherent whole. It was two years before Lyons' ideas coalesced and another two years before he was confident enough to publish them.

Concerning the physical presentation of the Collections, Lyons differed little from his predecessors. His method of presentation was essentially a continuation of the nineteenth century tradition consisting of ranks of objects, each with a detailed label aimed at the specialist. Importantly, Lyons realized two things about his Museum. It was too crowded and it was targeted at the wrong audience. Through a series of memorandums and publications, Lyons laid out his plans for the development of the Museum.

Overall, Lyons agreed with the ideas expressed in the Bell Report, but he differed greatly on one point – which was the most important type of visitor for the Museum. Within the Bell Report's statement of purpose for the museum (as quoted above), the types of visitors to the Museum are listed, but the Report orders them as student, technical visitor, specialist visitor, and ordinary visitor. In reality, the majority of the Museum staff thought of the technical visitor when designing exhibitions. In comparison, Lyons thought that the ordinary (or non-specialist) visitor should be the first priority for the Museum and this opinion was reflected in all of his thinking about the development of exhibitions.

Looking back at Lyons' ideas, many of them are obvious today, but he was one of the first to seriously think about the special problems of scientific and technical museums. In his 1924 article in the *Museums Journal*, Lyons introduced those special problems by contrasting the exhibits of an art museum with those in a technical museum. For Lyons, this contrast was one that he made repeatedly when asked about the presentation of the Collection. The contrast was based on the fundamental difference in the reason objects are displayed in the two types of museums. Art museums display objects for their beauty or attractiveness, while technical museums display objects based on their utility. So, according to Lyons,

While in an art gallery it is a question of appreciating the beauties of an object, in a collection of technical or scientific exhibits the visitor must understand their purpose before he can realize their importance and be interested in them.¹

Therefore, a technical museum must make visitors understand the exhibits and that requires each object's purpose, operation, and improvements on earlier examples to be explained. To fulfill this requirement, Lyons realized the profound influence that this had on the exhibition of objects.²

To accomplish this, Lyons devised three levels of information. To "furnish those main ideas which be in the visitor's mind if he is to understand the collection", there must be some form of introduction to each group/collection. Lyons is unclear about the actual form of the introduction, but he is clear that the purpose should be to provide a concise overview about the collection that the visitor was about to visit. The next level of description proposed was a group label. The aim of the group label was to "state clearly and simply the main principles which underlie" the exhibits. For the Science Museum, Lyons proposed using oval frames as a way to make these distinguishable from standard labels, which were the last level of information. It was on this level that Lyons made his first changes. As early as early 1921, he issued a set of guidelines concerning labeling of objects. These were, in many ways, a repeat of Ogilvie's instructions of late 1911, but Lyons codified the process by laying out strict guidelines for label writing. While he recognized the high standard present at the Museum, he also recognized that some of the labels were too long. To counter that problem, Lyons took an important step; he established a label with two parts, a brief general description in bold type followed by a detailed technical description in normal type. This, in Lyons' opinion, made exhibitions easier to read and more useful to the non-specialist – the most important visitor for Lyons.³

Besides the organization of information, Lyons also felt that organization of objects and cases needed attention. He felt that the galleries were dramatically overcrowded. According to his estimates, to relieve the overcrowding of the cases, it would require 40% more floor space, and to relieve the overcrowding of objects within the cases, it would require up to an additional 150% more floor space.⁴ Lyons, in line with the Bell Report, felt that the Museum needed a lot

¹ Lyons, 'The Aim and Scope of the Science Museum', *Museums Journal* vol. 24, no. 5, 1924, p. 117.

² Lyons, *The Aim and Scope of the Science Museum*.

³ Lyons, *The Aim and Scope of the Science Museum*.

⁴ Follett, *The Rise of the Science Museum*, p. 98.

more space and publicly complained about the lack of and slowness in acquiring additional exhibition space.¹

Unfortunately for Lyons, in the discussions that he held concerning his ideas, the reception from the Museum staff was disappointing. In a note written in 1934, after his retirement in 1933, Lyons expressed his frustration at the fact that he got no help from the high-level staff at the Museum. Lyons would not be pushed aside easily, and by 1923, he issued another memorandum outlining the changes that he wanted to occur. Like Ogilvie, he requested schemes for the Collections but unlike Ogilvie, made some progress with enacting those schemes, even when it meant angering the staff of the Science Museum.²

Probably the most innovative and long lasting of Lyons' projects was the Children's Gallery, which opened in 1931. It attracted large numbers of visitors and was an instant success for the Science Museum. The Children's Gallery served two main purposes within the Museum. It was designed to provide, in the simplest of terms, an introduction to science and its historical context. The other purpose was to allow hands-on exhibits designed for children to understand the fundamental principles behind the experiments. Perhaps more importantly, this Gallery was the first time that the Museum tried to explain more than the technical background of the Collections and ventured into displaying some of the cultural implications of science and engineering.³ This Gallery is important to the development of the Museum, and is covered extensively in Chapter Five.

In addition to the changes Lyons made to the Collections, he also made changes to the other ways that they were presented to the public. Behind the scenes, he enhanced the Workshops, the Drawing Office, and the Photography Department, and enabled them to play a larger part in the presentation of the Collections. On the public front, he changed the catalogues and eventually introduced the much smaller Collection Handbooks, but his work with the Lecture Service had the largest effect. Following the recommendations of the Bell Report, Lyons appointed a retired naval officer, Engineer Captain E.C. Smith, as the Guide Lecturer in April 1924. Almost immediately, a program of lecture-tours was initiated. The program consisted of one morning and one afternoon tour every weekday. The program quickly

¹ Lyons, *The Aim and Scope of the Science Museum*.

² Follett, *The Rise of the Science Museum*, pp. 99-102.

³ Hartley, *The Children's Gallery: a guide to the exhibits in the Introductory Collections in the Basement Gallery*, HMSO, London, 1946, p. 3.

expanded and in May 1925, it was expanded to include special lectures for school parties. Additionally in 1925, demonstration-lectures were offered on public holidays. Demand for lectures continued to climb and in 1928, a second Guide Lecturer was appointed. By the time of Lyons' retirement, the Service had established itself as one of the outstanding features of the Museum and served nearly 42,000 visitors at its peak in 1932.¹

Upon Lyons' retirement in 1933, the Science Museum was not only one of the most popular of the National Collections; it was also an internationally recognized museum. The Museum that Colonel EEB Mackintosh took over in 1933 was an entirely different institution than it had been when Lyons assumed the directorship. Mackintosh had more space, more visitors, and more collections. Yet, he still had to deal with many of the same issues that Lyons did, especially the construction of additional exhibition space. Unfortunately, the biggest difficulty that Mackintosh dealt with during his directorship was the upheaval and destruction caused by World War Two.

World War Two & The Science Museum

Before the development of powered flight, Britain was well protected by the Royal Navy, but flight changed the perceived balance of power. On 17 December 1903, Orville Wright achieved the first successful controlled flight in a powered heavier-than-air machine. By the time this was achieved, the Wright Brothers were the focus of international attention. In 1901, reports of the Wright's achievements reached Europe and in 1902, Ferdinand Ferber, a Frenchman, had constructed a Wright glider based on the vague details he received. Then, in early 1903, both Ferber and Octave Chanute popularized their inaccurate versions of the Wright flyers and called for greater aeronautical research in France.² Between 1904 and 1906, contracts for planes were negotiated with Britain, America, France, Germany, Italy, Russia, Austria, and Japan. Then in 1907, Charles R. Flint, a well-known international arms dealer, became the Wright Brothers' agent.³ The public realization of the airplane's power quickly followed. In 1908, H.G. Wells published *The War in the Air* – the first fictional description of a future air war.⁴

¹ AC 1940-51, p10.

² Jakab (curator), *The Wright Brothers: The Invention of the Aerial Age*, retrieved 9 March 2009 <<http://www.nasm.si.edu/wrightbrothers/>>.

³ Edgerton, *England and the Aeroplane: An Essay on a Militant and Technological Nation*, Macmillan Academic, London, 1991, pp. 2-3.

⁴ Wells, *The war in the air*, T. Nelson & Sons, London, 1908.

During the inter-war period, fictional depictions of the next Great War were popular – Noel Pemberton Billing, pioneer aviator and co-founder of Pemberton Billing Ltd (later known by its telegraph address, Supermarine), wrote *High Treason*, a play, in 1928 that was turned into a movie in 1929; H.G. Wells published his second version of the future war, *The Shape of Things to Come*, in 1933; and titles such as *The Gas War of 1940*, *War Upon Women: A Topical Drama, Four Days War*, and *Menace: A Novel of the Near Future* were published throughout the 1930s. While the individual plots varied greatly, they all share one common feature - a central, devastating surprise air attack on a major city (or cities).

The familiar outlines of the Houses of Parliament were no longer visible, and where Big Ben had reared its imposing height was a mass of smouldering ruins. It was incredible that he would never see it again, never see what had been to him and to thousands of others, one of the monuments of English life. ... With a shudder John hurried on. As he reached the Chelsea Embankment he met a wild, bedraggled figure moaning.

‘Are you hurt?’ John asked. ‘Can I help you?’

‘Nobody can help me. To think that those flying inhuman monsters have demolished that wonderful building and all it contained, all it meant to England.’

‘Yes,’ agreed John. ‘Parliament will never sit there again.’

‘Parliament!’ shouted the man. ‘Who in hell cares about Parliament? That is what I’m talking about,’ and with a wave of his hand pointed to the ruins of the Tate Gallery.¹

Preventing this scene, where the landmarks of daily life and the country’s cultural history were destroyed, was a top priority in the years immediately before the Second World War. For the civilian population, aviation was going to define the coming conflict and for many government officials, including museum professionals, preparing for the air war was a priority. At the Science Museum, the focus on aviation was a boon. As the home to the Wright Flyer, the interest in aeronautics played to a strength of the collection, and showed the usefulness of the Museum during a time of crisis.

War on the Horizon

Adolf Hitler became Chancellor of Germany on 30 January 1933. Within months, preparations began for the second war in Europe of the twentieth century. These preparations included the National Museums and Galleries of the United Kingdom, hereafter referred to as the National Collections. In 1933, at a meeting of the Standing Commission on Museums and Galleries, it was agreed to begin air raid precaution (ARP) planning to safeguard the nation’s

¹ Pollard, *Menace: A novel of the near future*, T. Werner Laurie, London, 1935, pp. 58-9.

Table 1: Air Raid Precaution Categories

Category	Description of Items	Storage Type/Priority	General Examples	Science Museum Examples
A	Culturally significant, easily handled, and/or the most valuable	In-house bombproof storage or immediate pre-War evacuation	Items made of precious metals or containing precious gems	Wright Flyer
B	Valuable but difficult to handle or of lower value but easier to handle	Tube system, secure area of a museum, or country house outbuildings at announcement of War	Sculptures and pottery	Automobiles, bicycles, and carriages
C	Considerable size but fragile or perishable	Evacuation to country houses as soon as possible	Large carpets and tapestries	Model ships
D	Large and/or immovable	Protected in-situ	Raphael Cartoons at the V&A	Large engines in East Block

cultural treasures.¹ As part of these early ARP plans, each museum was asked to prepare a list of objects to be protected. By 1934, the first lists had been created; based on monetary value, most items included were worth over £5,000.² The first step to protect objects was the agreement to move the “cream of the collections” into isolated country houses, where bombing was improbable.³ Over the next few years, plans slowly formed as both the Government and museums sought to safeguard their treasures.⁴ In spring 1938, as ARP plans neared completion, a small committee of the directors of the major museums was established. They were charged by the Standing Commission to protect the national collections from the ravages of war.

To fulfill that duty, the directors prepared detailed guidelines for the inevitable war (see Table 1 for details). The guidelines divided items into four categories, outlined their appropriate storage, and specified their evacuation priority. Each museum applied the guidelines to their own collections and by autumn 1938, lists were organized. The lists were only one part of the evacuation plan; packing and transportation posed logistical and organizational difficulties. The most pressing concern was the provision of safe storage, and despite the Office of Works being the “central coordinating authority” for it, many museums made independent arrangements because they thought the Office of Works could not provide sufficient storage.⁵ Through the Office of Works, the Science Museum was assigned only two country houses for their Category

¹ Standing Commission on Museums and Galleries, *The National Museums and Galleries: the War Years and After, Third Report of the Standing Commission on Museums and Galleries*, HMSO, London, 1948.

² V&A Ed84/264.

³ ScM Z101 (Unpublished manuscript, ‘War History of the Science Museum and Library, 1939-1945’ by Col. E.E.B. Mackintosh in 1945), p1.

⁴ These preparations were not just valuable for the National Collections but also for many other museums and institutions. For information about how the Museum of the History of Science, Oxford dealt with ARP, see MHS Old Ashmolean: Last Letters under Robert T. Gunther, 1938-40.

⁵ V&A Ed84/264

A and B items: Basing Park and Herriard Park, both in rural Hampshire.¹ Despite the apparent inadequate provision of safe storage, all major arrangements had been finalized by mid-1938. Requisitioning packing material was difficult for two main reasons: no national institution had attempted to pack their entire collection and with War approaching, supplies of some materials were limited. To simplify the task, the Science Museum, like some other museums, decided to break the tradition of custom-built cases and instead, stockpiled standard-sized boxes for either one large item or up to 50 small items.² The Science Museum, like most other museums, relied on the Office of Works to arrange van companies as transportation, while the British Museum (BM) and the National Gallery made separate arrangements for rail transport. One consistent feature of the transportation plans was that they were overly optimistic – a feature recognized at the time and confirmed during the plan’s first test. Despite their optimism, the railroads would be busy and virtually useless for the nonessential purposes of the museums. On top of that, Science Museum Director, Col. E.E.B. Mackintosh, realized that his road transport was likely to be a few lorries for several days and not several lorries for a few days, as promised.³

The first real test of the Museums’ preparation came in autumn 1938. After the invasion of Austria in February 1938, Hitler turned towards Czechoslovakia. By mid September, the crisis was deepening and it appeared that war was imminent.⁴ Under these circumstances, the museums’ readiness was put to the test. The largest problems occurred with transportation, because items needed to be transported safely, securely, and in a timely manner. On 15 September, the V&A discovered, much to their dismay, that the vans assigned were too small. The larger tapestries were too long for the vans and could not leave London.⁵ Even when items were able to leave museums, there were concerns about security and protecting the nation’s cultural treasures. This crisis ended quickly when on 30 September, Chamberlain returned to London and declared that there would be “peace for our time”.⁶ Luckily for the national collections, Chamberlain’s declaration allowed them to improve their plans.

¹ ScM Z101, p2

² ScM Z101, p2 & 18

³ V&A Ed84/264 & ScM Z101, p1-3.

⁴ Churchill, *The Second World War: Abridged Edition With an Epilogue on the Years 1945 to 1957*, Pimlico, London, 2002, pp. 112-30.

⁵ V&A Ed84/264.

⁶ Churchill, *The Second World War: Abridged Edition*, pp. 133-4.

Immediately, measures were taken to correct the inefficiencies and inadequacies discovered with the transportation, and improved plans ensured adequate manpower would be available to pack and move the collections. In addition, John Forsdyke, Director of the BM, raised the issue of security. He was worried about the security of cultural treasures in transit and while in storage in remote locations. Lacking other options, he proposed to arm warders and staff assigned to the houses. Legally, museum staff could carry firearms, but the subcommittee of directors, felt it unnecessary, because the presence of staff would be a deterrent.¹ The Science Museum did not have this deterrent because they did not staff their houses. Instead, they relied on the fire and security arrangements of the homeowners/occupants, despite the obvious problems. To offset the danger, staff made regular inspections and maintained friendly contact with all owners.² Maintaining friendly contact was not difficult since many of the owners had volunteered their homes to protect the national treasures, but some owners were more interested in protecting their homes from other dangers, such as military use or as refuge for evacuated children, than in protecting the National Collections.³ Security was only one problem with the country houses. The quality of storage was also an issue. Apprehension about humidity, temperature, and pests was expressed at the Subcommittee of Directors throughout late 1938 and 1939.⁴ These discussions foreshadowed the dangers that country houses posed to the collections they sheltered.

The Phoney War

Since the crisis passed quickly, no large-scale evacuation occurred and the visiting public's experience remained normal, but not for long. Throughout late 1938 and 1939, the diplomatic situation worsened. On 24 August, the secret German and Soviet agreement was revealed. On 1 September, Poland was invaded, and the UK was drawn into war with Germany because of its guarantee to the Polish Government. On 3 September, Chamberlain declared war. Before this, when the German-Soviet Pact was announced, the Science Museum was notified that war was imminent and to enact their plans. Between 24 August and 1 September, trucks made twenty-six journeys to the houses. One large case, 26 oil paintings, and books were stored at Herriard Park, while 147 cases were stored at Basing Park. This included all category A

¹ Memorandum dated 31 Aug 39, V&A Ed84/264.

² ScM Z101, p20-2.

³ Examples of this behavior can be found in V&A Ed84/264; V&A Ed84/267; and Tate TG/2/7/1/44/2.

⁴ V&A Ed84/264.

items, some B and C items, plus about 20,000 old/rare library books.¹ The evacuation was successful but very limited.

The vast majority of the Science Museum's collection remained in South Kensington and, until the public declaration of war, the visitor experience remained relatively normal. If raids had immediately followed the declaration of war, bombs would have inflicted disastrous damage on the national collections. The Museum closed on 3 September to safeguard the remaining collections. The old centre and western galleries were emptied, because the South Kensington Fire Brigade had deemed them a fire hazard for years. In addition, staff emptied the top two floors of the new East Block. They transferred all of the objects, most with their showcases, into the lower three floors of the East Block, because the concrete construction provided the best available protection. All available floor space was used and spare space in cases was filled with objects from fixed cases that were left in the vulnerable portions of the Museum. Staff took steps to prevent collateral damage. Fragile objects were wrapped and carefully placed into the display cases. Windows and cases were pasted with paper to minimize flying glass, and objects left in-situ were protected with three-inch wooden covers. By November 1939, most of this work was completed and the staff began regular inspections of the objects.²

By the time the President of the Board of Education, Lord Stanhope, ordered the Museum's closure, it only had a skeleton staff to maintain the collections and staff the library, which opened as normal. On 2 September 1939, Mackintosh left the Museum to become Commandant of the School of Military Engineering, leaving Dr. H. Shaw as Acting Director until Mackintosh's return in July 1940. Beyond the Director, 43 staff left for positions in the Services or other Governmental Departments before the museum closed. After closure, more staff left and the remaining staff were generally well past the normal age of retirement. They were, in the words of Mackintosh, a "somewhat senile staff". By the War's end, there were 115 staff – nearly half the pre-War high.³ Reduced staff levels had an effect on the Museum's collections, especially on maintenance. Specifically, a maintenance backlog developed that would not be rectified until the mid-1950s.

¹ ScM Z101, p2.

² ScM Z101, p9-11.

³ ScM Z101 p9, 12, 39, 58, & 79.

The expectation was that Britain's entry into the War would be greeted by intense and immediate German bombing. Fortunately, the waves of bombers did not appear and for eight months, there was little visible activity. Inactivity created its own problems. Apathy, boredom, and a false sense of security became common among all classes of people, including museum staff.¹ During this period of inactivity, many museums around London reopened. Most museums refurbished and reopened portions of old exhibitions, but three of the national collections did something different. The National Gallery reopened without its collection to house lunchtime classical concerts. Concerts started on 10 October 1939 and during the War, a total of 1,698 daily concerts were given. In addition, a canteen serving light meals opened in May 1940 – the origin of the Gallery's permanent café.² In February 1940, the Science Museum and the BM opened new exhibitions. All of the openings had one thing in common - to alleviate boredom. The cultural blackout and lack of military action created a sense of national boredom and many, like pianist Myra Hess (later Dame) who organized the lunchtime concerts, thought that the best solution was reopening cultural institutions. The reopenings were popular, but it was only a safe solution while air raids were light and infrequent.

At the BM, the Treasury put restrictions on the reopening. All exhibition proposals had to have Treasury approval, because items had to be “not of such value that damage to or destruction of the exhibited specimens would seriously affect the strength of the main collection”, and “no material increase” in expenditure for conservation, maintenance, or ARP could be incurred.³ On 22 Feb 1940, less than six months after closure, a small exhibition of printed books, manuscripts, prints, and drawings opened.⁴ The much larger War Exhibit, created by the Department of Prehistory and Europe, followed shortly. It included archaeological material, from Sutton Hoo and elsewhere; a variety of porcelain, pottery, and ceramics; metalwork from jewelry to lamps; and a collection of scientific material – six clocks, 40 watches, 17 weighing apparatuses, 38 scientific instruments, a few calendars, and several counting apparatuses.⁵ The

¹ Mackay, *Half the Battle: Civilian Morale in Britain during the Second World War*, Manchester University Press, Manchester, 2002, pp. 54-6; ScM Z101, p11-12.

² *War Years and After*, p. 13.

³ BM Standing Committee Minutes (BMSC), 6 Feb 1940 & 10 Feb 1940.

⁴ Miller, *That Noble Cabinet; A History of the British Museum*, Andre' Deutsch Limited, London, 1973, p. 334.

⁵ The War Exhibits Register, Department of Prehistory & Europe, BM

exhibition summarized the BM's entire collections. The danger faced by the War Exhibit caused it to be known as the 'Suicide Exhibition.'

On 14 February 1940, the Science Museum opened an exhibition entitled "Aircraft in Peace and War." The exhibition, as denoted by the title, focused on the uses of aircraft throughout history. The non-technical story presented was different than the Museum's normal story; instead, it was a social history. To present a social history of aircraft, the subject was divided into four periods: the Historic (1903-1914), the Great War (1914-1918), Civil and Military Aviation (1919-1939), and Aeroplanes of the RAF (1940). The majority of the items selected for the exhibition were models from the permanent aeronautical collections. Over one-hundred models were displayed. They were supplemented by a few full-scale items. These were pieces of modern equipment used by the RAF and loaned from the Air Ministry or the aeronautical industry. To give a sense of action and to complement the objects, photographs were displayed, many provided by the popular aviation magazine, 'The Aeroplane'. Partially because of the demands of War, it was not a static exhibition – pieces frequently moved into and out of the display. Whether by purpose or accident, the changing exhibition helped fulfill the purpose. It provided a topical display, covering issues related directly to people's daily life, and educated visitors about the uses aircraft had during the short history of powered flight.¹

One of the staff left at the Museum during the War was Mr. Bernard Davy, who quickly went to work organizing the exhibit. Davy joined the Museum in 1920 and spent his career working with the Aeronautical Collection.² In preparing the exhibition, Davy had, because of his careful pre-War work, models in the permanent collection of the majority of aircraft used by the RAF at the outbreak of War. Davy was able, because of his experience and contacts, to request accessions and loans for "Aircraft in Peace and War", even during this difficult period. From late 1939, Davy pressed his governmental and industrial contacts to contribute.³ The correspondence between Davy and his contacts illustrate the difficulty in presenting contemporary war materials.

Davy had extensive contacts within the Air Ministry. The correspondence concerning two exhibits shows the obstacles encountered and originality Davy expressed in organizing this

¹ ScM Ed79/43.

² Follett, *The Rise of the Science Museum*, pp. 61, 163.

³ ScM Ed79/43.

exhibition. To expand visitors' knowledge of a common war-time scene, Davy wanted to display a model barrage balloon with its complete support equipment. For this, Davy contacted the Balloon Development Establishment (BDE) at the Air Ministry. The BDE was unable to provide the model because of War work. Instead, Mr. A. Eldridge, an experienced civil servant at the BDE, constructed the model using official plans during his free time. The Museum paid £15 for the model, an amount that, in the opinion of Davy, barely covered the cost of the materials. It was installed in the exhibition on 27 March 1940 and provided the wanted explanation of a common London scene. At the beginning of planning, it was envisaged that a full-scale aircraft would be a central feature of the exhibit. To find it, Davy first turned to Vickers-Armstrongs Ltd, with the hope of borrowing a Spitfire that was displayed at the Brussels Exhibition in July 1939 – it was mounted in a manner appropriate for the Museum - but it was not available. They recommend asking the Air Ministry.¹ Unfortunately, one could not be located by the opening of the exhibition because of the demand for planes for active service, but the Air Ministry later loaned a 'Hurricane' fighter that was released from active service for the exhibition.²

Davy also exercised his industrial contacts for the exhibition. Among the models added to the permanent collection was the 'Whitley V' (Inv. 1940-11) from Armstrong Whitworth Aircraft Ltd. On the other hand, Davy was denied a model of the new Boulton & Paul Aircraft Ltd 'Defiant' bomber in June 1940 because the details shown on the model violated the Official Secrets Act.³ Davy also sought loans from industry. He contacted the makers of the important (and eventually iconic) aircraft engines. On 12 February, Napier delivered exhibition models of the 'Dagger' and 'Rapier' engines, and on 16 February, Rolls Royce delivered a 'Merlin' engine to the Museum. Later in March, Napier replaced the exhibition engines with production engines – a 'Dagger' Series III owned by the Air Ministry and a 'Rapier' Series VI owned by Napier – and gave the Museum notice that the engines could be withdrawn for active service.⁴ These industrial loans represented the majority of the full-scale exhibits on display.

¹ ScM Ed79/43.

² Letter to Rolls-Royce from Davy dated 29 May 40, ScM Nominal 1453/10.

³ ScM Ed79/43.

⁴ ScM Nominal 1219/17 and ScM Nominal 1453/10.

About 80,000 visitors viewed the exhibition over the first four months, and the decision was made to extend it indefinitely.¹ Its quick and successful production highlights that relevant collections were up-to-date. Quite unlike the traditional view of the Museum as a repository for old and out-of-date technology, Davy managed a cutting-edge Aeronautical Collection, that despite the lack of exhibition space and funds for accessions represented modern aviation. The ‘Hurricane’ and aircraft engines gave visitors a direct connection to the airmen in active service. The importance of this connection is highlighted in Davy’s correspondence because he mentions the fighter’s service history at every opportunity. The immediacy and sense of action embodied by these items were important because they helped to connect an essentially historical exhibit to the conflict that engulfed Europe. The Museum’s ability to integrate contemporary material into exhibitions allowed the Museum to showcase its educational potential to the Government.

The Blitz

During June 1940, southern England came under bombardment and in August, London and its suburbs were bombed. On the night of 7 September, a large raid hit London’s docklands, marking the beginning of over two months of continuous bombing. The increasing intensity of bombing caused many museums to rethink their displays. At most museums, this involved closure and further evacuation. “Aircraft in Peace and War” closed in September 1940 when serious air raids in South Kensington damaged the windows and glass roofs of the East Block.² This ended exhibits at the Science Museum for the duration of the War. At the BM, the small exhibition of printed materials was withdrawn in September 1940, because of the danger, but the War Exhibit remained open.³

Around the same time that “Aircraft in Peace and War” closed, the Natural History Museum was hit by two incendiary bombs and an oil bomb. The resulting fire damaged significant portions of the building and damaged the furniture, fittings, and collection of the General Herbarium, with 15% of the specimens being destroyed or damaged by fire or water. Further damage occurred in July 1944 when a flying bomb hit the Western Galleries. This bomb destroyed 155 of 162 display groups of the famous Nesting Series of British Birds and required the removal of 130 tons of broken glass from the museum. On 10 May 1941, the BM

¹ ScM Nominal 1219/17.

² AC 1940-51, p1.

³ Miller, *That Noble Cabinet*, p. 334.

experienced its most violent attack of the War, when incendiary bombs caused several fires. This attack broke a Clazomenian sarcophagus lid, burned 125,000 library volumes, and destroyed the majority of the War Exhibit.¹ A portion of the scientific instruments had been removed, but the vast majority of those on display were destroyed. This included 23 scientific instruments, all six clocks, and all 40 watches.² By May 1941, every room of the Imperial War Museum (IWM) had been damaged, and in Dec 1944, a rocket laid waste to a majority of the building. The Tate, long recognized to be in a dangerous position, was first damaged on 16 September 1940 and by January 1941, the majority of the roof was gone. At the War's end, all 34 exhibition rooms were damaged.³



The British Museum's Central Saloon, which housed a large portion of the War Exhibition, before and after bombs hit in May 1941. (Images Courtesy of the Trustees of the British Museum)



Outside of the Science Museum, on the Exhibition Road frontage of the V&A, evidence can still be seen of the bombs that, like many others, brought down significant amounts of glass and caused minor structural damage to both museums.

Compared to other institutions, the Science Museum escaped major damage. To paraphrase Mackintosh, the Museum licked its sores and thanked its luck that matters were no worse. In January 1941, Mackintosh, who had returned to the Directorship, broke his shoulder

¹ BMSC, 12 July 41 (p5708).

² BM War Exhibit Registry.

³ *War Years and After*.

and was away for four months. During this absence, he seriously considered the protection of the Museum's collection and decided that more comprehensive measures were needed. On his return, Mackintosh set a goal of evacuating 50% of all collections from South Kensington.¹ This made the Science Museum one of the last national collections to upgrade the protection of the treasures entrusted to them.

Improving Storage

The story of Britain's cultural treasures during War is typical of the transformation that many aspects of life went through during the War. It went from an amateurish attempt to hide treasures in remote locations to an efficient system of protection and conservation of the treasures. This change not only insured the survival of the country's cultural treasures, but also led to many changes in the country's galleries and museums in the years after the War.

At the beginning of planning in the 1930s, the main worry on the Directors' minds was aerial bombing. Defending against bombing was the main purpose of all storage. As time passed, various members of the Standing Commission sub-committee realized that their storage provided inadequate protection. Even the country houses, once seen as the salvation of the national collections, were deemed unsafe. As air raids increased and the RAF defense strengthened, many realized that some houses were under German flight paths and were at risk of accidental bombing.² Like the museums, who favored the remote locations, many other tenants used either the houses or their grounds. They were perfect for refugees, training camps, and military bases. The houses' environmental controls (or lack of) caused issues. The Science Museum realized this early, when they had to quickly remove the rare books stored in the old kitchen at Herriard Park to the Cambridge University Library because of damp.³ Museums also had to deal with the inhabitants. At Montacute House, the V&A had to battle a severe moth problem.⁴ On a different scale, the National Gallery was worried about Lord Penrhyn's St Bernard damaging their paintings at his North Wales castle.⁵ Owners were also a problem. From the beginning of wartime preparations, owners looked out for themselves and their

¹ ScM Z101, p12.

² Forsdyke, 'The Museum in War-Time', *The British Museum Quarterly* vol. XV, 1952, pp. 1-9.

³ ScM Z101 p63.

⁴ V&A Ed84/267.

⁵ Ezard, 'How lords wrecked war-time effort to save art', *Guardian*, 2002.

properties more than for the national good. In short, the idea to use country houses turned out to be a poor decision for many museums.

During the summer of 1940, several Directors decided that the best storage option was to convert disused quarries into special underground facilities. Between 12 August and 18 September 1941, the entire collection of the National Gallery was transported to the Manod slate quarry in northwest Wales, the first specially built underground facility.¹ By January 1942, the Westwood Bath Stone Quarry in Wiltshire was ready for occupation by the BM and the V&A. Westwood held treasures from more than its two primary tenants, a total of 31 other institutions placed items in Westwood – they included the Bodleian Library, the Fitzwilliam Museum, the Free French Government, a number of cathedrals, and other National Collections.² Unfortunately, the Science Museum was unable to find space in a quarry because Mackintosh's late decision to move the majority of the collection out of South Kensington was after the majority of the quarry space had been claimed. Thus, the Museum was forced into country houses, but Mackintosh had one advantage – he made arrangements based on the experiences of the other museums.

Eventually, over 60% of the Museum's total collections were accommodated in 30+ locations, including industrial warehouses, military depot quarries, and houses formerly occupied by other institutions.³ By War's end, the Science Museum was able to find underground storage in a shelter near Stockwell and in a disused underground factory at Warren Row, near Reading.⁴ This required the development of a complex system of storage and conservation, and the development of an extensive record-keeping program to support that system. An examination of the complex system highlights the changes that occurred during the War.

Finding locations to store locomotives, autos, and coaches was difficult. Barns did not protect the historic items enough and coach houses had become scarce. Nine, mainly 'Class C' houses were selected for these large items. They provided storage in stables and outhouses but conditions were unfavorable and the objects were vulnerable and/or exposed. Since vehicles were generally not protected by packaging, staff inspected 'Class C' houses more frequently than

¹ *The Gallery During the Second World War*, retrieved 24 Oct 2007, <<http://www.nationalgallery.org.uk/about/history/war/default.htm>>.

² Forsdyke, *The Museum in War-Time*.

³ ScM Z282 and ScM Z101, p13-14.

⁴ *War Years and After*, p. 26.

other houses and the regular condition reports created during the inspections allowed the Museum to track the conditions of the items and conserve them, if necessary. Despite difficulties with removal and transportation, “Puffing Billy”, Stevenson’s “Rocket”, and the Rocket replica were moved to Brocket Hall (in Hertfordshire) and Ramster (in Surrey). Another example of the accommodation was Henley Hall, where five vehicles and nine cycles, including the 1888 Benz Motorcar and the 1885 ‘Rover’ Safety Bicycle, were stored in the house’s outbuildings until 31 May 51.¹ The transportation collection shows the scale of the evacuation and the introduction of systematic condition reports - two items without precedence at the Science Museum.

The Wright Flyer, which Mackintosh called the Museum’s most precious object, underwent a series of complicated maneuvers during the War. It was dismantled at the outbreak of war, packed into the original cases, and they were placed in the safest part of the Museum’s basement. Shortly after, it was redisplayed until concerns for its safety were raised, some coming from the USA. This meant that safer accommodation was needed and the houses were not considered safe for it. So, Mackintosh requested space at Westwood, but was denied because the flyer’s crates would not fit through the quarry’s doors.² The War Office offered space at a depot quarry. Within months, mold appeared on the cases, and because the Office of Works denied the money to construct an air-conditioned room for protection, it had to be moved again. The Museum, luckily, found space in the Naval Depot Quarry, Corsham. The flyer stayed at Corsham until the end of the



After surviving the War, the Wright Flyer was returned to the Museum where a replica was constructed before it was returned to America. Here, Dr Shaw is speaking during the ceremony held to mark the return of the Flyer to America in November 1948.

(Image Courtesy of the Science Museum/Science & Society)

¹ ScM Z282 and ScM Z101, p16.

² V&A Ed84/269.

War, when it returned to London.¹ Over the course of the War, it made four major moves, underwent several minor adjustments, and even faced the possibility of being shipped back to the United States. Because of the flyer's importance, it received more attention than the standard object, but it highlights the pattern of movement experienced by much of the collection.

The process of providing better protection for collections marked the change from a series of amateurish attempts to professional procedures to protect, conserve, and monitor. Unbelievable to today's museum professional, the Science Museum did not keep duplicate copies of any of the Museum's essential records, including the Main Inventory and Registers. If a calamity had happened, such as the fires experienced by other museums, and records were lost, it would have been an irreparable loss for the Science Museum. This was rectified during the second evacuation, when curators kept meticulous records, made duplicates, and stored copies off-site.² This was done because Mackintosh knew it was imperative for copies to survive. Without the lists, he realized that collecting the Museum's possessions after the War would have been impossible.³ This change in attitude affected more than collection management during the War. Experiences in the quarries were so positive that they led to changes in museums post-War. The experiences of climate control and the conservation of items possible under ideal conditions created the push for climate control in London. While many national collections developed specialized conservation departments shortly after the War, the Science Museum left conservation to the workshops throughout the vast majority of its history. The Second World War helped to create the professional atmosphere that is expected at a museum, including such basics as regular condition/conservation reports and duplicated inventories.

Contributing to the War Effort

Each of the National Collections contributed to the war effort. The National Gallery held their concerts. The IWM's staff helped the Civil Defence and Service authorities, Ministry of Home Security, War Office, Air Ministry, Ministry of Information, Foreign Office, and allied Governments. They provided photographs, posters, and other information for didactic and propagandist uses. Additionally, some of the IWM's collection was used during the summer of 1940, when eighteen army and naval guns were pressed into service.⁴ Parts of the V&A, from

¹ ScM Z101, p17-18.

² The surviving Science Museum lists are in ScM Z282.

³ ScM Z101, p8 & 18.

⁴ *War Years and After*, p. 18.

1941 to 1944, became a school for evacuated children from Gibraltar, while the restaurant was used as a canteen for RAF cadets being trained in South Kensington.¹ The Tate was put to many uses, but most famously, the gardens were converted into Victory Gardens.² While the Kew Gardens contributed greatly to the “Dig for Victory” campaign; the Laboratory at Kew was central to the search for vegetable replacements for scarce raw materials; and its pharmaceutical expertise saved numerous lives.³ Like other museums, both the evacuated buildings and the resources of the Science Museum were used.

For a short period, the old 1862 Galleries were used as a victuals dump. In June 1941, a radio repair corps occupied the Museum’s Mess Hut. Then in January 1942, the No. 7 Radio School, teaching 1000 students, took up residence in the Museum. Officially, the occupation was until July 1944, but in reality they were there “somewhat longer”. The Lecture Theatre was in constant demand throughout the War, because of its capacity and projection equipment. It was used by the radio school, other RAF schools in the area, the local ARP organization, professional groups, and to present public programs. It was in such demand that, for the first time, a schedule was kept to prevent conflicts.⁴ The buildings were not the only contributions made by the Museum.

The Library, arguably, provided the Museum’s largest contribution. Despite volumes being evacuated for safety, the Library was open for the entire War to provide access to its scientific and technical material. The Library was an essential peacetime tool for many research bodies around the United Kingdom and the War only stimulated greater research requirements. During pre-War planning, it was expected that the reference service – the number of readers – and accessions, with the related work, would decrease, but loans and information services would increase, both in quantity and urgency. Combining these assumptions with the need to reduce personnel, the Library decided to release 40% of the total staff, with individuals being released according to age, experience, physique, and their position. Accessions, and related work, did greatly decrease! Publications from enemy and enemy occupied countries ceased, while the accession of British, American, Dominion, and Allied materials were reduced for reasons of transportation difficulties, paper rationing, and censorship. The reference service did not

¹ V&A Ed84/263.

² Tate TGA/2000/1/55/1.

³ *1939-1945: Kew at war*, retrieved 13 Dec 2007 <http://www.kew.org/heritage/timeline/1885to1945_war.html>.

⁴ ScM Z101, p31-3.

decrease! The expected decrease in normal readers did occur, but staff from foreign governments and refugee intelligentsia replaced them. Despite that, the reference service became less important for the Library. Its most important and dominant functions were the information and loan services. Official records were not kept for the specifics of the information service, but it severely taxed the time and capabilities of the reduced staff. Many requests came from unexpected sources and/or were time-sensitive. Many from the Intelligence Branches and other governmental departments, were not research-based; instead they were for geographic and/or technical information used for planning and operational purposes. The loan service, likewise, was driven by a similar increase in requests from government departments, national institutions, industrial firms, and research organizations. A measure was the expansion of borrowing institutions, which went from 450 to over 1,000 during the War. This great increase of activity combined with the drastic reduction of staff meant that general library work was neglected. In fact, by the end of the War, both Mackintosh and Lancaster-Jones, the Keeper of the Library, agreed that too many staff had been released and a more robust staff would have offered better services.¹ The Library was a hive of activity during the Second World War and was a central contribution to the War. The services that the Library provided during the War made it a well-known scientific and technical resource that continued to be extensively used after the War.

Finally, the Library's addition of a microfilm service should be mentioned. Before War, microfilm was rare in the British Isles and in late 1941, the Science Museum received basic microfilm equipment. Its service was quickly overtaken by the national organization, the Association of Special Libraries and Information Bureaux (ASLIB), which used the Library as its early base until it grew too large and moved across Exhibition Road to the V&A. This was not the end of microfilming at the Museum, its basic equipment was used "where speed was not of primary importance" and for creating in-house duplicates.² The development of the Museum's microfilm service and ASLIB changed the nature of library services and archiving around the country. For libraries, it reduced space required for duplicate copies and expanded the titles available by eliminating the dangers posed of loaning rare or important works. For archives, it enabled quick and highly portable copies to be produced. Both of these features contributed to

¹ ScM Z101, p59-70.

² ScM Z101, p66-8.

the quick and widespread uptake of microfilm throughout the UK, and the Library played a key role in its development.

Collecting the War

The Second World War produced a vast array of collectable material. Large items like aircraft and tanks, small items like gas masks and radios, or ephemera like War Office posters and pamphlets could be collected for a variety of reasons. At the end of the First World War, there was a significant gap before collecting began, especially in the case of the IWM, which was not opened until 1917. Museums were anxious to avoid the delay in collecting exhibits concerning the Second World War and collection began much earlier in the War.

In September 1939, the IWM made an application to the Treasury to extend the Museum's remit to cover the current war. In October, the Treasury approved the request and the Museum began efforts to acquire material.¹ In April 1940, the House of Lords asked the Standing Commission to consider how war materials should be allocated to the various institutions, mainly the IWM, the NMM, the Royal United Services Institution, and the Science Museum. The report provided slightly odd guidance because the Commission gave all museums priority. The IWM was given priority for material of a popular or spectacular nature; the NMM was given priority for naval material; the Royal United Services Institution was given priority for small personal mementos; and the Science Museum was given priority for technical material.² This report set the scene for tension between the IWM, the NMM, and the Science Museum.

The report also covered the measures available for the collection of material and it recommended the creation of a Disposals Board, on which the Services and the Museums would be represented. The board first met in 1945, but earlier steps were taken to preserve materials. The Air Ministry was the first Service to actively collect material, while the Science Museum was the first museum to collect and display objects, as previously discussed. In addition to the three museums mentioned, other collections became interested in material produced during the War: the V&A was interested in design and costumes, and the National Gallery, under the direction of Sir Kenneth Clark, displayed the War Artists' work.³ During War, collecting was

¹ Personal Communication with Peter Collins, Senior Collections Officer, IWM (26 Aug 08).

² *War Years and After*, p. 18.

³ *War Years and After*, pp. 11-8.

difficult because of staff limitations and security concerns, but the speed of collecting and availability of items greatly increased after the War.

So, how does one measure a museum's capacity to collect items that represent an event as large and complicated as World War Two? For the IWM, it was simple – collect anything and everything! For the NMM, the solution was similar – collect anything naval. At the Science Museum, a more complicated and varied set of criteria was created. The items that the Museum needed to collect were not the sensational pieces, like those collected by the IWM, but those that illustrated scientific and technical developments and/or those that were useful in educational displays. This demarcation did not eliminate institutional conflicts, but other factors, such as space limitation at the Science Museum, decreased the occurrence of conflict post-War.

As discussed, Davy, while creating the “Aircraft in Peace and War” exhibition, was actively collecting items. Of the items used in this exhibition that went into the permanent collections, the majority were models, such as the Armstrong Whitworth Whitley V (Inv.# 1940-11) and the Handley Page Hampden I (Inv.# 1940-26), but some other items, such as the Bristol Pegasus XVII (Inv.# 1940-76), were also collected. Additionally, Davy had in the 1930s collected several models of aircraft that saw active service and so had an advantage over the IWM's collecting effort. Davy continued his collecting efforts until “Aircraft in Peace and War” was closed and resumed them as soon as War ended, when in 1945 he received a captured V1 Rocket (Inv.# 1945-77) from the War Office.¹ Over the following years, several models, including one of the Avro Lancaster I (Inv.# 1946-206), and engines, including a Daimler-Benz DB 605 A1 (Inv.# 1947-181) were acquired. By collecting pieces other than full-scale aircraft, the collection was able to keep pace with technical developments without facing the space concerns. This pattern continued for nearly a decade until planning for the Centre Block display began in the mid-1950s. It was only at this point, when space was available for more full-scale aircraft, that the Museum sought them, including both the Hawker Hurricane (Inv.# 1954-660) and the Supermarine Spitfire (Inv.# 1954-659). But these iconic aircraft were not the end of the aeronautical World War Two materials, it continued through the 1980s, when the V2 Rocket (Inv.# 1982-1264) was finally collected.²

¹ ScM T/1945/77.

² ScM T/1982/1264.

For traditional subjects, like Aeronautics, this involved modernizing the collections, but with subjects that developed greatly during the War, such as nuclear physics, collections had to be reorganized and/or created for them. In short, collecting World War Two was difficult for the Science Museum because it had to be selective, but World War Two is well represented throughout the Museum's galleries and collections. From the model of Bailey Bridgework (Inv.# 1947-185) to the Marine Gas Turbine from The Admiralty (Inv.# 1949-175), the scientific and technical legacy of the War is evident in most galleries. On a question of sheer scale, the Science Museum was never going to be able to compete with either the IWM or the NMM, but it has been successful in fulfilling its purpose, because it has been able to incorporate many of the important advances made during the War into its collections.

Reopening the Museum

At the end of the War, the Science Museum was one of the most fortunate national collections. It was one of only three institutions, along with the Bethnal Green Museum and the National Maritime Museum (NMM), that did not sustain a direct hit. Of those museums hit, three sustained only minor damage equivalent to that sustained by the East Block – mainly broken windows, loose ceilings, and superficial damage to frontages.¹ The Museum's greatest loss was the Old 1862 Galleries, which totaled a quarter of pre-War exhibition space. Yet, the loss was not as dramatic as it may seem. The fire service condemned the old galleries as unsafe in the 1910s and were considered a fire risk since the First World War. So, in late 1940, when the issue of flammable structures became pressing, the decision to remove large portions of the wooden structure was natural and it left the 1862 Galleries in a semi-derelict state. Otherwise, most of the work was pretty basic – repairing windows and rooflights, removing the partitions built for the RAF, taking out the linoleum put down during the War, demolishing the air raid shelter built in the basement, and doing a preliminary cleaning/refit of the galleries. In short, the Museum needed manpower and space to restore their exhibitions.²

On 14 February 1946, the Science Museum reopened. A total of twelve galleries opened – four for permanent exhibitions and eight for the “Exhibition of German Aeronautical Developments”. It was a scientific and educational display that, despite the title, also covered British, American, and other international developments. This exhibition had its roots in a

¹ *War Years and After*.

² ScM Z101, p31 & 77-9.

display arranged by the Ministry of Aircraft Production for the Cabinet and MPs at RAE Farnborough.¹ Likewise, it followed the precedents set at the IWM, where exhibits of captured Axis equipment and advanced Allied technologies were designed to aid the training of Allied military and government personnel.² The exhibition was very popular and, like “Aircraft in War and Peace,” was extended. It was the first time that some items were displayed at the Museum, including the V2 rocket. A few of the items, but not the V2, were accessioned into the permanent collections.³ The real importance was that it was the first large-scale public exhibition of the material culture of World War Two in Britain and was another clear example of the Museum’s ability to construct exhibitions that highlighted contemporary technology.

The four galleries devoted to the permanent exhibitions were used for a “Special Science Exhibition.” It covered a range of recent developments in a variety of sciences and technologies - including atomic energy, uranium production, x-ray application, and the quartz crystal clock.⁴ This was the Museum’s first attempt at displaying wartime developments and it highlighted the problems that it faced during the post-War period – mainly the vast expansion of subjects and material that the Museum could cover.

The Museum opened the majority of the galleries to the public in late 1948. Throughout the period of reopening, the Museum continued a series of contemporary and historical special exhibitions. After the Special Science and German Aeronautical exhibits, a Naval Mining and Degaussing exhibit opened in June 1946. It was based on a display of material by the Admiralty Mining Establishment at Havant. Full of working exhibits, it attracted nearly 250,000 visitors in four months. Then, after several historical exhibits, “Home and Factory Power” opened in October 1947 with the purpose of contributing “to the solution of a national problem” by educating visitors about the relationship between domestic consumption, industrial consumption, and the production of gas and electricity. Then in November 1948, the Museum opened “Science in Building.” It was based on the work of the Building Research Station of the D.S.I.R. and was used by 60+ school parties, mainly from technical schools. In addition, the Museum held three anniversary exhibitions, all of which focused on showing historical developments and

¹ ScM Ed79/161.

² *War Years and After*, p. 17.

³ ScM Ed79/161.

⁴ AC 1940-51, p6.

applications to daily life.¹ The range of special exhibitions show that the Museum's staff was engaged with issues of national importance and of historical concern, with some of the subjects being covered in larger exhibitions. For example, the principles shown in "Science in Building" were later displayed at the Festival of Britain's East London "Live Architecture Exhibition." By using special exhibitions to show subjects unable to be illustrated by the permanent collections, the Science Museum was able to maintain its status as an institution of current scientific and technical training.

The years immediately after the end of the War were a flurry of activity at all of the National Collections. Each museum was trying to, at the minimum, return to their pre-war position. For some, like the Science Museum, the War had delayed previously approved buildings. In 1938, the Treasury had accepted seven urgent building needs, to be completed between 1939 and 1947, and in the words of the Standing Commission, the check caused by war, "coupled with the serious effects of enemy bombing ... has rendered still more serious an already urgent situation".² To direct plans for reconstruction, the Treasury approved a scheme with three tiers: 1) repair of air raid damage; 2) construct extensions and schemes either begun or planned before War; and 3) to reorganize the South Kensington site. The Treasury made one very important provision – that repair could be combined with extension and expansion where economical.³ This provision constrained the development of the Science Museum. The plan, as originally outlined in the Bell Report, was to demolish the Old 1862 Galleries and replace them with a modern group of three buildings – the Eastern, Centre, and Western Blocks. The War took care of the old galleries and because they were not to be repaired, the Museum was pushed down the list of priorities behind all of the museums that sustained significant war damage.

Of the seven scheduled pre-War building needs, several were subsumed in post-War reconstruction, but of the remaining needs, two were deemed urgent by the Standing Committee. They were the completion of the Entomological Block of the Natural History Museum and the construction of the Centre Block of the Science Museum. These fell to the second tier of the Treasury's reconstruction plan, but the Committee felt they deserved special attention. The Entomological Block was under construction at the outbreak of War, work stopped, and its

¹ AC 1940-51, p6-8, 14, 17, & 27.

² *War Years and After*, pp. 23-4.

³ BMSC, 10 July 43 (p5781-2).

steelwork survived undamaged. The Centre Block had been under consideration since 1912 and was one of the top priorities approved in 1938. By 1948, the condition was “wellnigh desperate” for the Science Museum, and that was before considering expanding collections to cover the developments of the War.¹ Plans were made for the construction of the Centre Block to begin in 1951.² Finally, nearly 40 years after the Bell Report, the second of its three phases was to begin.

Conclusion: War Experiences Shape the Future

The Second World War wrought dramatic changes throughout the world and this was equally true for museums. The experiences of the War shaped the modern British museum experience by increasing the level of professionalization, reinforcing the need for atmospheric controls, and pushing conservation reforms. Many of these advances were because of deficiencies in the previously accepted system, such as the lack of duplicate records at the Science Museum, and because they preserved the objects better. Yet, these advances were tempered by the effects of bombing because they not only collapsed the roofs of museums, but also the development programs envisaged for the 1940s and 1950s. Everyone felt this setback. While many museums were able to reformat pre-War ideas for the post-War world, the Science Museum was faced with dramatic changes within the fields it illustrated. The Museum was unable to respond, like the IWM, by greatly increasing accessions. Instead, it focused on creating temporary educational exhibitions about the developments of science and technology and because it focused on presenting, not collecting, contemporary science, the Science Museum was able to maintain its position as a museum of national (and international) importance.

Building the Centre Block

While the post-War priorities were being determined, the Festival of Britain office was looking for a place to house the exhibitions of pure science and the South Kensington museums were discussed. The basic arguments for the expansion of both the collections and exhibition space of the Museum, as laid out in the Bell Report and still relevant post-War, were three-fold: 1) a proper display of the Collections needed twice the space; 2) “comparatively few” eliminations could be made from the Collections; and 3) numerous accessions were needed to rectify the deficiencies of the Collections.³ By 1948, plans were made for the construction of the

¹ *War Years and After*, p. 26.

² Letter dated 26 June 48 (ScM 95B/10/1) in ScM Ed79/181.

³ *Bell Report (Part 1)*, p. 5.

Centre Block to begin in 1951 because it was third on the Ministry of Work's program for South Kensington, behind the completion of the Entomological Block at the Natural History Museum (to begin in 1949/50) and the shared Boiler House (to begin in 1950). In July 1948, the Festival's use of the Museum was doubtful and some, both at the Museum and the Ministry, hoped that any proposals would "blow over" because they could delay the use of the space by the Museum.¹ These hopes were expressed again during late 1948, when the South Kensington plans were discussed, and W.A. Procter declared that plans for the Festival "would not mature" and that the pre-War plans should go ahead unchanged.² Yet, nearly simultaneous with these statements, the Festival plans matured and it was agreed that the first section of the Centre Block would be constructed to provide space for a number of exhibitions.³ These included the Science Exhibition, a Planetarium, a Newton House,⁴ and a series of models.⁵ Each of these would have increased the space and facilities available at the Science Museum after the conclusion of the Festival, but drastic budget cuts to the Festival forced organizers to greatly constrict the exhibitions of the Festival. The budget cuts left only the Science Exhibition as part of the finalized program of the Festival at the Science Museum.

The construction of the Centre Block for the Festival did raise some issues. The main issue was whether the plans created in 1935 were suitable for the Festival, and more importantly, for the Museum after it was vacated. Naturally, the Ministry of Works did not welcome suggestions that required dramatic changes to those old plans. Overall, it was expected that the construction would provide 95,000 square feet for exhibition and 49,600 square feet for storage, offices, and a restaurant.⁶ As agreed in August 1948, the Centre Block section would be completed at the end of 1950 for the Festival's Science Exhibition, which opened to the public from 2 May to 20 September 1951.⁷ During its run, the Festival used about 35,000 square feet of the building (30,000 for the exhibition) spread over 3 floors.⁸ The Science Exhibition would

¹ Letter from Procter at MoW to Shaw dated 26 June 48 (ScM 95B/10/1) in ScM Ed79/181.

² Note of Meeting on 27 Sep 48 dated 10 Dec 48 (ScM 95B/10/2) in ScM Ed79/181.

³ "Note for Director on Return" undated in ScM Ed79/181.

⁴ This, according to the archive, was a rotating building designed to modify the laws of gravity by centrifugal force and would be used to demonstrate the principles of gravity.

⁵ Minute Paper titled "Planetarium for Festival of Britain 1951" in ScM Nominal 1356A.

⁶ "Note for Director on Return" undated in ScM Ed79/181.

⁷ AC 1940-51, p2.

⁸ Secretary Memorandum dated 12 Sep 50 marked ScM 95B/10/9 in ScM Ed79/181.

not completely vacate its portion of the Centre Block until nearly the end of 1951, but even after that point, the space could not be used immediately by the Museum. As soon as the exhibition closed, the Ministry of Works notified the Museum that money would be limited for works on the Centre Block and that they should take advantage of the materials created by the Festival in their displays. By economizing on redisplay, it was hoped to speed the opening of the new galleries.¹ Unfortunately, continuing budgetary constraints plagued the project and every proposal was estimated to require at least one year's worth of work and could not be included in the budget until after 1952/3.² This created a delay that could have been as long as three years for the (re)opening of the galleries. To prevent the space from becoming semi-derelict, the Museum struck a deal with the Natural History Museum to house the Mammals Collection, which had lost its home during World War Two. In early 1952, because of the agreement, the Treasury approved expenses to make the space acceptable for the Natural History Museum. For the Science Museum, this meant that they gave up half of the basement and ground floors of the Centre Block until the Mammals Collection's permanent home was completed.³ While this did create some additional space for the Museum's collections, it also created new problems with the Natural History Museum. Despite the additional space, exhibition and storage was still severely restricted, the planetarium question was still outstanding, and the delays to construction affected the Museum's ability to collect.

The Museum was caught in a Catch-22 over the planetarium. Post-War, the Ministry of Works still refused to design the Centre Block strong enough to carry the planetarium until the instrument was provided, while the Treasury would not purchase the instrument until the dome was constructed.⁴ This debate continued through the early 1950s. Gradually, it became obvious that the planetarium was a major delay to the construction of the Centre Block and that a solution must be found. In 1953, the lack of a completed Centre Block was seen as a huge disadvantage to the Science Museum. The expansion of Imperial College posed a serious threat to the Museum's Western Galleries, which housed the Aeronautics Collection. Restrictions on gallery space created the possibility that the Museum could lose significant donations from

¹ There is extensive correspondence about the ways that the Museum could economize by reusing and repurposing the Festival's leftovers. Most of the correspondence about this is in ScM Ed79/181.

² Various correspondence in ScM Ed79/181.

³ AC 1952, p2.

⁴ ScM Ed79/181.

Industry. Beyond that, the lack of storage space hampered the development of the collections. The solution to all of these problems was simple: finish the Centre Block.¹ Yet, gaining approval from the Treasury was not simple.

For the Museum, 1954 was a pivotal year - three major events occurred. First, the concern over the Aeronautical Collection faded because arrangements with Imperial College secured the Western Galleries until the Centre Block was completed. Second, Frank Sherwood Taylor divorced the planetarium from the Centre Block - a decision, along with the history of the Museum's attempts to gain a planetarium, that will be discussed in Chapter Four. Taylor reasoned that the separation could guarantee the speedy completion of both projects and it was not an admission of defeat for the planetarium.² Finally, in late 1954, the Treasury approved the Centre Block's completion.³ This approval was met with a renewed surge of interest in plans for the new building and the redevelopment of the older galleries.

This divorce had significant ramifications on gallery allocations and the future expansion of the Museum. After approving the Centre Block without the planetarium, the question of its appropriate location was again opened. Taylor's plan, as approved by the Museum's Advisory Council, was for the planetarium to be built in the basement of the future Western Gallery abutting the basement of the Centre Block. This solved one of the great problems that had plagued the planetarium for years: how to allow separate access at times that the Museum was closed. This new position would, upon completion of the Western Block, provide direct access from the street. Additionally, this move was important because it freed the top story of the Centre Block from the influence of the planetarium and, by association, the Astronomical Collection.⁴ Without this decision, the current display of the Aeronautics Collection would have never been possible. This decision had a larger effect on the actual physical structure of the Museum than any other single choice made by a Director. It created the space for the Flight Gallery, as it is known today, which has been one of the Museum's signature galleries since it opened in 1963.

Unfortunately, this progress did not continue. In 1955, Taylor fell ill again (he had also been ill during 1953) and he was sick for most of the last half of the year. On 5 January 1956,

¹ AC 1953, p2, 18.

² ScM Nominal 1356/36.

³ AC 1954, p1.

⁴ Paper C for Advisory Council on 5 April 55 in ScM Nominal 1356.

Taylor died at his home in Crowthorne, Berkshire.¹ For the second time in less than a decade, the Director of the Museum died while in the post. Taylor's replacement, Dr. T.C.S. Morrison-Scott, was an internal candidate and this allowed him to quickly establish his Directorship. This was lucky for the Museum because very soon after his appointment, he had to negotiate some complicated issues. In April 1956, Harold Macmillan issued his only budget as Chancellor of the Exchequer. This budget was supposed to rectify the unstable economic situation through a series of measures, including budget cuts, but quickly became known for its introduction of Premium Savings Bonds. At the Museum, "the incongruity of asking for reductions in staff at the time we were also being expected to expand" was realized and it was also noted that the lack of financial support from the Government was hurting the general development of the Museum because of the incapacity to initiate and complete proposals.² Taken together, the staffing cuts and inability to implement proposals caused by the Macmillan Cuts, as they became known at the Museum, meant that delays were inevitable.

Compounding these delays were the internal negotiations concerning the final layout of the galleries within both the new and the old buildings. These competing display priorities and their corresponding layouts had to be negotiated because they were influential in determining the final shape of the Centre Block. As mentioned above, one of the early negotiations of this type removed the planetarium from atop the building and replaced it with Aeronautics, but throughout the late-1950s and early-1960s similar negotiations were held regularly. Since the end of World War Two, the Museum had a habit of creating schemes for development of various types, ranging from the creation of new collections through the expansion of existing collections to the simple redisplay of old collections. It was during this period that many of the final decisions concerning these schemes were made. Many of the major schemes will be dealt with in detail later in this section, but to highlight the variation of schemes produced, a few will be introduced here. A proposal for a new collection to illustrate the developments of Automatic Control was made in 1951. By 1955, the idea had gained acceptance within the Museum and in 1956, it had been decided that this would either be a small new section or would be incorporated into existing individual collections.³ On the other hand, other collections, such as the George III

¹ Simcock, 'Alchemy and the World of Science: An Intellectual Biography of Frank Sherwood Taylor', *Ambix* vol. XXXIV, no. 3, 1987, p. 131.

² ScM Z183/6 No. 6 entitled "Macmillan Cuts".

³ ScM Ed79/119.

Collection, faced strong criticism of their place within the Science Museum.¹ In addition, there were numerous collections that had not been updated since the outbreak of World War Two and therefore some were basically twenty years out of date. Combined with the continued space limitations, complicated negotiations were required to finalize plans for the Centre Block.

The Museum was undergoing a philosophical shift. The Report of the Advisory Council for 1955 included more than the general reports. It included a discussion about the function and purpose of the Museum, a consideration about new developments in the art of visual display, some words on the historical perspective of the Museum, a section discussing the new facilities soon to be built, and a long report on the place of children within the Museum. Since the Museum gained independence in 1909, it had followed the same basic plan. That plan was most fully expressed in the Bell Report and provided the base for the majority of the Museum's plans throughout the first half of the century. By 1955, many things had changed at the Museum and a statement of the new purposes and functions of the Museum was required. The Report for 1955 was essentially a recapitulation of the working principles of the Museum. In addition, unlike the Bell Report, the Advisory Council Report did not offer many concrete suggestions for the improvement of the Museum, but this report is important because it highlights how the Museum had changed since its independence. This report provides a very good idea of how the Museum hoped to use the new space provided by the completed Centre Block.

According to the Bell Report, the Science Museum existed to provide technical and scientific education. The 1955 Report stated that the object of the Museum was "to exhibit the achievements, wonder, importance, and history of science." More telling, the report states, "the Museum exists to exhibit" (emphasis original). Whereas the Bell Report assumes that visitors to the Museum are naturally attracted to items (in much the same way that visitors could appreciate items of art²), the 1955 Report comes to a very different conclusion. It emphasizes the display of the items because if an exhibit fails to draw the attention of a visitor, then the visitor will not notice the knowledge presented. So, the first step to a successful exhibition was attracting the eye through modern visual display. These are methods that have developed outside of the museum world in areas such as shop counters, cartoons, advertising, television, and film/theatre. To bring these into the Museum and banish out-of-date nineteenth century

¹ ScM Ed79/125.

² *Bell Report (Part 1)*, pp. 13-4.

ideas, the best method was to bring outside consultants into the process to inject fresh ideas into exhibitions. Once the issue of attractiveness was overcome, curators could communicate “the achievements, wonder, importance and history of science.”¹ As a consequence of the new emphasis developing within the Museum, the idea that the Museum could train young people in the sciences was replaced by the purpose of influencing young people into scientific or technological careers.

Notwithstanding the specifics of the display, issues concerning the selection of items and how to communicate their functions and contexts were still unsettled.

In a certain sense the aesthetic status of a work of art exists in its own right. ... This is not true of the exhibits for the display of which the Science Museum was conceived. A clock is an object of no significance whatever unless it is known to be a clock. The difference between a modern mass produced alarm clock and a Tompion could not be appreciated by a man completely ignorant of clock-work.²

Thus exhibits that were without context or were poorly contextualized failed their primary purpose - education. Therefore, despite their possible attractiveness to the eye, exhibits had to simultaneously display function and context; otherwise the display served no useful purpose. Consequently, this linked problems of display with questions about accessions – a subject, which according to the Report, had never been carefully considered by the Advisory Council.³ The discussion within the Report concerns two basic questions: Should the collections be scientific or antiquarian? And, to what depth should the multiplicity of modern design be collected?

To answer the first question, the Report does not mince words. It says that “the Science Museum should be scientific, not antiquarian” and that being first is not enough to gain a place in the Collections! To gain a place in the Collection, an object should have contributed something to science or engineering by solving unique problems encountered in its construction. This condition was met by most, but not all firsts, especially given the vague sense that ‘contribution’ was defined. As far as the multiplicity of modern design, it was felt that the Museum should avoid “any artefact which exhibits no more than a particular arrangement of independent alternatives” (for example, automobile engines and transmissions) and any items that are generally considered to be modern consumer goods (for example, radios and

¹ AC 1955, p1-2.

² AC 1955, p2-3.

³ AC 1955, p3.

televisions). In these cases, accessions should be made that fit the ‘contribution’ guideline or that would illustrate the “principles embodied in such goods”.¹ These guidelines for the Collections of the Museum are not where the real importance of this Report lies.

The 1955 Advisory Council Report was mainly the work of Frank Sherwood Taylor and the real significance is partially born from his earlier experiences at the Science Museum. In the penultimate section of the Report, a call is made for two things: 1) a coherent plan and 2) enlarged Directorial powers. Having a plan was important, but the Directors of the Museum had historically faced serious opposition to any plans that they tried to implement. Taylor had faced resistance from his first day at the Museum and, such as in the case of the planetarium, had to try to out-manuever Keepers to accomplish his goal(s). To remove the need for such maneuvering, this Report recommended that the Director have the ability to implement policy decisions across the entire Museum, despite the protests of individual Keepers.² The section immediately after this recommendation is, by no accident, about the provision of a planetarium within the Museum – a subject in which Taylor had previously defended his Directorial decisions against the protests of a single Keeper.

While not as successful in becoming a long-standing term of reference for the Museum as the Bell Report, the 1955 Report marked the beginning of the long change from a museum focused on technical education to a museum focused on showing the history of science. The 1955 Report, while concentrating on the education of children and students, does not deal with practical education; instead it aimed to instill an appreciation of the achievements and history involved in the development of the sciences. While the new focus was appreciated by many, its suggestions were not as welcomed. Partially because of the strict nature of the recommended collections policy, it was never successfully established, and the Museum did not have an official collections policy until the 1980s. Most importantly, this Report did help to establish the power of the Director to overrule the opinions of the Keepers. The negotiations concerning the layout and schedule of the display of the Centre Block allowed the Director’s new powers to mature and become entrenched to the point that Directors of the last quarter of the century were willing to make drastic changes despite the protests of Keepers.

¹ AC 1955, p3-4.

² AC 1955, p4.

Once Taylor received approval in 1954, the construction to complete the Centre Block would start in 1958.¹ Here again, the Museum experienced delays. Construction would not begin on the Centre Block until April 1959. In truth, it was not until 1957, when the Government announced the expansion of Imperial College that real progress was made towards beginning the completion of the Centre Block. This was because of Imperial's long-standing claim to the space occupied by the Aeronautics Collection in the Western Galleries.² Finally, over 45 years after the Bell Report, progress was finally being made towards the construction of the second phase of the Museum's development.

Shaw oversaw the beginning of the Centre Block being constructed for the Festival of Britain; Taylor saw it used by the Festival and the Museum; Morrison-Scott saw construction continued; and in 1960, as the fourth post-War Director to oversee work on the Centre Block, Dr (later Sir) David Follett was named his successor. It was under him that in 1961, the fabric of the Centre Block was completed. In 1962, the Aeronautics Collection was 'flown' into place, and in 1963, both it and the Shipping Gallery was opened to the public. Over the next decade, working from top to bottom, the new galleries of the Centre Block were opened, including Land Transport in 1967 and the new Children's Gallery in 1969. This work was carried out according to the plan that originated under the guidance of Taylor, was shaped by Morrison-Scott, and finally completed by Follett.

The Sources of Delay

While the planetarium was a major proximate cause for the delay of the Centre Block, it was not the ultimate cause. The delays experienced by the Science Museum can be traced to two main sources: a lack of independence and lack of consistent leadership. The lack of independence, which can also be seen in the absence of administrative and financial autonomy, was the basis for many of the interdepartmental struggles faced by the Museum. The lack of a long-serving Director complicated those interdepartmental conversations because of the inconsistency of the Museum's long-term goals, which changed with each Director's personal agendas, and because of the lack of continuous professional relationships. Additionally, the lack of a Board of Trustees exposed the Museum staff to the vagaries of interdepartmental relationships and amplified the changes in the Directorship. The lack of these things placed the

¹ AC 1954, p6.

² AC 1959, p1.

Museum on an uneven footing with other National Collections and, in many ways, reduced the Museum's ministerial influence.

Many people believe that cultural institutions need administrative freedom from the government for a variety of reasons. For most institutions, this involves the creation of a Board of Trustees that acts as a buffer between the government and the institution. One of the earliest examples was the 1753 creation of the BM governed by a Board of Trustees, which reported directly to Parliament. Similarly, in the early 20th century, when moves were being made to establish the NMM, independence from a governmental department was a high priority, and in 1934, it was created under the control of a Board of Trustees.¹ The Science Museum and the V&A did not achieve similar independence until 1984.² Historically, the Museum had been under the control of the Ministry of Education and had to have approval from them, the Treasury, and the Ministry of Work for any major project. During this period, the Museum did have an Advisory Council, but they had no real power. While their recommendations were generally accepted by the Ministry of Education, they carried no weight outside of that Ministry. This relationship formed the basis of the Catch-22 situation over the planetarium and the delays in expansion.

Financial independence is also important to the development of museums. While the Science Museum was successful garnering small donations, especially of items, it was never successful to the level of other National Collections and relied heavily on the Treasury for building funds. In comparison, the BM, the Tate, the National Portrait Gallery, and the Wallace Collection received donations for new galleries and/or the renovation of old galleries from Joseph Duveen.³ At the NMM, the conversion of the Queen's House was covered by Sir James Caird, at a cost of more than £80,000, and was neither the beginning or the end of his donations, which included his £300,000 collection and the creation of the Caird Trust.⁴ Throughout the period of Duveen's and Caird's donations, which corresponds roughly to the period the Science Museum actively sought a planetarium, it was able to only get a £20,000 loan! The inability to find donors compounded the Catch-22 situation and the delays.

¹ Littlewood & Butler, *Of ships and stars*, pp. 52, 70-2.

² 'Museums to get greater freedom: Heritage Bill', *The Times*, 25 February 1983, pp. 4.

³ Martin & Davies, *Duveen, Joseph Joel, Baron Duveen (1869–1959)* in *DNB*, OUP, 2008.

⁴ Carr & Savours, *Caird, Sir James, of Glenfarquhar, baronet (1864–1954)* in *DNB*, OUP, 2004.

An example of the importance of independence can be taken from the NMM in the years immediately after its creation. During these years, while the Queen's House was being returned to its original state and the rest of the site was being converted for use by the NMM, decisions were taken by the Trustees, chaired by Lord Stanhope, or by the Director, Callendar, without the interference of any Government department and all costs were met by Caird, including landscaping, the cleaning of pictures, and the gesture of thanks to him - the Caird Rotunda.¹ In essence, if the Trustees or Callendar wanted something to happen and Caird was willing to pay, it was done. Because of their independence, their plans did not need to be commented on or approved by the series of departments that the Science Museum had to negotiate.

The lack of consistent leadership also contributed to the Museum's problems. During the twentieth-century, the Science Museum had eleven Directors and between 1930 and 1960, it had five: Sir Henry Lyons (retired in 1933), Col. E.B.B. Mackintosh (retired in 1945), Dr Herbert Shaw (died in post in 1950), Dr Frank Sherwood Taylor (died in post in 1956), and Dr T Morrison-Scott (retired in 1960). This turnover was high when compared to other National Collections. For instance, the V&A had two, the NMM had two, the Tate had two, the Wallace had two, the National Gallery had three, and the British Museum had four directors (but one, Sir John Forsdyke, served 14 years). Each Director at the Science Museum had his own agenda but, more importantly, each change disrupted professional (and personal) relationships that could be important during interdepartmental negotiations. In addition, because of the absence of Trustees to guide it during periods of transition or to provide support upon the death of a Director, the Museum relied on civil servants to make decisions that could greatly influence its future. This meant that the Museum operated within a diminished sphere of influence.

Again, the contrasts with the NMM are significant. The NMM's first Director, Sir Geoffrey Callendar, was involved with the project from the early 1920s until his death in 1946. His long involvement resulted in the creation and original layouts of the NMM, and he cultivated a large group of contacts within Government. Three of the contacts are particularly significant because of their relation to both the NMM and the Science Museum. The most senior was James Stanhope, seventh Earl Stanhope. He was the Chairman of both the National Maritime Museum Trust (1927-1934) and the Board of Trustees of the National Maritime Museum (1934-1959). Also, from 1930, he sat on the Board of the National Portrait Gallery and

¹ Littlewood & Butler, *Of ships and stars*, pp. 71-8.

was named the Chairman of the Standing Commission in 1941.¹ For the Science Museum, he was the President of the Board of Education - a conflict of interest that caused problems repeatedly. Also important was William Ormsby-Gore, fourth Baron Harlech. On 29 June 1939, as a Unionist MP, he moved the second reading of the National Maritime Museum bill and, because of statements about the absence of displays about the “national maritime adventure”, Mackintosh called Ormsby-Gore the “*accoucheur-in-chief*” of the NMM in a letter of complaint.² As mentioned earlier, his actions delayed the Centre Block in January 1936. In addition, he was active with many other major collections, including the British Museum and the National Library of Wales, and was the chairman of the Standing Commission in 1949.³ The final person was Sir Eric de Normann, the chief architect at the Ministry of Works. According to Littlewood and Butler, he was key for the development of the NMM and throughout his career helped to move along work at the NMM.⁴ Each of these men became involved with the NMM for different reasons, but one of the continuous features of their involvement was the presence and friendship of Callendar. Additionally, the involvement of these men in competing institutions, especially between the Science Museum and the NMM, meant that their personal biases influenced their professional judgements and exaggerated the Science Museum’s other disadvantages.

No one individual or circumstance caused the delays that the Museum experienced, but the scale of the delays is still significant. Overall, the second stage of the Bell Report was delayed by between thirty and forty years, while the third stage was opened by the Queen in 2000 - a full 78 years after it was recommended! Luckily the Museum was able to expand both its storage and exhibition space outside of South Kensington, otherwise its ability to collect would have been restricted greater than it was after the Second World War.

¹ Littlewood & Butler, *Of ships and stars*, pp. 56, 112, & Appendix 1.

² Littlewood & Butler, *Of ships and stars*, pp. 71, 107-8.

³ Robinson, *Gore, William George Arthur Ormsby-, fourth Baron Harlech (1885–1964)* in *DNB*, OUP, 2004.

⁴ Littlewood & Butler, *Of ships and stars*, pp. 60, 120.

CHAPTER 3:

THE FESTIVAL OF BRITAIN, 1951



The Abram Games Festival Logo

Festival Basics

In 1951, Britain held a national festival. It was a government-sponsored program of cultural events, consisting of thousands of activities spread throughout Great Britain and Northern Ireland. The vast majority of the events were not planned or sponsored by the main London-based organization, but were locally-produced events designed to celebrate the special character of an area or historical event. The official events were spread across 55 principal locations from London to Glasgow to Dolhedre, Wales. These included the main South Bank Exhibition in London, the Ulster Farm and Factory Exhibition, a scattering of arts festivals, and the ports of call for the two traveling exhibitions - the Festival Ship *Campania* and the Festival Exhibition.¹ Not only was it spread geographically, but the events were spread throughout the year with the majority of the official events taking place from 3 May to 30 September. Overall, because of the Festival, over 600 towns, villages, and institutions made improvements to their amenities, including the planting of 2,000 trees by the Bedfordshire County Council and a new wing at the Science Museum. The events attracted large crowds - 8.5 million at the South Bank and 1.35 million saw the traveling exhibitions. These crowds included a large number of international visitors - about 600,000 - that spent £74 million while in the country.² With such a large attendance, the Festival is fondly remembered by many who attended it, and has come to

¹ The Festival Exhibition is commonly known as “The Land Travelling Exhibition” and this is/was the popular name for it. The moniker, “The Land Travelling Exhibition”, was an official name but was not included on the cover of its guide. For that reason, it will be referred to as The Festival Exhibition throughout this work.

² Barry, 'The Festival of Britain, 1951 - Three Cantor Lectures', *Journal of the Royal Society of Arts* vol. C, no. 4880, 1952, pp. 667-704.

symbolize many of Britain's post-War aspirations, aspirations that were compounded by a completely new political landscape, with two clear superpowers - the United States and the Soviet Union - and a reduced place for Britain. In this new world, Britain needed to make a statement about her place in world affairs.

The Festival was to embody that statement and used British intellectual contributions to define Britain's post-War position. The Festival's original working orders were to display "the British contribution to civilization, past, present, and future, in the arts, in science and technology, and in industrial design."¹ Beyond that, Director-General of the Festival, Gerald Barry, took the Festival to answer Winston Churchill's gibe, "What sort of people do they think we are?", because it was about showing the nature of the British people.² One of the key subjects that would show the nature of the British was science, but this was science in the broadest sense – not just the method of investigation and the body of knowledge gained, but also as the human activity of the people engaged and the physical products of the method (i.e. technology). It was envisaged that a new science-centric British identity would be formed and the Festival was designed around that identity. This was done through the careful selection, collection, and exhibition of British manufactured goods. Historical examples, such as the 1851 Great Exhibition, show that large-scale exhibitions were effective platforms to make broad statements; in this case, about Britain, its people, and its place in the post-War world.

This was not the only purpose of the Festival, it had several motivations from the beginning. At its beginning, the Festival was planned as an international exhibition showing Britain's recovery after the War. In 1943, when the Royal Society of Arts first suggested commemorating the 1851 Exhibition, the proposed international exhibition was to be a "striking manifestation" of the "positive achievements" of all nations.³ In short, it was hoped to repeat the success of the Great Exhibition. This hope was not realistic and was quickly dashed because of financial difficulties - money was an obstacle from the Festival's first organizational struggles. The cost of an international exhibition was much too great for post-War Britain and reducing the exhibition's scale provided it with a clearer focus and with the practical functionalism that, to

¹ Barry, *Cantor Lectures*, p. 674.

² Barry, *Cantor Lectures*, p. 676.

³ Bennett & Attlee, 'The proposed international exhibition: action taken', *Journal of the Royal Society of Arts* vol. XCV, no. 4735, 1947, pp. 111-8.

many, was its greatest feature.¹ The lack of funding determined the Festival's final, relatively modest, scale, but what factors determined its final purpose?

The purpose, as defined above, was an amalgam of the purposes that various contributors to the development originally held. At a superficial level, the Festival was a centennial celebration of the Great Exhibition. According to those involved, the Festival's purpose was to tell the story of the British achievement in all areas, written through the history of the British people, as opposed to the history of the British crown or Empire.² Politically, it was a statement of the "radical middle-classes"³ that supported the Labour government led by Clement Attlee and the *Let Us Face the Future* manifesto. Besides the more philosophical concerns, the Festival was expected to highlight the British way of life, promote British Industry, display important British art/design, and cover the entire British Isles. Its design was to 'distract' the visitors from the difficulties of war and reconstruction and, as such, it was part of the Government's larger program to sell the post-War world to visitors.⁴ To be successful in all of these purposes, this national reassessment and reaffirmation required that its arguments be presented in ways that were both entertaining and educational. This jumble of goals and ideas was gradually moulded into the "sophisticated creature"⁵ that turned its working orders into a consistent face that presented the new science-centric British identity across dozens of locations around London and throughout Great Britain and Northern Ireland.

Organizing the Festival

The Festival of Britain's Executive Committee was formed in 1948, and on 31 March, Gerald Barry was appointed Director-General. This was the beginning of the Festival as a government project, but it had been discussed since 1943. The first suggestions, which were made in private by members of the Royal Society of Arts, were to celebrate the centenary of the Great Exhibition with another international exhibition. During the final years of the War, the idea did not develop, but in the last months of 1945, a series of letters appeared in British newspapers supporting an event to be held in 1951.⁶ These letters included an open letter in the

¹ Frayn, 'Festival' in Sissons, & French (eds), *Age of austerity*, OUP, 1986, , p. 308.

² Banham & Hillier (eds), *A Tonic to the Nation: The Festival of Britain, 1951*, Thames & Hudson, London, 1976, pp. 7-8.

³ Frayn, *Festival*, p. 307.

⁴ Barry, *Cantor Lectures*, pp. 676-7.

⁵ Barry, *Cantor Lectures*, p. 673.

⁶ The first of these was written by John Gloag in *The Times* on 11 Sep 1945.

News Chronicle by Gerald Barry to Stafford Cripps, President of the Board of Trade, arguing for a trade and cultural festival to be held in London.¹ Cripps replied favorably to the letter and the first formal steps were taken to organize the Festival. The first step was the Ramsden Committee's feasibility investigation of an international exhibition in 1951. It concluded in March 1946 that an international exhibition was feasible and that one should be held as soon as practical to show the world the recovery that Britain had made from the efforts and damages of war.² Even though the Ramsden Committee's recommendations were generally accepted, the cost of such an endeavor was too high for post-war Britain, which still had as many as four million houses³ that had been damaged or destroyed by bombing. The government's calculations deemed that it would cost approximately £70 million and would have required approximately one-third the building labor available for three years.⁴ The government decided to organize, in the words of Barry, a "suitable and inexpensive" event.⁵

In March 1947, the less ambitious event, with a budget of approximately £12 million, was announced. Instead of the planning being the responsibility of the Board of Trade, the responsibility for organizing the Festival fell to the Lord President of the Council, the Right Honourable Herbert Morrison, a Labour MP. This smaller national event was not going to be designed as a trade exhibition, instead it was going to tell a story about British industry, arts, and sciences.⁶ This, in the words of Barry, who was the personality behind much of the Festival, was "something at once both more modest yet more ambitious; more simple, yet more complicated."⁷ These reductions and changes in the organization of the Festival created a revolutionary event, where the nation was *on exhibit*.

The Festival of Britain, like any large event, was a reflection of the characters involved in the organization. Very few decisions were made without the input of the eleven-strong

¹ Barry, 'Open Letter to the President of the Board of Trade', *News Chronicle*, 14 Sep 1945.

² Ramsden, Lord, et al., "Board of Trade. Report of the committee Appointed By the Secretary for Overseas Trade Under the Chairmanship of the Lord Ramsden to Consider the Part Which Exhibitions and Fairs Should Play in the Promotion of Export Trade in the Post-War Era and to Advise on the Policy and Plans to be Adopted to Derive the Maximum Advantage From Such Displays [Cmd. 6782]." *HMSO*, London, 1946.

³ According to some sources, this was one-third of the total housing in Britain. The total amount of construction to be completed was far greater than four million homes, when public and commercial buildings are included.

⁴ Conekin, *The Autobiography of a Nation: The 1951 Festival of Britain*, Manchester University Press, 2003, p. 28.

⁵ Barry, *Cantor Lectures*, pp. 668-70.

⁶ Conekin, *The Autobiography of a Nation*, pp. 28-9.

⁷ Barry, *Cantor Lectures*, p. 670.

Executive Committee. This committee's work extended beyond just offices and meetings. They used any opportunity or location available to plan. It did not matter if it was in the "Information Room" of Number Two Savoy Court or at a bus stop, the Executive Committee controlled all decisions about the Festival. This micro-management meant that the organizers had a larger impact on the Festival than many realize. Their limited number and detail-oriented management style meant few aspects escaped their influence. Even at points where outside expertise was used, such as on the Advisory Panels, the experts were used solely as "silent guarantors of the Exhibitions' factual integrity", without the Executive Committee and their subcommittees losing any actual control.¹ As mentioned, when the Festival was announced in March 1947, the Rt. Hon. Herbert Morrison was the formal leader of the organizational efforts of the Festival. In practice, he was not the most important figure for the Festival. That was Sir Gerald Barry, who was both the driving personality and the recognized leader. It was his personal opinions that affected all aspects of the Festival, either because of his direct involvement or because of his selection of like-minded individuals for both the Executive Committee and the subcommittees, especially the Science Director and his Science Council.

Sir Gerald Reid Barry (1898-1968) was a World War One veteran and a journalist/newspaper editor before being named the Director-General of the Festival of Britain. His experience at the *News Chronicle*, where he was managing editor from 1936 till 1947, is reflected in the style of management used for the Festival of Britain because he had the experience of an interfering chairman and later, during the War, the ability to successfully push the paper leftward.² Besides his newspaper work, he was a founding member of PEP (Political and Economic Planning) with Max Nicholson, Julian Huxley (zoologist), Sir Basil Blackett (international financier), Michael Zvegintzov (research chemist), and others. The PEP was a Labour think-tank that from its foundation in 1931, was one of the top research organizations dealing with the economic and social problems of modern post-World War One society.³ As Director-General, Barry dealt with three years of financial crises, strong political opposition, bad press, bad weather, construction difficulties, and organizational struggles, but organizing the Festival "was a job right up his street and for which he was marvelously equipped."⁴ It was his

¹ Barry, *Cantor Lectures*, pp. 674-84.

² Conekin, *Barry, Sir Gerald Reid (1898-1968)* in *DNB*, OUP, 2008.

³ 'Political and Economic Planning', *Nature* vol. 151, no. 3831, 1943, pp. 372-4.

⁴ Casson, 'Sir Gerald Barry', *The Times*, 25 Nov 1968, pp. 10.

combination of skills, political beliefs, and connections that made him ideal to be named as Director-General of the Festival by Lord President Herbert Morrison.

Herbert Morrison (1888-1965), by the mid-1940s, had long been involved with politics. His political beliefs started early - reading extensively a range of historical and economics works including English translations of Marx, Engels, and Kautsky. Gradually, during his late teens, he became a socialist. By his early twenties, he had become an effective outdoor speaker and was committed to a gradual transformation of the social and economic conditions of the working classes. In 1912, he ran for his first office, a municipal position in Vauxhall - a race he lost. After the creation of the London Labour Party in May 1914 and the death of its initial secretary, Morrison was elected as its second secretary and his first significant post. Morrison's political successes continued. From 1929 to 1931, he was the Minister of Transport. From 1934 to 1940, he was the leader of the London County Council. In May 1940, his intervention in the debate on the failure of the Norwegian expedition was crucial in securing the vote that led to the creation of Churchill's coalition government. From October 1940 to May 1945, he was Home Secretary and from November 1942, he was a member of the War Cabinet. As Home Secretary, he dealt with several difficult issues, including censorship of the press, and preparing for/responding to the Blitz. During the War, he built a reputation as a ministerial troubleshooter because of his habit of holding careful discussions with all parties before reaching a firm decision. Post-War, he continued to play a key role in the Labour party, including producing the first draft of the *Let us Face the Future* manifesto. After challenging Attlee for the Labour leadership early in 1945, he was named the Lord President of the Council and Deputy Prime Minister. These positions put him in charge of domestic affairs, including economic planning and the nationalization program. In 1947, he was asked by Atlee to be the minister in charge of the Festival and it became his pet project, even after he was moved to the Foreign Office in 1951.¹ Morrison, while being publicly known as "Lord Festival", only got involved when his intervention was needed. He solved labor disputes that threatened to delay the Festival. He removed politically-slanted statements about free meals from the Schools Pavilion. He negotiated the approval of an "indecent" statue by Barry and avoided embarrassing press coverage. He reorganized the control of the Festival Pleasure Gardens. His only unsuccessful intervention concerning the Festival was his failure to

¹ Howell, *Morrison, Herbert Stanley, Baron Morrison of Lambeth (1888-1965)*, 2008, retrieved 19 Feb 2009 <<http://ezproxy.ouls.ox.ac.uk:2117/view/article/35121>>.

obtain permission for the exhibitions to be open on Sunday. During the opening week of the Festival, he gave many of the important speeches and was the King's escort through the South Bank on his official visit.¹ His public involvement with the Festival made him an important figure.

Perhaps most important for the Opposition's perception of the Festival, was the appointment of Baron Ismay (1887-1965) as the chairman of the Executive Council by Atlee. An appointment that, according to Ismay himself, called for strategic planning no less complicated than a military operation.² His appointment was important because he had made his military career being trusted, calm, calculating, soothing, and a skilled negotiator - a point proven by the fact that he was trusted completely by Churchill and that he was chosen as the first secretary-general of NATO.³ Politically, the appointment of Ismay was important. With his involvement, many of the right-leaning politicians, including Churchill, could not strongly oppose the plans as vehemently, and he provided an unmatched level of seniority.

A final and sometimes overlooked individual who headed the organization of the Festival was Max Nicholson (1904-2003). At the age of thirteen, he was published in *The Field*. In 1921, he published his first newspaper article. In 1923, he was writing travel guides and by 1925, he was well established, partly because of his articles on birds. In 1926, he won a scholarship to Hertford College, Oxford and continued to publish (he was the Oxford correspondent for the *Saturday Review*). Also in 1926, he published *Birds in England* - a work that suggested the Victorian collecting mania should be replaced with a modern ornithology. This was followed by *How Birds Live* (1927) and *The Art of Bird-Watching* (1931). In 1933, he founded the British Trust for Ornithology. At the same time he was establishing himself as a leading ornithologist⁴, he was also actively involved in the political scene. In 1929, he became assistant editor of the *Weekend Review*, where his "A national plan for Britain" appeared in February 1931. Shortly afterwards, he was joined by Barry and others in the creation of the PEP. Nicholson also published articles

¹ Donoghue, & Jones, *Herbert Morrison: portrait of a politician*, Phoenix, London, 2001, pp. 492-3.

² He made this comment in a speech that he gave on 8 June 1949 at a meeting of the heads of local government at the Guildhall in London.

³ Lewin, *Ismay, Hastings Lionel, Baron Ismay (1887-1965)* in *DNB*, OUP, 2008.

⁴ His status as a leading ornithologist allowed him, once he left the civil service in 1951 when Morrison was moved to the Foreign Office, to become the Director-General of the Nature Conservancy. It was during his directorship that the Conservancy experienced its "glory years". In addition, in 1951, he took over the editorship of the important ornithological journal, *British Birds*. He was an active member of the environment and development movements until his death, with his last publication coming in 2001.

with Barry in the *News Chronicle*. Nicholson's involvement with the civil service began during the War, when he joined the Ministry of Shipping (later the Ministry of Transport) and became responsible for allocating tonnage for nearly all British seaborne freight. For the first time, he displayed the skills that helped him organize the Festival, mainly getting around procedural obstacles, getting the right people to do the right job, and getting people to work together. As part of the post-War Labour government, he was the Secretary of the Office of the Lord President and Morrison's most senior civil servant - in essence, his personal secretary. His official concerns were to promote economic planning. When that role was lost to the Treasury, it freed up his time to devote to the Festival.¹ While it was Morrison's decision to name Barry as Director-General, it was Nicholson who decided that Barry was the perfect person for the job.² In addition, he continued to work with Morrison on the Festival and was instrumental in helping Morrison with many of the difficulties encountered.

The Festival Presentation Panel was where final decisions were made.³ Yet, according to official Festival publications, it did not exist.⁴ While not being an official committee of the Festival of Britain Office, it was important as a clearing house for the work of the various official committees and as a subset of the Executive Committee. The Presentation Panel included Peter Kneebone (designer), Anthony Hippisley Coxe (representative from the COID), James Holland (architect), James Gardner (architect), Ralph Tubbs (architect and critic), Misha Black (architect and experienced exhibition designer), and five members of the Executive Committee. They were Barry and four of the committee directors who controlled different aspects of the Festival - Exhibitions, Finance and Establishments, Architecture, and Science and Technology. The Director of Exhibitions and also the deputy chair of the Presentation Panel was Cecil Cooke, a civil servant from the Central Office of Information. The Director of Finance and Establishments was George A. Campbell, a civil servant from the Treasury. The Director of Architecture, Town Planning and Building Research was Hugh Casson, an architect who worked for the Air Ministry's camouflage service and for the Ministry of Town and Country planning during the War. Finally, the Director of Science and Technology was Ian Cox, who

¹ Greenwood, *Nicholson, (Edward) Max (1904–2005), ornithologist and environmentalist* in *DNB*, OUP, 2009.

² Nicholson, as quoted in Ebong, 'The Origins and Significance of the Festival of Britain, 1951', PhD, 1986, p. 51.

³ Conekin, *The Autobiography of a Nation*, p. 35.

⁴ Taylor, *The Official Book of the Festival of Britain*, 1951, HMSO, London, 1951, pp. 71-2.

had worked for the Ministry of Information during the War. Of these four, Casson and Cox were more influential on the final structure and appearance of the Festival.

Hugh Casson, who was knighted in 1952 for his work on the Festival, headed the Council of Architecture, Town Planning, and Building Research, or more commonly known as the 'design group' - comprised of himself, Misha Black, Ralph Tubbs, and James Holland. Casson, with the group he chose, created the Festival's look and feel. While he only made a small contribution through his designs, his selection of architects/designers, many of them relatively young, was the real manifestation of his influence. He and Holland laid out the basic plan for the South Bank, combining Casson's theatrical flair (he worked in theatre while in Cambridge), modern architectural theory, and pre-War European exhibition into a cityscape that was completely new for the vast majority.¹ Together, this group was responsible for many of the Festival's most dramatic buildings.

Ian Cox, as Director of Science and Technology, was the leader of the Science Council, a group of ten scientists who were considered eminent in their fields and were in charge of the main chapters of the scientific story. While they were responsible for the final content of the displays, Cox and Barry realized that factual accuracy was important for all scientific and technical displays. To ensure that, eighteen Advisory Panels of specialists were created to act as an editorial control. Overall, this group was responsible for a large percentage of the Festival's exhibitions, including the contents of the Dome of Discovery and the Science Exhibition at the Science Museum. Personally, Cox was responsible for the overall plan of the South Bank and wrote *The South Bank Exhibition: A Guide to the Story it Tells*.

Another person key to the message portrayed by the Festival was Dr Jacob Bronowski. He was the best of both worlds for Barry; he was trained as a mathematician at Jesus College, Cambridge and edited a literary magazine, *Experiment*, with a fellow mathematician. After leaving Cambridge, he lectured at the University College of Hull and in 1942, joined the war effort. His focus was on operational research methods, and he applied his methods to write a report based on his experiences in Japan as scientific deputy to the British joint chiefs mission in 1945. After his publication of *The Effects of Atomic Bombs at Hiroshima and Nagasaki*, he did not return to his post as a mathematics lecturer. Instead, he turned his research methods to

¹ Powers, *Casson, Sir Hugh Maxwell (1910–1999)* in DNB, OUP, 2007; Harvey & Brunius, 'Brief City', 1952.

industrial problems, joining the National Coal Board in 1950 and researching smokeless fuel.¹ At the same time, he turned his attention to other fields, ranging from the writings of William Blake to paleontology and biology.² It was at this point in his life that he became involved with the Festival of Britain. Barry wanted the captions of the Festival to be “brief, accurate, and pithy”, that the vast majority of the explanation should be contained within the exhibits, and that visitors would not spend time in exhibits reading.³ Bronowski’s scientific training and skills as a poet and author were harnessed to meet these demanding criteria, and for *The Exhibition of Science, South Kensington: A Guide to the Story it Tells*.

Beyond this select group of people were an army of workers, ranging from secretaries to construction workers that made the Festival happen. Some of them will be introduced or referenced later for specific reasons, but there was one larger group that was important to the planning and outcome of the Festival. They were the intended audience, who became the Festival’s visitors. The majority of the Festival was aimed at the “intelligent layperson” - an idealized portion of the population who were informed non-experts receptive to complicated modern ideas.⁴ This was the scientific equivalent of Dr Samuel Johnson’s and Virginia Woolf’s “common reader” - a person who reads for the pleasure and is driven to learn for their own improvement.⁵ The idea of the intelligent layperson developed during the nineteenth and early twentieth century alongside concerns over increasing specialization, not just in the sciences but also throughout the humanities.⁶ Popular throughout the 1940s and 1950s (and persisting in some areas until the late 1960s), the intelligent layperson developed a long list of quasi-mythical characteristics and his characteristics (for it was still generally a ‘he’ that was catered for) can be summed up as: politically/socially involved citizen; educated in a grammar or public school; open minded about and interested in science and technology; listened to the BBC’s *Home Service* and *The Brains Trust* on the radio; read Penguin paperbacks on special topics, such as *Why Smash Atoms?* or *The Managerial Revolution*; regular reader of broadsheet newspapers; knew all the laws

¹ Sheets-Pyenson, *Bronowski, Jacob (1908–1974)* in *DNB*, OUP, 2007.

² O’Connor, & Robertson, *Bronowski*, 2003, retrieved 26 July 2005 <<http://www-groups.dcs.st-and.ac.uk/~history/Mathematicians/Bronowski.html>>.

³ Barry, *Cantor Lectures*, p. 690.

⁴ Forgan, 'Atoms in wonderland', *History and Technology* vol. 19, no. 3, 2003, pp. 177-96.

⁵ Woolf, *The Common Reader, First Series*, 1925.

⁶ Collini, 'Before Another Tribunal: The Idea of the ‘Non-Specialist Public’ in *English Past: Essays in History and Culture*, OUP, 1999, pp. 305-25.

of cricket; held membership in a society, like the Royal Society of Arts; lived in the city but enjoyed the countryside; supported modern town planning; and believed that urban poverty could be solved through the involvement of the Government.¹ It was for a person with these characteristics that the Festival was designed and who intellectuals, like Barry, hoped would support the work of scientists and engineers in developing a Britain for the future.

Placing the Festival

The Festival of Britain was designed *as a nation on show* and so the locations where it was placed are symbolic of the nation that it represented.² Over the course of the year, 2,000 cities, towns, and villages took part in the Festival. In Coventry, Lady Godiva's possession was held as part of the city's Festival of Britain celebrations.³ In Oxford and Cambridge, the Universities and Colleges held a series of events that expressed the "finest developments" in the arts that they had encouraged throughout the centuries and, by opening places generally closed to the public, to show the grace of their architecture.⁴ In small villages throughout the country, similar events were held that highlighted special features of that area. Most places where the Festival occurred are not important here because, while science was a major theme for the larger events, it was not exhibited in these smaller (and more numerous) events. Of the approximately 55 principal events⁵ that occurred around the United Kingdom, about a third presented science or technology to the public. In London, these were at the South Bank area, the Battersea Pleasure Gardens, and the Science Museum. Outside of London, science and technology was dealt with briefly in the traveling exhibition, and particulars were given comprehensive coverage in Belfast, Glasgow, and Wales. The Festival, while controlled from No. 2 Savoy Court and centered on London, reached throughout the United Kingdom.

¹ Memo dated 16 Aug 49 in NA Work 25/48/A5/49/D59.

² For a discussion of the importance of the place versus the space involved, see Carter, Donald, & Squires, *Space and place: theories of identity and location*, Lawrence & Wishart, London, 1993, p. xiii.

³ 'The City of Coventry: The legend of Lady Godiva' in WB Stephens (ed.), *A History of the County of Warwick: Volume 8: The City of Coventry and Borough of Warwick*, 1969, pp. 242-7.

⁴ Taylor, *Festival of Britain, 1951*, pp. 42-3.

⁵ The distinction between 'official' and 'unofficial' is hard to determine because even some of the official events were neither planned nor funded by the London-based organizers. Instead of making determinations based on any official status, I am going to deal with the principal events as outlined in the various schedules published by the Festival Office during 1950 and 1951. One common feature of many of the principal events was the design of the official guides. The guides for the South Bank, the Science Exhibition, Live Architecture at Lansbury, Industrial Power in Glasgow, Farm & Factory in Ulster, the Festival Ship, the Festival Exhibition, and the Exhibition Catalogue were all similar in their cover design and layout.

The epicenter of the Festival was the South Bank. It was the single largest display created for the Festival of Britain and contained the majority of all exhibits. It occupied nearly 35 acres of land, of which four and a half were reclaimed from the Thames.¹ It was the location for the basic story about the British contribution to the modern world. This was told through the various themed areas, including the Dome of Discovery, The Lion and the Unicorn pavilion, the Power and Production area, and displays on Transportation. In addition, it contained other features that expressed the influence of science and technology on daily life, including the Telecinema,² restaurants with science-based designs, and sculptures, such as 'The Skylon'. The integration of science and technology into the displays at the South Bank stressed the increasing influence that science has on daily life.

Since the South Bank demonstrated the relationship between science and daily life, it was left to the Science Exhibition at the Science Museum to show the step-by-step method that science used to produce results. The guide to the exhibition defines science as something not remote, mystical, or scary, but as the understanding of the world based on common knowledge and simple observations. Along those lines, the exhibition looked inside nature/matter and showed how it worked.³ Although, the Science Exhibition emphasized pure science, rather than the South Bank's emphasis on applied science, it was not exclusively a display of pure science. The Science Exhibition presented new technologies, like computing and robotics, to visitors and reinforced the South Bank's message about the influence of science and technology on daily life.

The South Bank was where people could experience modern architecture, but the Festival also created a place where people could live it. In a section of East London, the Festival held the Live Architecture Exhibition. It was built as a place where British people could learn about modern building sciences and town planning. In addition, it was a practical project to rebuild a heavily damaged section of London as the example of new materials, methods, and styles that could be applied to areas throughout the country.⁴ Of all the Festival locations, this was one of the few sites that was constructed as a permanent addition to the fabric of London - it

¹ Cox, *The South Bank Exhibition: A guide to the story it tells*, HMSO, London, 1951, p. 7; *The Story of the Festival of Britain, 1951*, Festival Council, London, 1952, p. 6.

² In some resources, it is spelled as Telekinema, while in the BFI's publication, *Films in 1951*, they spell it Telecinema. In this paper, Telecinema will be used.

³ Bronowski, *Exhibition of Science: South Kensington: A Guide to the Story it tells*, HMSO, London, 1951.

⁴ Banham & Hillier, *A Tonic to the Nation*, pp. 138-41.

was designed as a community.¹ This locale was designed to put into practice the science that was demonstrated at the South Bank and elsewhere by the Festival.

While architects and scientists “ran away” with the South Bank and the other exhibitions, the Pleasure Gardens at Battersea Park was where people could relax and have some fun. The Pleasure Gardens were also the only place within the Festival that companies could sponsor exhibits.² The last difference within the Gardens was the presence of non-British products - the American fun fair rides, were only the most prominent of them. The Gardens were designed and advertised as the place to play, but only in a socially beneficial manner.³ In short, it was designed as a place for education. In a period of rationing and austerity, the Gardens were a location to educate the citizen consumer, who during this period was generally seen as female,⁴ about technology.⁵ Overall, the gardens were a place to escape the overtly educational displays of the rest of the Festival and to enjoy the commercial benefits that modern society had created.

Besides these events above, a handful of other things were planned in London



The Pleasure Gardens were also unique because it was the only Festival exhibition that advertised within Festival publications. This advertisement appears in nearly all other Festival guides.

(From Land Traveling Exhibition Guide, page xx)

¹ Conekin, *The Autobiography of a Nation*, pp. 120-2.

² Banham & Hillier, *A Tonic to the Nation*, pp. 118 & 132-3.

³ The idea of rationale or beneficial recreation has a long history. From the earliest modern collections, part of the rationale of their presentation was that the act of viewing an item could improve the viewer. For examples of this, see Chapter 1 of Bennett, *The birth of the museum*, Routledge, London, 1995. During the early nineteenth century, it was a popular idea within Britain, culminating in the Great Exhibition of 1851. For a discussion of this, see Greenhalgh, *Ephemeral vistas*, 1988. Finally, for a comparison of the ideas of leisure between the Great Exhibition, the Festival of Britain, and the Millennium Experience, see Philips, 'Stately pleasure domes - nationhood, monarchy and industry: the celebration exhibition in Britain', *Leisure Studies* vol. 23, no. 4, 2004, pp. 95-108.

⁴ One expression of the Labour Party's views on women's place in society can be found in *Womanfare*, Labour Party, London, 1951.

⁵ Conekin, *The Autobiography of a Nation*, p. 209-212.

during 1951. For example, at the V&A, the National Book League arranged an exhibition of books and the V&A held a commemorative exhibition about the Great Exhibition of 1851.¹ The Royal Festival Hall held a series of concerts and other events. Throughout London (and the UK), churches held special services and presented talks about the place of religion in modern society.² All these other events were designed to show the contributions that the British had made to modern culture, but they did not deal with science or technology.

The rest of the major Festival events occurred outside of London. They fall into two rough categories: those planned from London and those planned autonomously from London. The most notable of the events planned by the Festival Committee in London were the two traveling displays: the Festival Ship and the Festival Exhibition. Together these two displays visited fourteen locations, and were one way that the Festival Committee tried to extend the South Bank throughout the UK.³ The autonomously planned events ranged from the smallest event in a village to some of the larger towns and were mainly non-scientific. These events, like many of the scientifically-minded ones, were historically related to the place in which they were organized. For example, both Oxford and Cambridge highlighted their academic credentials, Brighton celebrated its Regency period (1790 to 1830) glamour, and Bath recreated its Georgian splendor.⁴ Besides the traveling exhibits, there are three provincial functions that are important for their portrayal of science and technology.

In Glasgow, the Festival held the Exhibition of Industrial Power to present the story of British contributions to heavy engineering. It was a story about machines and the men who designed and used them. The story was presented through a series of 'halls' - each illustrating an area of heavy industry and the effects of British contributions. These were the Hall of Power, the Hall of Coal, the Hall of Steel, Power for Industry, the Hall of Electricity, the Hall of Hydro-Electricity, the Hall of Civil Engineering, the Hall of Shipbuilding and Railways, and the Hall of the Future - which presented atomic energy. The exhibition was planned under the auspices of the Scottish Committee of the Festival Council, a London-based group, but it was the Council

¹ Gibbs-Smith, *The Great Exhibition of 1851: a commemorative album*, HMSO, London, 1950; The National Book League, *The Festival of Britain: Exhibition of Books*, CUP, London, 1951.

² *The Church and the Festival: Souvenir Programme*, SPCK, London, 1951.

³ The Festival Exhibition went to Manchester, Leeds, Birmingham, and Nottingham. The Festival Ship docked at Southampton, Dundee, Newcastle, Hull, Plymouth, Bristol (Avonmouth), Cardiff, Belfast, Birkenhead, and Glasgow. The links between the three exhibits are clear when the three guides are compared and many of these similarities will be discussed in this section.

⁴ Taylor, *Festival of Britain, 1951*, pp. 30, 42-3, 46.

for Science and Technology and specifically Alastair Borthwick who controlled its organization and thematic presentation, helped by Basil Spence (Later Sir Basil) as Chief Architect.¹ This, despite the name of the Scottish Committee, was controlled by the same group that planned and designed the main London exhibitions and was another attempt to extend the Festival across the country.

Another example of the London planning of provincial events was the Welsh Hillside Farm Scheme in Dolhendre. It was planned by the Welsh Committee of the Festival Council, a sibling organization to the Scottish Committee mentioned above, and used land that belonged to the Ministry of Agriculture and Fisheries. The collection of small farms used for the project was the largest agricultural unit owned by the Government in 1951 and had been collected mainly through the payment of death duties. Unlike many of the Festival events, this one did not attempt to tell a story; instead it was designed to provide examples of the scientific methods of farming that could be used in Britain.

Finally, in Belfast the Ulster Farm and Factory Exhibition was held. It was designed to tell the story of Northern Irish farms and factories as a part of the larger British agriculture and industry. It told the story of new factories and industries, while a nod to the Great Exhibition was made with the differences between a farm of 1851 and a 'futuristic' farm being presented. This event was different from the others discussed because it was planned semi-autonomously from the Festival Committee. The Northern Ireland Government planned the event but it was executed by the London-based designer Willy de Mayo, who was hired through the Festival Committee.² Yet, here again, because of the involvement of the London-based organizers, this event had many of the same functions, despite its placement in Belfast.

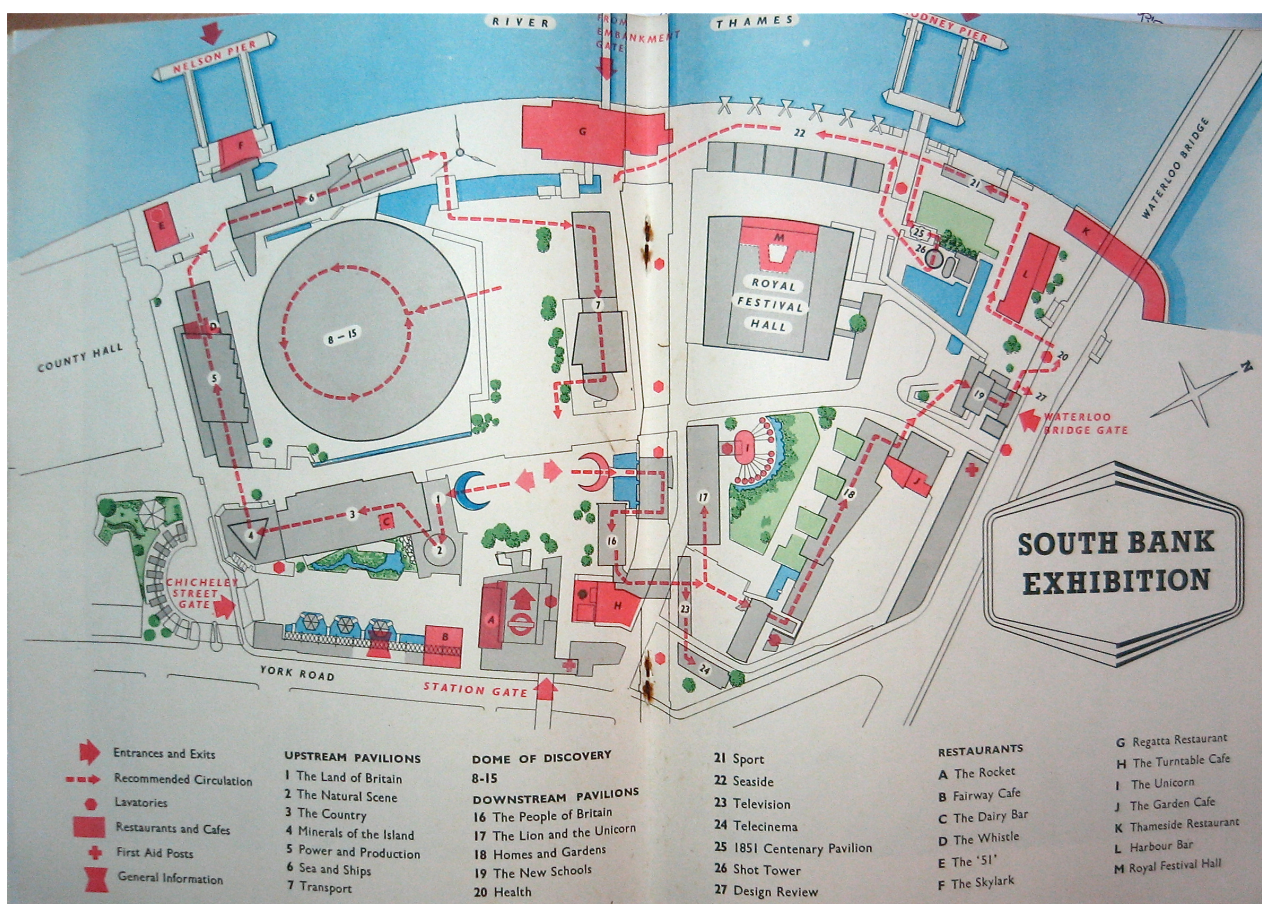
These places were popular with visitors. The South Bank attracted nearly 8.5 million people (or nearly 20% of the total population), with 2.5 million of them attending in the last 32 days. Downriver in Battersea, the Pleasure Gardens hosted 8 million visitors. Elsewhere in London, the Exhibition of Science had 213,744 visitors and the architecture in Lansbury saw 86,646 visitors. On the road, the Festival Exhibition attracted an average of 115,500 per city, and at sea, the Festival Ship averaged nearly 89,000 per berthing. The Ulster Farm and Factory Exhibition had 156,760 visitors, while the Exhibition of Industrial Power attracted 282,039.

¹ Banham & Hillier, *A Tonic to the Nation*, pp. 152-4.

² Banham & Hillier, *A Tonic to the Nation*, pp. 155-6.

Taken together, nearly 20 million bodies passed through the turnstiles of the main Festival events and that did not count a single person that attended any of the local arts festivals or other events held around the country.

As was repeated in all of the official guides, "all these activities will add up to one united act of national reassessment, and one corporate re-affirmation of faith in the nation's future." In addition, these places made Britain a nation on display, but unlike many attempts to display Britain, the Festival did not try to define a single 'Britishness.' Unlike the modern attempts by the Labour Party to define what it means to be British, the Festival recognized that it was the differences that made the United Kingdom great. Throughout the Festival's places, despite the focus on the intelligent layperson, differences were celebrated and the contributions of various aspects of British society were recognized. This meant that the uniqueness of each place chosen by the Festival was celebrated and a different version of being British emerged from each place.



The routes visitors were expected to follow are marked on the South Bank Exhibition Map with red arrows and was referred to in the text as the "Way to Go Round."

(Image from the South Bank Guide)

The Two Cultures: the Sciences and the Arts

Whether it was a scientific achievement, a technological breakthrough, a national enterprise, an unrivaled craft, or an artistic masterpiece, the Festival wanted to show all subjects

where “the British contribution [was] outstanding”¹ and to use them to express the incredible breadth and depth of the British contribution to civilization. This meant that everything, from Shakespeare to Darwin, was examined for what it could tell visitors about the British contribution to modern life. This meant that there was no difference between a well-designed pattern for carpet and a well-designed mass spectrometer because they all expressed the Festival’s aim of demonstrating Britain’s achievements in the arts, sciences, technology, and industrial design.² This resulted in a wide range of exhibits including the unique alongside the everyday and was seen, by some, as an “extraordinary cocktail” created by “some ambitious but seriously deranged kleptomaniac”.³ While this was not everyone’s opinion or the goal of the organizers, it does highlight the main difficulty faced by the Festival. It was essential to the Festival’s success that the variety was incorporated into a single, coherent story.

Thus, the presentation of a story was essential to the Festival. Unlike a trade show or imperial exhibition, that did not require a narrative, each of the Festival exhibitions were designed as narrative displays, essentially read like a book. For example, at the South Bank, each pavilion contained a series of exhibits, like a chapter contains a series of paragraphs. Following the ‘way to go round’ (see map on previous page) - as the maps of pavilions and exhibits were labeled, visitors began with the past, continued through the present, and finished with a glimpse of the future. At the same time, as with a book, it was realized that some would start at the end (or, even, the middle) and zig-zag through the pavilions, “but such visitors may find that some of the chapters will appear mystifying and inconsequent.”⁴ Yet, no matter how one went around, the story could be read.

The story was about the People of Britain, the Land of Britain, and how they interacted to produce the British achievements of the past, present, and, it was hoped, the future.⁵ This was the basis of the theme created by Ian Cox that formed the structure of the South Bank and many of the other principal events, with the traveling exhibitions being an extension of the South Bank

¹ *Notes for Industry on The 1951 Exhibitions*, Festival of Britain Office & COID, London, 1950, p. 7.

² *Design in the Festival: Illustrated Review of British Goods*, COID, London, 1951.

³ Hylton, *From rationing to rock : the 1950's revisited*, Sutton, Stroud, 1998, p. 16.

⁴ Cox, *The South Bank Exhibition*, p. 8.

⁵ Similar statements about “The Story the Exhibition Tells” can be found in many of the official guides, but the most complete statement is found in Cox, *The South Bank Exhibition*.

into the UK's peripheral population centers.¹ In short, here is a sketch of the themes covered by the story presented at the Festival:

The land, endowed with scenery, climate and resource more various than any other country of comparable size, has nurtured and challenged and stimulated the people. The people, endowed with no one single characteristic that is peculiar to themselves, nevertheless, when taken together, could not be mistaken for any other nation in the world. So, ... the tale of the continuous impact that this particular land has made on this particular people, and of the achievements that this people has continued to derive from its relationship with this land. ... But even the whole two volumes of the Land and the People, taken together, must give an incomplete idea of the distinctive British contribution, unless a third volume is added: a memorandum on the pre-eminent achievements of British men and women ... in the Dome of Discovery.²

Significantly, this was not a standard account of British history. It did not follow any of the traditional historical stories and it did not discuss certain canonical topics, such as politics, the monarchy, or imperial expansion. These were rarely directly invoked. Instead their importance was recognized, but they were not considered by the organizers as defining characteristics of the British. A perfect example of their view was the treatment that the Empire and the Commonwealth received. Never being explicitly called upon as an explanation, their existence and influence was implied throughout many of the exhibitions.³ Instead of a canonical story, science was positioned as the key to understanding the British contribution to civilization. This placed an emphasis on understanding the intellectual progress of science and technology, both as a way to understand history and as a way to shape the future.⁴ This is not just a story about science; it is also a story told through science. As will become evident throughout the discussion of the exhibitions, science and technology were important in every section and their influence was constantly reinforced in the official guidebooks of the Festival.

In choosing to emphasize science and technology, the Festival organizers were trying to make a statement about the position of the United Kingdom in the post-War world. They were attempting to link the British identity with an innate motivation to explore, discover, and create.⁵ This innate motivation, according to organizers of the Festival, was manifested mainly in

¹ Cox, *Festival Ship Campania: A Guide to the Story It Tells*, HMSO, London, 1951, p. 5.

² Cox, *The South Bank Exhibition*, pp. 8-9.

³ For a discussion of the absence of Empire from the Festival, see chapter 7 of Conekin, '*The Autobiography of a Nation*'.

⁴ Bronowski, *1951 Exhibition of Science*, p. 38.

⁵ Banham & Hillier, *A Tonic to the Nation*, p. 63.

Britain's history of exploration and in contemporary men of science.¹ Focusing on this motivation provided the background to most of the exhibits on the South Bank and throughout the Festival. With this emphasis, the Festival presented a different view of science to the public and it was shown in forms that were readily understood by the intelligent layperson. The Festival used two primary frameworks that combined the humanities with the sciences: the history of discovery and the use of science to produce art. Telling the history of discovery was the most popular method used by the Festival. It used two techniques to help visitors understand science and its effects. They stressed the importance of historical British discoveries and then highlighted the importance of British work to current research and culture. The presentation of science and art at the Festival was exemplified by the Festival Pattern Group, which attempted to spread the results of scientific enquiries, specifically x-ray crystallography, through a range of artistic endeavors. The use of these methods in the Festival will be examined for their effect and the consequences they had on the overall presentation of science.

History of Discovery

As mentioned, the history of science was presented to visitors at the Festival through the importance of British discoveries. Following 'the way to go round' the Dome of Discovery, the visitor, upon entering The Land section, would immediately be faced with the British urge to explore, discover, and conquer the most difficult/exotic/dangerous places. While only a few - such as Livingston, Scott, and Mallory - accepted the biggest challenges, the urge was somehow essentially British because without their exploration, there would have been no development or use of those distant lands. The connection between discovery and use was immediately reinforced for visitors through the next series of displays on surveying, water control, and agriculture.² As has been noted, this style of narrative display was created in opposition to traditional museum culture and the trade-show mentality of many (inter)national exhibitions.

The vast majority of the background to stories told at the South Bank and throughout the Festival was provided by the Science Council, and particularly its Director, Ian Cox. In August 1948, the Executive Committee accepted the "Master Plan" for the South Bank. Created by Cox, it was an intellectual (as opposed to a physical) plan for the layout of the pavilions and exhibits within them. Furthermore, during later stages of the preparation, the Science Council,

¹ Cox, *Festival Ship Campania*, p. 18.

² Cox, *The South Bank Exhibition*, pp. 41-3.

which never numbered more than eleven, provided the narrative structure of the displays, acting as curators of the exhibits by providing briefings for each section about their display and narration.¹ They did not become involved with the display, it was handled by the Council of Industrial Design (COID) and the architects or designers of the section. In this position, the Science Council created the narratives that emphasized the British scientific/technical contributions to civilization.

These narratives were a selective history of British science. They presented science as a history of British discoveries and were designed to reinforce two separate story lines. The organizers wanted visitors and readers² to conclude, through their version of history, that science was an integral part of British identity. Furthermore, it was also important that they concluded that this identity was going to be the defining characteristic for Britain in the post-War world. Finally, it was important for visitors and readers to conclude that history provided the background for and the support of current scientific and technical research. All of these themes are present throughout the Festival, but were most fully expressed within the South Bank Exhibition.

Following 'the way to go round' the South Bank, one would not have gone far before seeing the first references to the British nature for searching and discovery. The first pavilion one should view was "The Land of Britain" and it was packed with references to the British drive to search and discover.³ While references were scattered throughout most of the pavilions to either the history or the future of British science, the Dome of Discovery was the real attempt to integrate this history of science into the British national identity. Inside the Dome, references to great British achievements were used to provide background and support for current science.

Elsewhere on the South Bank, the connection between Britain and its achievements was positioned as a natural development. Britain, as a small island, "bred" the pioneers of sea, rail, road, and air transport.⁴ In other words, the development of British characteristics was natural

¹ Banham & Hillier, *A Tonic to the Nation*, pp. 63-5.

² Readers is included here because a large portion of the Festival's outreach was through published materials that appeared before and during the Festival. The official material, such as *The South Bank Guide*, follows the exhibitions to the letter. Other materials, such as the *Notes for Industry*, were written for specific audiences and provide an interesting addition to the materials published for the general public. Finally, unofficial publicity, especially that included in politically similar newspapers, repeated the story presented by the Festival to an even larger audience.

³ Cox, *The South Bank Exhibition*, pp. 11-3.

⁴ Cox, *The South Bank Exhibition*, p. 32.

and unavoidable. Thus, the connection between past British achievements and modern scientific research and application was a natural result of being British. One paragraph from the Dome of Discovery's thematic description in the guidebook embodies the type of connection that was being made inside the Dome:

The fundamental discoveries of British physicists have had very many applications. One example of Boyle's law, for instance, is the modern mechanism for closing the doors of underground trains; one of the outcomes of Newton's genius has ultimately been the jet engine; Faraday's classical experiments with a magnet and some coils of wire made electric power possible. Kelvin's mathematical insight helped to create refrigerators; Maxwell laid the foundations of radio before a message had ever been transmitted; J.J. Thomson's discovery of the electron resulted, among many other things, in the cathode ray tube of a television set. It was Rutherford who provided the means for releasing nuclear energy.¹

That paragraph is the full description for the "Physical Discovery" section of "The Physical World" and it clearly links past British achievements with the technologies of the modern world. This implication is reinforced throughout the Dome's exhibits; from Britain mirrored in the world map to Darwin's domination of modern biology, the Dome's displays showed Britain's domination of vast stretches of intellectual endeavors, as opposed to the traditional vast stretches of empire, and showed the importance of continued support for science, just as it was traditionally important to support the empire. The Festival of Britain's position on science placed science, rather than the Empire, as the source of national identity and future national prosperity.

Within the Festival of Britain, the examples from the history of science were carefully selected and cultivated in a way that would invoke both the past mastery of British scientists and demonstrate the country's future potential. These examples used science, instead of empire and industry, as the defining characteristics of post-War Britain. Stories about research, such as the myth that developed around penicillin, were used to to define a post-Imperial identity.² Furthermore, through the use of history to link the characteristics of British men of discovery, such as Drake and Cook, with British scientists, such as Newton and Darwin, the Festival was able to create a history of discovery that made modern Britain into a country defined by science.

¹ Cox, *The South Bank Exhibition*, p. 62.

² For an explanation of the myth that has developed around penicillin, see Bud, 'Penicillin and the new Elizabethans', *British Journal of the History of Science* vol. 31, 1998, p. 312.

This history of discovery changed the way that the “Great Men” of science were portrayed. Newton is perhaps the best figure to use to chart changing significance. The myth of Newton began to coalesce while he lived, and by the late eighteenth century he was a key figure, as both hero and anti-hero, within popular culture. For poet and naturalist Erasmus Darwin, Newton was one of a pantheon of heroes that would help define England as a scientific nation. In contrast, William Blake framed Newton as an antihero who contributed to the destruction of imagination through the dominance of his natural philosophy.¹ Whether he was cast as the hero or the anti-hero, it was Newton’s philosophical influence that concerned people. This was not the case at the Festival. He, along with Darwin and Rutherford, were presented as examples of a scientific attitude, and not of a particular philosophy. The change in emphasis from philosophy to attitude made the connections between explorers and scientists. Those connections allowed the history of discovery to be extended to include science as the final frontier of British discovery.

Science and Art

The Lady with a Stoat [by Leonardo] is as much a research into man and animal, and a creation of unity, as is Darwin’s *Origin of Species*.²

In 1959, C.P. Snow gave his famous Rede lecture, in which he claimed that the two cultures had become “totally incomprehensible” to each other, and that they had been “dangerously separate” for over 60 years, to the extent that people educated to the greatest level in their fields could no longer communicate with people from other fields about their major intellectual concerns.³ Yet, just eight years before Snow made these comments, the Festival of Britain presented another view of art and science - as comprehensible, cooperative, and complementary fields. Like the comparison in the quote, the uses of both art and science were recognized for their individual achievements and for the way they could work together. In addition, the Festival showed that it was possible for scientists and artists to communicate, work together, and produce previously unknown products.

The belief that Britain was uniquely positioned in the post-War world to reconcile and integrate the sciences and the arts was asserted by the Festival’s Executive Committee and by

¹ McNeil, 'Newton as national hero' in Fauvel, Flood, Shortland, & Wilson (eds), *Let Newton Be!*, OUP, 1988, pp. 222-39.

² Bronowski, *Science and Human Values*, Penguin, Harmondsworth, 1964, p. 32.

³ Snow, & Collini, *The two cultures*, Canto edition, CUP, Cambridge, 1993, pp. 11, 17, & 60.

many of the other individuals involved. To communicate this to the general public, many of the exhibitions, in London and across Britain, were presented to show how science could influence design, decoration, architecture, planning, and other artistic endeavors. These ideas were presented directly in sections such as “Science in the Fine Arts” of “The Physical World” in the Dome of Discovery.¹ They were used to design decorative elements, such as the ‘stroboscopic’ flash representing the sun in Glasgow,² for many exhibitions. In addition, the products of the Festival Pattern Group (FPG) were used in many venues as the overall decorative scheme. A Festival visitor could see the FPG’s work while dining at the Regatta restaurant, while touring the Science Exhibition, or visiting the Festival Exhibition. This wide-ranging presentation was what the Festival’s executives and others used to integrate the sciences and the arts.

Out of this, a new modernist aesthetic with science at its foundation was developed. It was an aesthetic in which scientific expertise was used to validate the design agenda and to help determine what was ‘good’ design. Support for this idea came from both groups; scientists, designers, and artists were supportive of and involved in the implementation of designs formed under this modernist scientific aesthetic, which was commonly known as the ‘Festival style’.³ While characterizing the modernist scientific aesthetic is difficult because of the range of inspirations (physics, chemistry, biology, geography, et al.) and implementations, the Festival style can be characterized as using bright colors and non-floral patterns.⁴ This style featured the work of the FPG prominently and the unique integration of the sciences and the arts made the FPG’s contribution even more significant.

The background of the FPG comes from two sources. First, there was the desire to promote British goods, especially those bound for export. Second, there was a widespread interest in general science and, particularly, crystallography, in which British scientists were at the forefront of research. Much like the Festival, the roots of the FPG extend into World War Two, when the Design Research Unit, led by Misha Black, contacted Dr Helen Megaw, a Cambridge crystallographer, about a new look for the future. This was the first communication between a designer and a scientist about the possibility of using crystal structures as the basis for

¹ Cox, *The South Bank Exhibition*, p. 60.

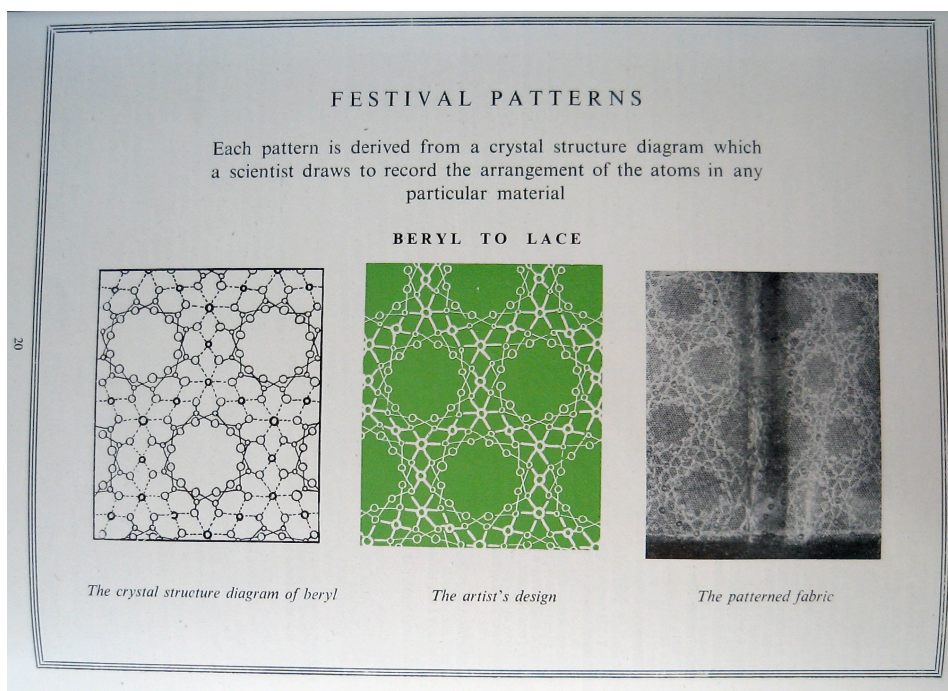
² *Exhibition of Industrial Power, Kelvin Hall Glasgow*, HMSO, London, 1951, p. 152.

³ Conekin, *The Autobiography of a Nation*, pp. 49-57.

⁴ For a view of the Festival style there are two films: the short color film, *Festival in London* (1951), and the black and white film, *Brief City* (1952) which was narrative by Casson and is about the architecture of the South Bank.

designs, but it did not lead to any developments.¹ The instance that actually led to the creation of the FPG came about in May 1949 at a weekend course organized by the Society of Industrial Arts. The course's purpose was to introduce designers to visual material from other arts and sciences. Professor Kathleen Lonsdale, a co-worker of Megaw at Cambridge, presented a paper about crystallography using patterns drawn by Megaw, and suggested that they could be used on textiles. One of her audience was Mark Hartland Thomas of the COID.² He was responsible for the representation of industry at the Festival. Part of his responsibility was to find sources of stimulation for new designs and products for 1951, and when he heard Lonsdale's suggestion, he did not delay in contacting Megaw for more diagrams. Hartland Thomas realized wider usage of the diagrams were possible. He set up the FPG and it eventually involved 28 manufacturers from areas such as textiles, pottery, plastics, lace, and paper.³

The result of this new inspiration would, according to Thomas, be modern because they



came from "nature at a submicroscopic scale not previously revealed."⁴ In addition, these new designs would be British because their aesthetic roots were in nature, a traditional location for the inspiration of British decorative patterns.⁵ To the

This presentation of the derivation of a pattern from the crystal structure diagram fits the method favored by Megaw and many scientists because it stressed scientific accuracy, instead of the creative freedom desired by designers and manufacturers.

Festival organizers, this

(Image from Land Traveling Exhibition Guide, page 20)

¹ Forgan, 'Festivals of science and the two cultures: science, design and display in the Festival of Britain, 1951', *British Journal of the History of Science* vol. 31, 1998, pp. 222-3.

² This is the canonical story about the organization of the FPG, but it is unclear whether diagrams drawn by Megaw were displayed at this particular talk. A short discussion of this is presented on p222-3 of Forgan, *Festivals of science and the two cultures*.

³ Banham & Hillier, *A Tonic to the Nation*, pp. 60-1.

⁴ Mark Hartland Thomas as quoted in Banham & Hillier, *A Tonic to the Nation*, p. 61.

⁵ Conekin, *The Autobiography of a Nation*, p. 62.

would fit their overall scheme because the interaction of British people with the environment was producing cutting-edge science and design. This perfect example of the Festival's theme illustrated Britain's position in the post-War world and contributed to the goal of harmonizing art and science.

Yet, the process used to create the design was not always harmonious, despite the face presented within the Festival publications. Problems arose in the FPG's design arrangements because of issues relating to ownership of the pattern(s) and their scientific legitimacy. When Megaw produced a pattern, it was not a raw material to be worked with; it was a scientific product that was an accurate representation of the crystal. In short, Megaw was the person who made creative leaps, while assuring the pattern was accurate to the greatest extent possible. From her writings, it is clear that she was concerned about insuring that the patterns were scientifically accurate.¹ The limitations placed on designers by scientists concerned about the reception of the patterns as accurate stifled creativity, resulting in very straight-forward adaptations of many of Megaw's designs. On the other hand, these adaptations were derided by design critics because of their lack of creative effort.² Additionally, similar arguments occurred over nomenclature - scientists wanted to retain the scientific name of the substance, while designers (and manufacturers) wanted creative names for the resulting patterns.³ Thus, throughout the process, the scientists involved tried to protect scientific accuracy by placing limits on the actions of the designs and manufacturers. So, without going into a lot of detail, this was a major weakness in the FPG.

According to the Design Council, the biggest achievement of the FPG had nothing to do with the relationships between scientists and designers. Instead, the biggest benefits to the public came from the collaboration of the different industries during the design process. It increased the level of design conversation between the industries that furnish homes - a feature that was praised by the COID.⁴ This cooperation was evident across the range of materials produced by the FPG and used to decorate the areas of the Festival. In the Science Exhibition, the walls and seating were covered with FPG patterns, while the specially-designed light fixture

¹ Megaw, 'The Investigation of Crystal Structures', *The Architectural Review* vol. 109, no. 652, 1951, pp. 236-40.

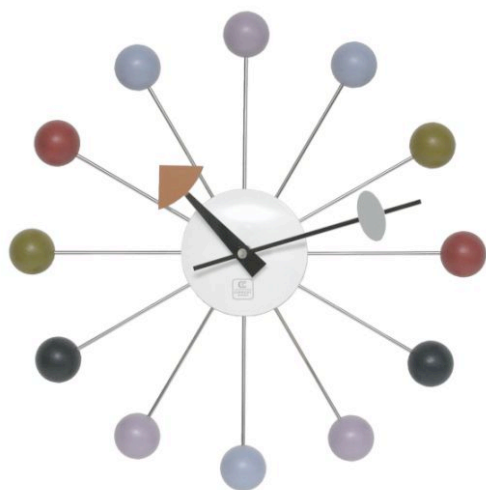
² One of the clearest examples of this criticism is in the caption to the page of images (p237) included in Megaw, *The Investigation of Crystal Structures*.

³ Forgan, *Festivals of science and the two cultures*, pp. 229-31.

⁴ Banham & Hillier, *A Tonic to the Nation*, p. 61.

that illuminated a large section of the gallery represented the atomic structure of matter.¹ The Festival Exhibition's Corridor of Time was decorated with crystallography-based designs.² Finally, the most widely referenced use of the FPG's work was the Regatta restaurant at the South Bank. It was designed by Misha Black as a showcase for art and design.³ While the restaurant is significant because of its use of FPG products, it is also significant because it illustrates the coordination between the various industries producing FPG items. At the Regatta, the walls, the floors, the menus, and even the silverware were covered with FPG patterns. A display in the foyer was created for the products that did not fit in the restaurant.⁴ While the Regatta and other attempts showed the possibilities of the FPG program, as noted by the Design Council, it also showed the impact that collaboration between industries could have on furnishings.

Overall, the FPG was a failure. Despite coming to symbolize the Festival style for many people, neither the FPG nor its designs survived 1951.⁵ Additionally, the FPG failed to harmonize science and art for a variety of reasons, including its inability to mediate the different conventions of ownership and creativity held by each field.⁶ Yet, it was not a complete failure, it did achieve a small level of success and was able to leave a design legacy. It was able to show that science could be an inspiration for artists and designers and that 'scientific' patterns could be



commercially successful. The most direct connection with the FPG can be drawn to what became known as "contemporary with knobs on" - where the combination of lines and knobs or blobs echoed the typical molecular schematic. These designs, popular throughout the 1950s and 1960s, produced some of the most recognizable modern designs, particularly the Howard Miller 'Atom' or 'Ball' clock, which is

¹ For the list of manufacturers and products used, see Bronowski, *1951 Exhibition of Science*, p. 52. The basis of the hexagonal layout and representative nature of the lighting fixture, see Banham & Hillier, *A Tonic to the Nation*, p. 146.

² *The Festival Exhibition, 1951: Birmingham, Leeds, Manchester, Nottingham*, HMSO, London, 1951, p. 11.

³ Banham & Hillier, *A Tonic to the Nation*, p. 83.

⁴ Thomas, *The Souvenir Book of Crystal Designs: the fascinating story in colour of the Festival Pattern Group*, London Typographical Designers, 1951, pp. 14-7.

⁵ Banham & Hillier, *A Tonic to the Nation*, p. 61.

⁶ For a blow-by-blow account of its struggles, see Forgan, *Festivals of science and the two cultures*, pp. 225-31.

still available for purchase today (see image on previous page).¹ Also, as mentioned, it provided a forum in which different industries could collaborate. Finally, its effect on the Festival should not be underestimated. It became associated so strongly with the Festival style because it was used so heavily within the Festival. The FPG patterns, combined with the modern architecture and bright colors, provided the stark contrast with people's experience of drab and old-fashioned design and decoration.

A more traditional role that art and design had throughout the Festival was to illustrate science and technology through murals and sculpture. Many of the South Bank pavilions and other Festival exhibitions contained large murals and sculptures as part of the exhibition design. The largest of these was the huge mural for coal in the Hall of Power in Glasgow.² In the Science Exhibition, murals were used to illustrate a range of topics, from chemical analysis to photosynthesis.³ While in many instances, such as the coal mural, they were used exclusively for decorative purposes, they also served an educational role in many exhibits. For example, the wide use of them in the Science Exhibition prevented the use of "unfamiliar words" and presented the story in a way that "no words need get between the visitor and its understanding."⁴ Therefore, the skill of the artist was employed to improve the scientific understanding of the visitor, which required scientific understanding by both the artist and those who commissioned the works.

Despite some shortcomings in the attempts to harmonize science and art, the Festival showed that scientists and artists were willing to communicate about their major intellectual concerns in a manner that was significant for both parties. In the interactions at the Festival, the communities were out of step on creative and ownership issues, but not on intellectual issues. They were not from two separate cultures; instead, participants were thoroughly engaged in both subjects and in conversations about the correct use and ownership of designs. These were conversations that could only take place in a culture in which both scientists and artists were participating. And, even though Snow would not agree with that appraisal, one of his other

¹ 'Festival of Britain', *Twentieth Century Architecture*, 2001, pp. 124-5; *Howard Miller: 625-333 Ball Clock*, 2007, retrieved 27 March 2009 <<http://www.howardmiller.com/Product/Details.aspx?StyleID=1000>>.

² *Exhibition of Industrial Power, Kelvin Hall Glasgow*, p. 8.

³ Bronowski, *1951 Exhibition of Science*, pp. 10, 21.

⁴ Bronowski, *1951 Exhibition of Science*, p. 6.

purposes was to locate Britain's place among the world's leading countries¹ - a goal he held in common with the Festival and one that was undertaken by the scientists and artists who worked together.

The Festival was not the only location where science and art were brought together, and its attempts were not the only ways that science could benefit art. In 1951, members of The Independent Group held an exhibition at the Institute of Contemporary Art in London entitled "Growth and Form". This exhibition was proposed as part of the Festival in 1949, but was not included in the Festival program because it did not fit the Festival's theme - it was not about Britishness or about modern science.² Instead, it was based on the work of the Late Victorian zoologist D'Arcy Wentworth Thompson and his 1917 work, *On Growth and Form* (second expanded edition published in 1942). This work presented comparative anatomy from a different point of view than the traditional biological one, instead focusing on the mathematical and physical aspects of biological processes. It brought together physics and biology to show that physical forces were one of the main determinants of biological structures.³ Additionally, this work is considered to be a great example of scientific literature, or more specifically, science written as a humanity. Partially because of his style, but mainly because of its philosophical basis, the work was popular with post-War artists, particularly Constructivists. The resulting exhibition was a fully-conceived exhibition environment of microphotographs, x-ray images, and films of natural objects and processes covering 17 categories. These categories were based on different aspects of growth and of natural forms taken from subjects ranging from atomic particles to astronomy. While the exhibition dealt with a wide range of scientific materials, it did not deal with any contemporary scientific developments and mainly focused on early twentieth century morphology. The exhibit (open from 4 July to 31 August) was considered a success by the modernist community, despite only having 1,140 visitors and losing the ICA £223, for two main reasons: it was a critical success and it can be considered the public debut of The Independent Group.⁴ While it did not share the thematic presentation of the Festival, it was a conscious attempt to harmonize art and science.

¹ Snow & Collini, *The two cultures*, p. VIII.

² Massey, *The Independent Group: Modernism and Mass Culture in Britain, 1945-59*, Manchester University Press, Manchester, 1995, p. 42.

³ Calman & Falconer, *Thompson, Sir D'Arcy Wentworth (1860-1948)* in *DNB*, OUP, 2004.

⁴ Massey, *The Independent Group*, pp. 43-4; Conekin, *The Autobiography of a Nation*, p. 63.

Interestingly, this much smaller attempt to harmonize science and the arts received a large amount of positive critical acclaim, especially when compared to the Festival's official program. For example, famous architects and designers, such as Le Corbusier and Frank Lloyd Wright, panned the work done on the South Bank, while Le Corbusier greatly enjoyed the ICA exhibition.¹ Yet, because of the limited public exposure and the intellectual orientation of "Growth and Form", its lasting cultural effect was markedly smaller than even the FPG.

For copyright reasons this image cannot be made available via ORA. The image can be viewed at: <http://collections.vam.ac.uk/item/O140755/nylon-design-crystal-design-project/>

This diagram of Nylon (CIRC.78E-1968) was drawn by the a member of the Festival Pattern Group and was used as the basis for wallpaper and textile designs. (Image Courtesy of V&A)

During this period there were also scientific and technical developments that influenced design. These mainly involved the introduction of new colors, materials, and techniques. New colors were the result of the work on artificial dyes done by the plastics industry and they, importantly for the Festival, created a palate of more vibrant colors that matched better across a range of materials. Two of these, a deep bright orange and a turquoise blue, became commonplace throughout the textile industry during the 1950s.² In addition to new colors, a whole range of new materials was created or first used during the War. The most famous of these was nylon - invented in 1936, on sale to the general public in 1940, and used extensively during the War to replace silk³ - and it was followed by the creation of several other artificial fibers. For example, both Orlon (a nylon wool/cashmere substitute) and Dacron polyester were created during the War by DuPont and ICI, respectively.⁴ They quickly became popular, but these did not impress visitors at the Festival. The product that was used the most was ICI's

¹ Conekin, *The Autobiography of a Nation*, p. 63.

² Harwood, *Festival of Britain*, p. 121.

³ *Nylon: 1955, In Depth*, retrieved 16 March 2009 <http://www2.dupont.com/Heritage/en_US/1935_dupont/1935_nylon.html/1935_nylon_indepth.html>.

⁴ *Orlon®: 1941, In Depth*, retrieved 18 March 2009 <http://www2.dupont.com/Heritage/en_US/1941_dupont/1941_indepth.html>; *Dacron®: 1950, Overview*, retrieved 18 March 2009 <http://www2.dupont.com/Heritage/en_US/1950_dupont/1950_overview.html>.

Leathercloth, which came in two main varieties, a nitrocellulose-coated wall-covering and PVC-coated upholstery fabric. It was covered with FPG designs, put on the Telecinema seats, and across the walls of the Science Exhibition.¹ Finally, during this period, techniques of printing fabric became increasingly important because the printing of texture was used to disguise cheap cloth. The importance of printing only rose with the gradual introduction of rotary screen printing during the mid-1950s, which enabled fine lines and crisp textural details to be machine printed.² These scientific and technological developments and others had a great effect on industrial design from the late-1940s through the 1950s.

Those developments combined with atomic and molecular motifs became widely adopted as part of the post-War design aesthetic. As noted, the x-ray crystallography contributed to the development of the new vocabulary, but it was too specific to lead to a complete school of design.³ Beyond the FPG, designers were producing scientifically-inspired products. In America, hand-printed designs, such as Rose's 'Interlace' (1952) and Haratsy's 'Fibra' (1954), representing enlarged details of items (specifically, lace and a loom, respectively) were produced. In Sweden, Markelius's 'Pythagoras' (1952) was screen printed; it was a geometrically-inspired pattern. In the UK, beyond the "contemporary with knobs on" like Day's 'Graphica' (1954) or Turnbull's 'Electronic' (1954), other more linear and/or cartographic patterns were produced, such as Tisdall's 'Eclipse' (1957). Unfortunately, it is difficult to locate the inspiration of many of these non-pictorial patterns because, since they are not floral, they have simply been labelled scientific.⁴ Yet, despite the resulting dilution, it is undeniable that the period of the Festival marked a decisive shift where design started to emulate the imagery of science and technology.

The Two Cultures: the Festival's Conclusions

As has been shown, the Festival did not believe that science and the humanities were incompatible. While the official narrative, created by Ian Cox, placed more emphasis on the scientific and technical contributions, it recognized the importance and influence of the humanities. Yet, the presentation of this influence was greatly constricted within the main Festival events and the majority of the humanitarian events were held on the periphery. At the

¹ Thomas, *Souvenir Book of Crystal Designs*, pp. 14-7.

² Harwood, *Festival of Britain*, pp. 124-5.

³ Zinc Hydroxide 8.39 tile panel in *From Atoms to Patterns, 24 April-10 August 2008*, 2008, retrieved 16 March 2008 <<http://www.wellcomecollection.org/exhibitionsandevents/pastexhibitionsandevents/fromatomstopatterns/index.htm>>.

⁴ Harwood, *Festival of Britain*, pp. 124-6.

South Bank, the main expression of the humanities was the Lion and Unicorn Pavilion - an appropriate name for a pavilion to display the “indefinable character” of the British.¹ Within this one space was crammed the exhibits about the development of the English language (including the King James Bible), displays of British crafts, discussions about liberty/politics, and enigmatic subjects, like British humor and eccentricity.² To paraphrase Misha Black, it was a gallon of exhibits in a pint pot of a building.³ The crowding of many traditionally important historic subjects into a single, small display designed consciously for foreign visitors clearly signals that these subjects are important to understand but will no longer define the British character. Instead, that will be defined by the greater story being told at the South Bank and throughout the Festival.

Yet, the greater story being told by the Festival relied on an audience of intelligent laypeople, which in turn relied on the universal education of citizens - from theology to art to history to science. In the words of Taylor, only a “wise man” with a wide range of knowledge and a correct “technique of thinking” could successfully shape the future.⁴ In Taylor’s contribution to the Festival - a talk entitled *Conspectus of Science, 1851-1951* given on 16 July 1951, he highlighted the need for education and the validity of subjects beyond science, namely metaphysics, history, and art.⁵ This idea concerning the legitimacy of subjects beyond science does appear at the Festival outside of the Lion and the Unicorn pavilion, most tellingly in the New Schools pavilion, where the British are credited with continuing the spread of Greek knowledge around the world.⁶ To continue the spread of both scientific and classical knowledge, Britain relied on the contributions of its intelligent laypeople, who if you believed the History of Discovery presented, were the most inquisitive people in the world and would have no problem continuing to have a dramatic effect on the daily lives of people across the world.

¹ It is unclear where the specific inspiration for this pavilion originated but the use of the Lion and the Unicorn as symbols of the United Kingdom date to the accession of James I of England (né James VI of Scotland) in 1603. Within the Royal Coat of Arms, the lion is said to symbolize realism and strength and the Unicorn to symbolize fantasy, independence, and imagination. Additionally, these two creatures have a traditional heraldic rivalry that is the basis for a nonsense nursery rhyme, which was included in Festival literature, for it, see Cox, *The South Bank Exhibition*, p. 68.

² Cox, *The South Bank Exhibition*, pp. 66-8.

³ Hooper, *Cider with Laurie: Laurie Lee remembered*, Peter Owen, London, 1999, p. 130.

⁴ MHS FST 208, *Prize-giving address*, Nuneaton Grammar School Speech Day, 6 October 1954; MHS FST 206, *The Old Order Changeth*, Keble College, 11 September 1951.

⁵ MHS FST 206 & 270, *Conspectus of Science*.

⁶ Cox, *The South Bank Exhibition*, p. 74.

Science and Daily Life

To demonstrate the contributions to civilisation made by British advances in Science, Technology and Industrial Design, it was clearly necessary that they should be exhibited, in their practical forms, against a background representing the living, working world of to-day.¹

By 1951, science was an inescapable part of daily life. To present that, the Festival's display had to work on several levels. They needed to show how science was being used, how science could be helpful, and what science may provide in the future. Most importantly, the exhibits needed to make people feel comfortable about the increasing influence of science in visitors' daily lives. These requirements meant that all contemporary objects on display had to illustrate the impact of science on daily life. That, combined with the Festival's national focus, meant that the objects were the best that British manufacturers could offer.

The combination of purposes meant that a different method needed to be employed in the selection of items for display. So, unlike previous international exhibitions, all items that were displayed were chosen based on their merit. Space was not for sale or available simply based on the manufacturers' reputation.² This was a distinct break with previous large exhibitions, both national and international, and required a new plan of action. At previous large exhibitions, the organizers created categories and spaces for the manufacturers, and it was the manufacturers who selected and displayed the objects. Only after displays were created was any merit-based selection done, such as the Prize Medals and Council Medals of the Great Exhibition. At the Festival, this process was turned on its head and a system of selection was created. The system selected items based on a range of criteria, including their quality, value, and design.³ The result of this process was the 1951 Stock List. It was compiled with the support of industry and trade organizations, but the final selection was made by four expert teams from the COID. When finished, the 1951 Stock List contained entries from approximately 5,000 firms for over 20,000 items.⁴

It was not only the creation of the 1951 Stock List that was unique. The collection of the 1951 Stock List items was also of a different type and scale than previous large-scale exhibitions. Whereas many of the items that were on display at the Great Exhibition were still in the

¹ Cox, *The South Bank Exhibition*, p. 6.

² Barry, *Cantor Lectures*, p. 682.

³ *Notes for Industry on The 1951 Exhibitions*, pp. 2-3.

⁴ *Industry in the Exhibitions*, COID & Scottish Committee of the Council, London, 1951, pp. 2-4.

government's possession at the Museums at South Kensington, nearly every item that was displayed for the Festival was on loan. This required an effort of military precision to organize and track every one of the objects, and the Festival hired a retired general to oversee the project. At its largest, the Festival loan program tracked over 10,000 items from "locomotives to lipsticks" exhibited at a range of sites from the South Bank to Glasgow.¹

These 10,000 items represented the best of British industry, and were mainly ordinary, everyday objects that a visitor, after seeing them at the Festival, could purchase and use. For example, the automobiles on display in the Transport and Communications Pavilion highlight both the ordinary nature of the objects and their availability. There were 36 cars selected for the South Bank Exhibition. Ten were on display when the Royal Family toured on 3 May 1951, and the rest were rotated onto display periodically. The cars ranged from the inexpensive, the Morris Minor saloon (£333 base price), to the luxurious, the Rolls-Royce Silver Wraith touring limousine (£4,145 base price).² Both within the exhibition and the advertisements in the Official Guides, they were portrayed as examples of the best of British manufacturing (even foreign-owned companies, like Ford) and were noted for their world-wide use.

15 miles from South Bank Exhibition

ONCE it was a lonely riverside marsh with tall reeds shifted by the winds. Today — a mighty factory stands there, employing 16,000 people. There, the Ford cars you know so well are built . . . there, the big tough Thames Trucks — the sturdy Thames Vans and the famous Fordson Major Tractors

are turned out minute by minute. To the far corners of the world these Ford products go. They stand the rigours of every climate, they give a fine performance — always reliable — always economical. And they are, every one, backed by the incomparable Ford Dealer Service which spans the globe.

Ford OF DAGENHAM

FORD MOTOR COMPANY LIMITED · DAGENHAM

Throughout the Festival, many international companies, like Ford, expressed their Britishness. In this advertisement, Ford emphasizes the quality of their British-made products and their importance to the local economy.

(From South Bank Guide, page xxxviii)

¹ Barry, *Cantor Lectures*, p. 683.

² For the complete list of motor vehicles (cars, trucks, commercial vehicles, and scale models) on show during the Festival at the South Bank, see *1951 Exhibition, London Catalogue of Exhibits*, HMSO, London, 1951, pp. 74-80. The base prices are from Packer, *The Festival of Britain (Website)*, 1999, <<http://www.packer34.freemove.co.uk/>>..

While the cars ranged from the basic, like the Ford Anglia 8hp saloon (£280 base price), to the cutting-edge, like the Jaguar XK120¹ (£988 base price), they were all products of modern engineering. Taken together, they demonstrated the range, from cheap and cheerful to fast and elegant, that was possible when science and engineering were applied to daily life. However, automobiles were not the most illustrative of the science encountered in daily life and other displays more explicitly illustrated those connections. These exhibits, spread throughout the Festival, were aimed at the main audience - the intelligent layperson. To appeal to that audience and their interests, these exhibits showed the influence of science on the average person's daily life at work, at home, at play, and on the foundation of modern life - energy production.

Energy

Today, perhaps more than in 1951, we realize the importance of energy to the maintenance of the modern world. Both at the Festival and in general life, the importance of energy and energy production was emphasized. Taylor, Director of the Science Museum during the Festival, noted on numerous occasions that primitive man had only the quarter of a horsepower that his muscles could produce, while 20th century man has upwards of 200 horsepower at his disposal daily.² According to many writers, including Taylor and Cox, the increase in power allowed the achievements of the modern world to occur, and the history of the modern world is the history of increasingly available energy. At the Festival, the exhibits presented the main sources of energy for modern Britain – coal, water, petroleum, and nuclear.

By 1951, the idea of the Second Industrial Revolution was widespread. If the Industrial Revolution can be grossly defined by coal and steam, then the Second Industrial Revolution can be defined mainly by petroleum and electricity.³ From the late nineteenth century to the early twentieth century, the development of science-based industry gave rise to a new economic order that was based on the use of a suite of new technologies. These included the development of industrial chemistry, the internal combustion engine, and the spread of electrification, which

¹ The Jaguar XK120 was the world's fastest standard production car at the time. It was designed as a test bed for the XK engine but was put into production from 1948 to 1954.

² Taylor, *Power To-day and To-morrow*, Frederick Muller, London, 1954, p. 13.

³ This definition is taken from the earliest known use of the phrase "Second Industrial Revolution" and the resulting discussion of the differences between the two economic orders that developed around the technologies of each revolution. While this definition holds reasonably true, the purpose behind it is different because the author is writing about city planning and the resulting communities from each revolution. In short, he was wanting a change from dirty mining towns to clean electrified cities. For this, see Geddes, *Cities in Evolution: An Introduction to the town planning movement and to the study of civics*, Williams & Norgate, London, 1915, pp. 58-108.

ushered in a range of additional social and technological changes.¹ While never specifically mentioned within the Festival's displays, the relationship between the British dominance of the Industrial Revolution and its declining position in world affairs is evident. Furthermore, as mentioned previously, the displays were trying to convince visitors of Britain's continued dominance of scientific and technological innovation.

Civilization depended on coal, according to the Festival, and it was presented as one of the most important sources of energy throughout. Coal was also recognized for its historical significance and the changes that coal power made possible, since it was the main source of power for the Industrial Revolution.² In Glasgow, coal occupied its own "Hall of Coal" as one of the two main sources of power used by heavy industry. On the *Campania*, it was presented as the main focus of the "Minerals of the Island" section. On the South Bank, coal was presented in the "Minerals of the Island" pavilion as the "prize gem" that was the basis for all industrial developments. Without coal, iron and steel would not have been made in such quantities and numerous products, such as nylon and aspirin, would not have been possible.³ Thus, coal was positioned not only as historically important, but also as an important part of Britain's future. It was the most important mineral resource that came out of British soil because of its contributions to industry and to chemistry. In short, without coal, it can be inferred from the exhibits, none of the other industries or sources of power presented would be possible.

In Glasgow, the other major source of power for heavy industry was water, as presented in the "Hall of Hydro-Electricity." Like the presentation of coal in Glasgow, the presentation of waterpower was done through the display of heavy machinery and engineering equipment, with special demonstration pieces and models. In the "Hall of Hydro-Electricity," a model hydroelectric power station showed how water generates power, and a glass-covered staircase being sprayed with water allowed one to experience its power.⁴ The conversion of the water's power into the electricity that powered modern life was recognized by Princess Elizabeth in her opening speech at Glasgow. She recognized that it was electricity, not coal, that was going to

¹ The classic text that is generally credited with providing the modern definition of this period is Landes, *The Unbound Prometheus: technological change and industrial development in Western Europe from 1750 to the present*, CUP, Cambridge, 1969, of which an updated second edition was published in 2003.

² Cox, *Festival Ship Campania: A Guide to the Story It Tells*, p. 12; Cox, *The South Bank Exhibition*, pp. 21-2.

³ Cox, *The South Bank Exhibition*, p. 22.

⁴ *Exhibition of Industrial Power, Kelvin Hall Glasgow*.

continue the Second Industrial Revolution and shape the industrial landscape of the future.¹ Water was not the only source of the electricity that would shape the modern world because scientific research had unleashed other sources of power, including petroleum and, ultimately, the atom.

The one source of energy that was notably absent from the general narrative was petroleum. Its discovery, production, and use were not discussed to the extent that other power sources were exhibited. Throughout the exhibition, there was not a single entire exhibit designed to tell the story of petroleum. It was absent because petroleum and its related technologies were not distinctly British. Coal and steel were the riches in the rocks of the British Isles,² while oil was a foreign substance. Similarly, the technologies that used coal and iron ore were British-born, while petroleum technologies were, for the most part, foreign. Instead, its use and influence in modern life was only presented through the inclusion of objects that required it as fuel. In the place where one would expect a treatment of petroleum, in the Transport pavilion, there is little or no mention of petroleum technologies in each of its sections. The Rail Transport section proclaims the British dominance in rail history, and tries to claim its current leadership by highlighting the 660hp diesel-electric locomotive made for the Tasmanian Government, and other non-steam powered rail projects. Yet, these exceptions to steam power are presented as “abundant evidence that railways are not bound by steam” despite being infrequently seen by the public.³ This during the same period when steam power was quickly losing its dominance of the rails. In the Road Transport section, even less evidence was given for British contributions, with its theme being that “the main contribution of the modern British motor industry has been in the small and economic private car ... and equally famous for a few luxury private vehicles”.⁴ Overall, in this period before North Sea Oil and before the United Kingdom became a large-scale petroleum producer, the British connections to petroleum were Imperial and outside of the Festival’s narrative structure, which limited the presentation to mainly automobile technologies that affected people’s daily lives.

¹ *On this day - 28 May 1951: Glasgow powers up for the festival*, retrieved 17 March 2009 <http://news.bbc.co.uk/onthisday/hi/dates/stories/may/28/newsid_3005000/3005617.stm>.

² Cox, *The South Bank Exhibition*, p. 12.

³ Cox, *The South Bank Exhibition*, pp. 33-4.

⁴ Cox, *The South Bank Exhibition*, p. 35.

Three different sections at the Festival presented the story of nuclear energy. The pure research aspect of nuclear energy was presented at the South Bank. The objects of research, from elements to atoms, were presented at the Science Museum's Exhibition of Science. The use of nuclear energy was presented at Glasgow's Exhibition of Industrial Power. A quite obvious omission from all of the sites was the military application of nuclear research. This is particularly glaring because within a year of the Festival's closure, Britain detonated its first atomic device on 3 October 1952 and in an ironic connection to the Festival, the HMS *Campania* was used as the flag ship for the expedition.¹ Therefore, because of that omission, the Festival's presentation was able to present a positive view of nuclear research and its results, which for the Festival was almost exclusively energy.

In "The Physical World" exhibition inside the Dome of Discovery, the goal was to show how British scientists had "explored inside nature to discover how matter ... is made." As described earlier, this was a perfect example of the History of Discovery as presented by the Festival. It gave a quick history of modern chemistry and physics, focusing on British contributions - ranging from Boyle and Newton to J.J. Thomson and Rutherford, "who provided the means for releasing nuclear energy." The guide does not mince its words on this point: the British were the pioneers. Many of the details of the exhibition cannot be determined from the South Bank guide, and despite giving visitors a choice in the ways to go round, the center of the gallery was nuclear physics and its applications. From the map, it is clear that the final sections of the display were dominated by the British Experimental Atomic Pile (commonly known as BEPO), but other examples of applied nuclear physics were shown, including the use of "by-products of research" as radioactive tracers in medicine.² The catalog, and presumably the exhibits in the Dome of Discovery, ignored the military applications of physics and focused solely on peaceful and benevolent applications of science. This oversight is repeated throughout the South Bank. In the Health pavilion, displays about penicillin and plastic surgery do not mention their wartime background.³ If the guide is an accurate reflection of the displays, then the only direct reference to the War was in the aircraft section, and it was concerning decisions

¹ For the service history of the *Campania*, see *HMS CAMPANIA, Escort Aircraft Carrier including Convoy Escort Movements*, retrieved 18 March 2009 <<http://www.naval-history.net/xGM-Chrono-05CVE-Campania.htm>>.

² Cox, *The South Bank Exhibition*, pp. 60-2; Forgan, *Atoms in wonderland*, pp. 181-2.

³ Cox, *The South Bank Exhibition*, p. 77.

made in 1940-1 about the needs of post-War Britain.¹ The dearth of military references throughout the South Bank, and especially in certain pavilions, was censorious because, despite fitting the overall purpose of the Festival, it ignored obvious historical and contemporary connections.

While the South Bank provided a basic historical narrative about the scientific developments that would lead to nuclear energy, the Exhibition of Industrial Power in Glasgow continued it to its conclusion - the use of atoms to produce energy. The grand finale of the exhibition was the Hall of the Future, where the power source of the future – atomic energy – was presented. According to its guide, the Hall of the Future was the place where the “visitor walks in the present, looks down on the past, and looks up to the future.”² This exhibition, like in the Dome of Discovery, linked the past to the present and the present to the future through the use of British scientific pioneers. As with all of the exhibitions dealing with atomic energy, Rutherford was central. In Glasgow, he was the connection to a future of unlimited power provided by atomic energy. Again, like at the South Bank, the current work of British scientists on the atomic bomb was omitted. Yet, one cautionary note was issued in the guide, atomic power held the possibility of “undreamed of plenty and comfort” or “our complete extinction,” depending on how it was used.³ This single reference to the destructive power of atomic research was not enough to counter the overwhelmingly positive presentation of nuclear energy.

In contrast to both of those exhibits, the Exhibition of Science at the Science Museum used a completely different narrative structure to convey the importance of atoms as objects of research. The narrative used would have been familiar to all visitors, young and old, because it was based on Lewis Carroll's *Alice in Wonderland*. The visitor was Alice, shrinking from normal size to “ten thousand million times smaller” - small enough to ‘see’ into atoms.⁴ The use of Alice was a well-established cultural reference and provided both a meaningful framework and a comfortable presence.⁵ Once visitors had passed through the atom and entered the exhibit, they were presented with the story about how scientists learn about the structure of nature. Like at other Festival sites, this was a British story. The story told about splitting the atom was about

¹ Cox, *The South Bank Exhibition*, p. 36.

² *Exhibition of Industrial Power, Kelvin Hall Glasgow*, p. 42.

³ *Exhibition of Industrial Power, Kelvin Hall Glasgow*, p. 45.

⁴ Bronowski, *1951 Exhibition of Science*, pp. 7-9.

⁵ For a discussion of the use of Alice and the Wonderland metaphor, see Forgan, *Atoms in wonderland*.

Rutherford, Cockcroft, and Walton.¹ It treated these three as an isolated group of pioneers and, if the display followed the guide, completely denied the work of physicists such as Irène Curie and Frédéric Joliot in Paris or M. Stanley Livingston and Ernest O. Lawrence in Berkeley.² This biased account placed British researchers as the pioneers, which was their natural position according to the History of Discovery presented elsewhere at the Festival. So, without the obvious narrative structure of the South Bank, the Science Exhibition was able to fulfill its own purpose of presenting pure science and to contribute to the Festival's overarching narrative.

In a world where electricity was quickly replacing all other local sources of power, the presentation of energy, and nuclear energy in particular, was a high priority. The organizers of the Festival knew that the modern post-War world was one that would increasingly depend on the reliable production of electricity for its daily operation. With the coming of the Second Industrial Revolution, the Festival's organizers felt it was important that the intelligent layperson held a positive view about energy production, whether it was by burning coal, harnessing water, or splitting the atom. In many ways, this was designed to counter the public's perception of many technologies that were developed and used during the War.

At Work

This brings me to quite another aspect of the influence of science on human life – namely industrialisation. The growth of industry from crafts has been perhaps the greatest difference between human life in the West to-day and that of two centuries ago.³

For the vast majority of human history, a person's daily work was to provide for themselves and their family. When you add the changes brought about by the Second Industrial Revolution to those that occurred during the original Industrial Revolution, Taylor's insight is perfect and he was not alone in the realization of the effect of science and technology on people's daily work. Within the Festival, industrialization and its effects were addressed at several sites, each with a different focus. Heavy manufacturing and engineering were displayed in Glasgow's Exhibition of Industrial Power. Light manufacturing and farming were displayed at the Ulster Farm and Factory Exhibition. Farming was also the subject of a model working farm that became the Welsh Hillside Farming Scheme in Dolhedre, Wales. While the South Bank did not

¹ Bronowski, *1951 Exhibition of Science*, p. 14.

² Nye, *Before Big Science: the pursuit of modern chemistry and physics, 1800-1940*, Harvard University Press, Cambridge, Mass, 1996, pp. 211-2.

³ MHS FST 206, *The Old Order Changeth*, 11 September 1951.

try to directly display the processes, it was the main site for exhibiting the products of industry. All of these exhibits presented science and the related technological developments as the drivers of industrial development and increased farm productivity. By improving the scale, efficiency, and productivity of the British workforce, science was improving Britain's industrial power, international renown, and economic position.

In Glasgow, the story presented was about British inventiveness and the effect of British heavy industry and engineering throughout the world. Against this historical background, the current products and projects of British heavy engineering were exhibited.¹ With exhibits about the development of steel, civil engineering, and transportation technologies, the presentation stressed the scientific and technological developments that led to the current British position and would help to maintain Britain's position in the modern world. For example, in the Hall of Steel, all three sides of the steel industry were displayed - the brute, the fine, and the specialty. Each type required special skills, all of which were shown to be dominated by the British, but special attention was given to specialty developments and the role of research laboratories to find new types of steel to solve specific problems.² It was this supposed combination of traditional and modern techniques that would help Britain maintain its position in the world.

In Ulster, the story was much more complicated for several reasons. First, it was divided into three main areas: traditional industries, new industries, and agriculture. Second, it presented a different story than other Festival locales. The story, as presented in the *Official Souvenir Handbook*, was the story of the skill and attitude of the men of Ulster. Additionally, unlike the main Festival narrative, it was a story of perseverance by those who created the industrial power of 1951 Ulster - the home of the largest single shipyard in the world, the greatest makers of tea machinery, and one of the biggest rope works in the world. Additionally, this was a story of the political and social development of Ireland, with recognition that it was never at peace. The final difference was that for most of Ulster's industrial history, science or technological development did not play an important part because the traditional industries were craft-based, such as linen manufacture and pottery. Science and technology's influence on Ulster's industry developed mainly during World War Two, and it was seen as the future for

¹ Banham & Hillier, *A Tonic to the Nation*, p. 152.

² *Exhibition of Industrial Power, Kelvin Hall Glasgow*, p. 14.

Ulster's industrial complex.¹ The difference in history and development between Northern Ireland and the rest of the UK was evident throughout the Ulster exhibition.

Unlike many of the other exhibitions that were planned with a heavy influence from London, the Ulster exhibition did not shy away from mentioning the war and from discussing war production. The discussion of the war was used to emphasize Northern Ireland's connection to the United Kingdom and its separation from Ireland by making an unstated comparison between the contributions of Northern Ireland to the UK's war effort and the neutrality of Ireland. The story of the War was a statement of integration and cohesion with the rest of the UK. A great example is the presentation of Ulster's rayon industry, which was a direct outcome of the war and the loss of the Belgian flax supply to German occupation. It is told as the "patient courage" of linen manufacturers who adapted their machinery to spin rayon fibers to produce large amounts of cloth for war use. Then, in the post-War world, these former linen manufacturers retooled for modern manufacturing methods to make Ulster into a power in the world rayon market, while maintaining the "intelligent hands" of a true craftsman to create better rayon fabric. Finally, in a nod to the historical narrative presented elsewhere by the Festival, Robert Hooke was presented as the intellectual grandfather of rayon.² The story of the rayon industry encapsulates all the key points of Ulster's industrial story: craft roots with linen, adaptation in the face of adversity, current technological innovation, and a scientific connection.

Yet, all of these points were echoed in other industry displays. The contribution of Ulster's shirt making industry to World War Two (of 30 million shirts) was stressed. Woolen production in Northern Ireland had 2000 years of craft tradition behind it, and the popularity of its tweeds showed its relevance to the modern world. The old cotton industry was revived after the War, and become an important industry for Ulster. The engineering industries, both shipbuilding and machinery manufacturing, were pushing ahead with technological innovations and expanding their abilities. Finally, many new science-based industries, such as nylons and tabulating machines, were developed in Ulster by the Ministry of Commerce after the War.³ Together all of these industries reinforced the various story lines presented in the *Official Souvenir Handbook*.

¹ *Festival of Britain 1951 in Northern Ireland: Official Souvenir Handbook*, H.R. Carter Publications, LTD, Belfast, 1951.

² *Festival of Britain 1951 in Northern Ireland*, pp. 26-7.

³ *Festival of Britain 1951 in Northern Ireland*.

Connecting with history was easy for the Farm section in Ulster. It made a direct comparison with 1851 through two model farmhouses and displays of modern farming equipment, representing the past, present, and future of agriculture. The past was represented by the “Ulster Farmhouse of 1851,” which was designed to show visitors the number of advances that were made in the 100 years between the Great Exhibition and the Festival. The displays of a selection of modern farming equipment and the displays of the Ministry of Agriculture represented the present. Finally, the “New Model Farm” designed by Henry Lynch-Robinson represented the future, mainly through electrification. Through the technical displays from the Ministry of Agriculture, particularly on improving soil and agricultural products, and the “Farm of the Future”, it was hoped that farmers would make improvements to their own farms.¹ This idea of improving farming methods by demonstrating the possibilities that modern science and technology could bring to the farm was not new, but was considered effective by many people.

Ulster’s Farm and Factory Exhibition was not the only exhibition that discussed the future of British farming. There was also the Welsh (or Dolhendre) Hillside Farm Scheme. It presented the latest improvements in living and working conditions for small-holders and was designed as a working model for all British farming communities. The scheme created a new community of model farmsteads, outbuildings, new cottages, and improved roads to serve eight families; this required the coordination of forestry and agriculture with community planning to stimulate the economic viability of small farms.² This unique undertaking was possible because, as mentioned earlier in the Festival’s Places section, the land had come under government control through death duties and, when taken together, represented the largest agricultural unit owned by the British government. That, combined with the social democratic tendencies of the Festival’s organizers, created this singular scheme to improve a group of Welsh farms as the model for future British farming.³ When comparing the size of the scheme to its intended effects, this was the most ambitious endeavor of the Festival, and it asserted a vision of a scientifically planned and improved future, which was supposedly right around the corner.

¹ *Festival of Britain 1951 in Northern Ireland*, pp. 20 & 42-5.

² Taylor, *Festival of Britain, 1951*, p. 61; *The Story of the Festival of Britain, 1951*, p. 11.

³ Conekin, *The Autobiography of a Nation*, pp. 69-71.

According to the exhibition in Ulster and the scheme in Wales, the solutions to farmers' problems were found in science and technology - an idea echoed in the South Bank's Country pavilion. For the Festival, farming was manufacturing and the farmer was now a "technician ... of science." This was achieved by making the British countryside "the most highly mechanized of any in the world" and by relying on science to solve many of the fundamental problems faced by farmers - poor soil, diseases, and climate. These changes did not just affect what farmers did, but also how they farmed. Increased mechanization on the farm meant that while tractors and their specialized implements could do every job on the farm, the farmer also had to be an amateur engineer to maintain his equipment.¹ This meant that for farmers across Britain, the seeds for improving their farms and bettering their lives were to be found in the research and engineering laboratories.

Outside of farming and industry, few other jobs were addressed directly by the Festival, but one type of employment - the scientist - was constantly mentioned. The scientist and the researcher are invoked throughout the South Bank and across the entire Festival as the improvers of industry, farmers, and design. Furthermore, unlike any other profession, scientists were given an entire exhibition, the Science Exhibition, to explain what they do, how they do it, and that their work was not mysterious or dangerous.² The privileged position that the scientist and researcher had within the Festival paralleled the importance placed on expertise throughout Britain during the period, with the ultimate professional expert being the scientist.³ As is shown throughout the Festival, these experts used their talent and training to benefit society and plan for a better future. So, being a scientist was one of the most important jobs that you could do.

At Home

'Building science' was key to the Festival's presentation of modern town planning and housing. In a way that was similar to the planning used at the Welsh Hillside Farm Scheme, improvements to homes and their contents were the result of coordinated efforts between a range of disciplines, including engineers, material scientists, and technologists. While various aspects of the building sciences were covered throughout the Festival, the largest example was East London's Live Architecture Exhibition in Poplar. While the future was being presented at the

¹ Cox, *The South Bank Exhibition*, pp. 17-9.

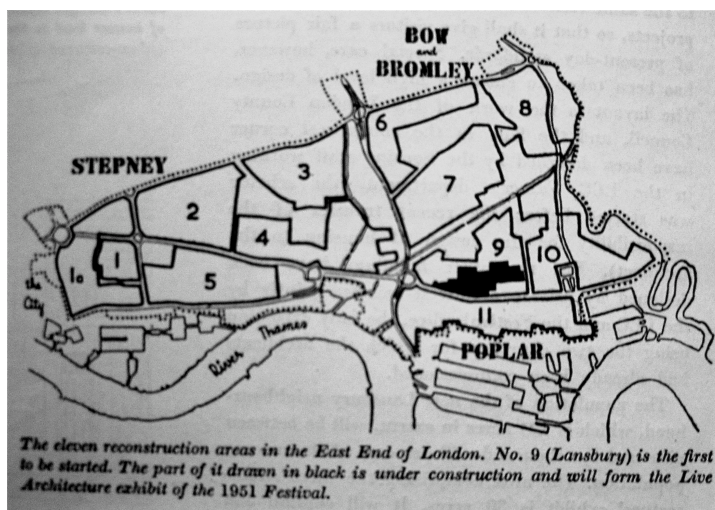
² Bronowski, *1951 Exhibition of Science*, p. 7.

³ Ortolano, *The two cultures controversy: science, literature & cultural politics in postwar Britain*, CUP, NY, 2009, pp. 17-9.

South Bank, the Live Architecture Exhibition was to show what was currently possible.¹ Demonstrations of the newest design innovations for housing the urban poor are a consistent thread throughout international exhibitions, from the Great Exhibition through to current exhibitions. For instance, at the Great Exhibition, Prince Albert sponsored the “Model House for the Working Class.” Both in 1851 and 1951, the sections were about designs that emphasized economy and efficiency, but the emphasis on science during the Festival was designed to appeal to the perceived characteristics of its audience, the intelligent layperson.² So, to appeal, the exhibition was designed as a modern, scientifically-built estate.

In 1951, there was no other group of contiguous modern buildings to demonstrate the modern ideas of town planning and architecture that had been discussed in Britain for over a decade. The style of presentation followed was common at large exhibitions much earlier, but Frederick Gibberd, who originally proposed the idea of a ‘live’ architecture exhibition, proposed a twist to the prevailing ideas. His twist was to rebuild a destroyed section of a city, instead of creating a residential suburb or new town. It was in this frame of mind that the organizers searched for a site, finally settling on the completely destroyed “Neighbourhood No. 9” in Poplar, East London.³ It was in this sense truly ground-breaking; it was the first modern contiguous rebuilding within a city.

The area selected was a triangle of land that was 124 acres in size between the East India Dock road on the south, the Limehouse Cut Canal on the north, and a set of rail lines on the east. The whole area was estimated to house nearly 10,000 individuals but the whole site was too large for the use of the Festival. So, the Live Architecture Exhibition was staged on a quarter of the site - an area of roughly 30 acres, or approximately the



This map shows the eleven reconstruction areas in East London, with the darkened area representing the portion of Lansbury (Neighborhood No. 9) that was being constructed as part of the Festival of Britain.

(From *The Architectural Review*, 109(651), page 177)

¹ Dunnett, *Exhibition of Architecture, Poplar: Guide to the Exhibition of Architecture, Town-Planning, and Building Research*, HMSO, London, 1951, p. 5.

² Greenhalgh, *Ephemeral vistas*, pp. 145-6.

³ Banham & Hillier, *A Tonic to the Nation*, pp. 141-3.

same size as the South Bank location. This site had been under consideration for rebuilding by the London County Council, but the Festival's involvement gave it priority. Upon completion, it was to contain, besides homes and flats, two churches, a care home for the elderly, a shopping centre, public houses, schools, playgrounds, and open spaces. Yet, unlike at other Festival locales, it was intended that construction would continue throughout the Festival's opening to show the use of current building methods and materials.¹ As a last touch, Neighbourhood No. 9 was renamed in honor of George Lansbury, a popular politician who served as an MP for the area until his death, at the age of 81, in 1940.² This new community was constructed as one of the few permanent legacies of the Festival and it was hoped that the ideas expressed in it would become a model used throughout the country.

Beyond the modern aesthetic, the exhibition was about the arts and sciences of rebuilding a destroyed country. According to Frederick Gibberd, "to many people it may be hard now to remember what London was like in 1951 ... perhaps drab is the most evocative word."³ In short, the exhibition went beyond the pre-Festival patchwork of repairing damage with makeshift materials to construct a vibrant new community that was an integrated part of London. In the construction of this community, ways to avoid traditional problems could be explained; new construction technologies and advances in building science could be shown to visitors through cut-away houses; and incomplete buildings could show different systems of construction and utilities. In short, building science and research would show how "to produce the buildings that will suit new needs, at the rate at which we need them and at a price we can afford to pay."⁴ Beyond the construction of buildings, the neighborhood was a planning model for the use of space. In the use of space and relationship of buildings, Lansbury was one of the first instances of simultaneous work by many architects following a set of standards based on scientific methods that would guarantee good and economical buildings.⁵ The style of organization and planning that produced Lansbury was like the organization and planning that occurred in major research laboratories.

¹ *Exhibition of Architecture*, p. 7.

² Banham & Hillier, *A Tonic to the Nation*, p. 142.

³ Banham & Hillier, *A Tonic to the Nation*, p. 138.

⁴ *Exhibition of Architecture*, pp. 28-9.

⁵ Gaskell, *Model housing from the great exhibition to the Festival of Britain*, Mansell Publishing, London, 1987, pp. 124-5.

In contrast to how to do things correctly, Gremlin Grange, a three-quarter scale mock-Tudor house was built. It was a house of an “unscientific demeanor.”¹ The idea of Gremlin Grange was simple – it was the anti-model. It illustrated all of the deficiencies – such as structural cracks, damp, leaning walls and chimneys, peeling plaster, smoking fireplaces, and bad lighting – that could appear in a house built without following scientific principles.² This horror house was in direct juxtaposition to the construction of Lansbury that surrounded it and the application of scientific principles in the planning and construction of both the buildings and the public spaces. The standards created in the research laboratory were put into practice throughout Lansbury for any visitor to witness.

Even though it did not attract the crowds that the South Bank did, the environment was a remarkable contrast to the rest of the drab setting that preceded and surrounded it. With a low attendance of under 87,000, it was important that the visitors who did come were mainly special interest groups who were interested in town planning, housing, and architecture. While other people, who were not counted in the official attendance numbers because they did not visit the small exhibition, roamed freely through the streets of the new planned community, it was not as popular as many had hoped.³ Overall, Lansbury is special for three reasons – it was permanent, unlike many of the Festival’s other structures; it was influential, not in the reconstruction of London, but within the New Towns movement;⁴ plus it provided real homes for London residents and for the COID to furnish with British products.

The Exhibitions will affect every one of us, because such things as cups and saucers, knives and forks, carpets and chairs, filing cabinets and buses, light fittings and cardboard boxes, form the background to our lives.⁵

Both at Lansbury and at the South Bank, British consumers were shown items created under the modern scientific aesthetic that they could use in their homes. As noted earlier, these items were selected from normal industry and were available for purchase. Yet, the COID realized that the public needed to be educated about good design. The Festival was the perfect location to train consumers about how to select items that were ‘scientifically’ produced; designed through careful investigation by the manufacturers into suitable materials, machine

¹ Matless, *Landscape and Englishness*, Reaktion Books Ltd, London, 1998, p. 268.

² For the full list of problems with the Gremlin Grange, see *Exhibition of Architecture*, p. 8.

³ Harwood (ed), *Festival of Britain*, pp. 145-6.

⁴ Harwood (ed), *Festival of Britain*, p. 154.

⁵ *Design in the Festival*, p. 11.

production methods, consumer needs, and consumer desires.¹ The products that were scientifically produced ranged from new objects to traditional ones made with new materials. Many of the objects selected by the COID made use of metal, synthetics, and laminated wood to make lighter, more durable, or more economical objects, ranging from chairs to bedroom furniture to sports equipment.² This consumer training is a constant feature throughout the exhibitions; this was because one of the Festival's goals was to sell the post-War world, and all of its products, to visitors.

The products of British factories were displayed throughout the Festival but the largest concentration of products was at the Design Review on the South Bank, where the Stock List was kept for public reference. According to the South Bank guide, the purpose of the Review was to show the "high standard of design and craftsmanship that has been reached in a wide range of British products of to-day."³ While the Review and Stock List were important reference works, it was the more limited presentation of items within the displays that made the real impact on visitors. Some of the displays, such as the Power and Production pavilion, were purposefully designed to draw people through them and into the showrooms attached to the pavilion.⁴ Similarly, the rotation of exhibits through the South Bank, of which motor vehicles are the largest example, was a way to expose visitors to a wider variety of products. This movement was a key part of consumer training because it conditioned visitors as to what was normal and useful for modern life.

At Play

The need to explore and play was the major motivation behind many of the exhibits, from the Science Exhibition at the Science Museum to the Battersea Pleasure Gardens. These exhibits provided a structured, entertaining and educational experience for the visitor. So, no matter what their daily work was, they could explore science and technology for themselves through the entertaining activities provided by the exhibitions. For the intelligent layperson, entertainment was best when it was also edifying. While many of the exhibitions fit this definition, the Telecinema and two displays at the Science Museum – the NIMROD computer and the *Machina Speculatrix* – are exemplars.

¹ *Design in the Festival*, p. 11.

² *Design in the Festival*, pp. 16-51.

³ Cox, *The South Bank Exhibition*, p. 87.

⁴ Black, et al., *Exhibition Design*, Architectural Press, London, 1951, p. 109.

At the Science Museum part of the Stop The Press section at the end of the exhibition was the Nimrod computer. For all but the most privileged visitors, this was the first computer that they had ever seen or used. The Nimrod was designed to play Nim, a simple game where a player starts with piles of tokens. To play, each player takes one or more tokens from any single pile, until the last token is taken from the last pile. Nimrod was designed to play Nim two ways, both where the winner takes the last token and where the winner forces the other player to take the last token.¹

The visitor response to the computer was varied. According to John Bennett, the originator of the idea and an attendant for the machine at the Science Museum, there were reactions from gawking at the flashing lights to genuine interest in the underlying algorithm. Even though, according to him, the machine was a success, he also felt the intended message about basic programming was only occasionally understood.² Yet, the booklet produced to accompany the computer's exhibition was very ambitious. Not only does it cover the basics of computing, but it goes into some depth about the construction, programming, and operation of Nimrod. This includes technical details, part types and voltages, which are provided for the more interested visitor.³ Taken together, Bennett's observations and the type of information contained in the booklet, not only was Nimrod a success but, at some level, the public was capable of understanding complicated details and that they were interested in the operation of computers. The use of a computer game to entertain and to demonstrate the principles of computing was a success for the Festival in offering educational entertainment.

Another example of this type of exhibit at the Science Museum was Grey Walter's Electromechanical Tortoises, also known as the *Machina Speculatrix*, which were autonomous phototropic robots.⁴ These robots were some of the first of their kind because they were not programmed to do specific tasks; they were allowed to "roam" and "speculate" about their surroundings.⁵ Since very little evidence survives, including only one of the three tortoises

¹ Goodeve, *Nimrod*, retrieved 20 July 2009 <<http://www.goodeveca.net/nimrod/>>.

² Goodeve, *Nimrod*.

³ *Faster than Thought: The Ferranti NIMROD Digital Computer*, HMSO, London, 1951, retrieved 20 July 2009 <http://www.goodeveca.net/nimrod/NIMROD_Guide.html>.

⁴ Bronowski, *1951 Exhibition of Science*, pp. 32-4.

⁵ Gasperi, *Michael Gasperi's Grey Walter Machina Speculatrix Page*, retrieved 31 August 2005 <<http://www.extremenxt.com/walter.htm>>.

displayed,⁶ it is unknown exactly how they were received, but this attempt by the Festival organizers to present an entertaining and educational display can be considered successful because it was replicated in the Millennium Dome and elsewhere since 1951.⁷

At the South Bank, the Telecinema was constructed and designed to entertain the visitor and for the “equally important function” of providing a space for exploring the technical and creative techniques that would be the future of cinema. For the Festival, the main experiments were in the “third dimension” – stereoscopic films with stereophonic sound.³ The program that included the Telecinema was different than most programs at the Festival because, much like the Welsh Farming Scheme, it was designed to make a direct contribution to its field. The Festival was successful in its attempt, with a total output of four films (one black and white, one color, and two animated by Norman McLaren). Beyond that, the Telecinema presented the films to visitors in a cinema that was the “most highly equipped cinema in the world”,⁴ and it was a post-Festival success because the Telecinema was one of the few buildings that survived the change in government that followed the Festival. Like Nimrod and the Tortoises, the Telecinema presented cutting-edge technology to the general public for the first time.

Entertainment, for the most part, at the Festival was meant to expose visitors to new technologies, many of which were based on useful scientific and technological developments. The distance that the Festival’s organizers went to present the visitor with ‘cutting edge’ technology is evident at the Battersea Pleasure Gardens, where the only non-British technology of the Festival was on display - American carnival rides. Just as visitors needed to see the newest robotics and computing, the visitor needed to see the newest in amusement rides. So, in a break from all other parts of the Festival, the organizers admitted that they were not at the forefront of technology and imported rides from America.⁵ The motivation behind providing the visitor with examples of the best science and technology in the world was to train the visitors to be consumers of ‘high-tech’ merchandise.

¹ Holland, *The Grey Walter Online Archive*, retrieved 31 Aug 2005 <<http://www.ias.uwe.ac.uk/Robots/gwonline/gwonline.html>>.

² *Exhibition of Science 1951*, retrieved 23 August 2005 <<http://jwgibbs.cchem.berkeley.edu/science1951/>>; Gasperi, *Michael Gasperi's Grey Walter Machina Speculatrix Page*; Holland, *The Grey Walter Online Archive*.

³ BFI, *Films in 1951*, Sight & Sound, 1951, pp. 43-4.

⁴ BFI, *Films in 1951*, p. 44.

⁵ Harwood (ed), *Festival of Britain*, pp. 132-3.

At Battersea, which was the Festival location of overt commercialism, the emphasis was on 'rational recreation' that would allow the visitors to have "full and varied lives".¹ These were lives which contained a love of beauty, and a proper understanding of design standards. The Festival Gardens Guide was unique in several circumstances because of the commercialism represented in the Gardens. First, it included a 'Shopping Guide' to give visitors a glimpse of the "quality and luxury" available on the "Bond Street of the Gardens" and throughout the Gardens.² These items included the whole range of Festival souvenirs that were manufactured - from the guidebooks and postcards to badges and teaspoons.³ While these items were available for purchase at other sites, only at the Pleasure Gardens were they given such prominent placement. Souvenirs were just the beginning of the commercial nature of the Pleasure Gardens; all the chief features were sponsored by a British firm. Perhaps the most famous of these was the Guinness clock, but Nestlé's sponsored the Playland and Schweppes sponsored the Grotto. Not only did the Gardens stress the rational recreation of shopping, they also offered gendered shopping opportunities. While men could contemplate the purchase of pipes, snuff, fountain pens, cameras, watches, and electric razors, women were encouraged to "pause for beauty" by Leichner - a cosmetics company best known for their stage make-up. Leichner sponsored the Ladies' Powder Room, complete with "expert assistants" to offer free advice on make-up use and did make-overs for "a small charge." In addition, the Powder Room was attached to the chemist's shop, where the Leichner products were available for sale.⁴ More important than continuing gender assumptions, defining the middle-class, or increasing rational recreation, the goods on display and for purchase at Battersea were a signal of economic recovery. They were quality goods, which were considered luxury goods during the War and under rationing, and with the variation offered, there was something for everyone.⁵ Thus, besides providing quality entertainment to its 8 million visitors, the Pleasure Gardens also educated them about quality products and good design.

¹ Harwood (ed), *Festival of Britain*, pp. 136-7.

² Baron, *Pleasure Gardens Guide, 1951: Battersea Park*, HMSO, London, 1951, p. 43.

³ The souvenirs trade for the Festival was a major undertaking that was, like the Stock List, overseen by the COID, but some manufacturers did not go through the official channels. Instead they made unofficial souvenirs, some even included a knock-off Festival logo. For an in-depth treatment and illustration of the range of souvenirs available, see Rennie, *Festival of Britain 1951*, Antique Collectors' Club, Woodbridge, Suffolk, 2007.

⁴ Baron, *Pleasure Gardens Guide*, p. 43.

⁵ Harwood (ed), *Festival of Britain*, pp. 129-37.

As noted, leisure and entertainment were educational within the Festival. Whether one was visiting the Ladies' Powder Room at the Pleasure Gardens or the Transport pavilion on the South Bank, the goal was for the visitor to leave having learned something. The stated purpose was to learn about Britain's contributions to modern society's advancements and to the technology of daily life. In addition, the Festival outlined a future populated with modern items, not the debris of the past. To populate such a future, consumers had to be educated about good design, and encouraged to spend.

The Festival's Legacy

In *The Story of the Festival of Britain*, several legacies are defined. First, the Festival was an opportunity to enrich the national collections by transferring scientific and technological displays to suitable organizations - national museums, Government departments, schools, local museums, and other organizations, both within the UK and throughout the Commonwealth. Not only were scientific and technological displays distributed, but various works of art were lent by the Arts Council to galleries, schools, councils, and civic organizations. Second, the prestige of the Stock List, and its 10,000 specially-selected items, greatly assisted the COID's long-term plans and it became a permanent feature for certain trades.¹ Yet, these are not the legacies for which the Festival has been remembered or for which those who organized it wanted it to be remembered.

The main legacy that the Festival wanted to leave behind was a new view of Britain's place in the world. The short version of the Festival's main purpose was to demonstrate British contributions to civilization. Every exhibit at the Festival's official events emphasized the influence that British individuals or small groups, instead of the British crown or government, had on the world. These statements were made to secure Britain's place in the post-War world and were not limited to the official exhibits of the Festival. Many of the smaller events of the Festival that occurred across the country in 1951 focused on the cultural and artistic achievements that British individuals had given to the world. From Boyle and Newton to cricket and football, the Festival's purpose was to remind the world of British contributions.

Using its version of history, the Festival made a sales pitch to both the British public and the world about their place in it. The basic idea was that Britain could play Greece to the United

¹ *The Story of the Festival of Britain, 1951*, pp. 29-30.

States' Rome. No longer the workshop of the world, the country would become its intellectual capital. This metaphor relied on establishing a continuous chain of British contributions in numerous fields. This ranged from the numerous tenuous connections made in the Dome of Discovery and at the Science Exhibition to the contribution of English language (spoken by 250 million people in 1951¹) and literature to the world. While the main contributions highlighted at the Festival were scientific advances and related technological developments, it was important that Britain presented a total intellectual package to the world.

Beyond its major sales pitch about the place of Britain within the world, the Festival was also trying to sell a new lifestyle to the public. It was the lifestyle of the Second Industrial Revolution: powered by electricity, surrounded by the products of industrial chemistry, and carried forward by the internal combustion engine. To supply this revolutionary lifestyle, the Festival created an image of a robust and dynamic industrial base, able to supply the world with all of the accoutrements needed to progress into the egalitarian future promised by the Festival's organizers. In reality, this was actually just an expression of the complacency of British industry because they, between the War and the Festival, appeared to be able to sell anything to anyone in the world, while the rest of the world replaced damaged and destroyed industrial capacities.² This seemingly positive situation actually hid the reality of the economic uncertainty of the British economy after the War, an uncertainty that the Festival experienced directly through budget cuts during planning. Despite reality, the Festival was still about renewing and reinvigorating a drab country.

To achieve that, the Festival paraded the endless possibilities of science in front of visitors. Yet, not without conditions because in the scientific exhibitions of the Festival, neither warfare nor empire was emphasized to any extent. The reason for this was the negative connotations associated with military applications of science and technology. The displays of science that involved military technology were generally obtuse about the military aspects or they glossed any military association, as in Ulster. From the atomic bomb to the use of railroads to spread the Empire, the research goals and applications were sanitized before presentation. In short, they were presented as peaceful and benevolent, with only small warnings occasionally stated about the possibility of something other than a positive future. By sanitizing the

¹ Conekin, *The Autobiography of a Nation*, p. 96.

² Hennessy, *Never again*, p. 429.

presentation of science, the Festival did not deal with important questions that were being raised by scientists and engineers.

Additionally, science was fetishized by the Festival as the source of improvement in the future. The fetishization of science led to the unquestioned assumption that science would provide a better way for things to be done; whether it was manufacturing a chair or powering the world. Though many argued that science should be guided by history, art or metaphysics, no one argued that science would provide the improvements of the future. Science was presented as more than just an answer for how to build a better house, but also as the way to build a better Britain. This presentation of science made broad statements about Britain and the British nature. The Festival's introspective nature made it stand apart from previous large-scale exhibitions and from the exhibits available in national collections.



A crowd waits to attend one of the first public planetarium showings on the roof of the Carl Zeiss factory in Jena, Germany in 1924. It was scenes like this that planetarium supporters hoped to duplicate in London.
(Photo Courtesy of Carl Zeiss Archive)

CHAPTER 4: A PLANETARIUM IN LONDON

Study of the heavens has inspired the noblest flights of man's imagination on the one hand, and of his intellect upon the other.¹

The Zeiss projection planetarium, the instrument of Man, is in truth a theatre of the skies in which the celestial bodies are the actors - a theatre set under the infinite vault of heaven and providing beauty, entertainment, and drama in an entrancing and awe-inspiring spectacle.²

The word planetarium has described several different types of instruments over the years. According to the Oxford English Dictionary, as early as the 1730s, a planetarium was a mechanical model of the solar system that showed the movements of the planets. By the middle of the nineteenth century, the word was used in a more general manner to mean any representation of the planetary system, including graphical. In 1913, the idea of the modern projection planetarium was born when Oskar von Miller of the Deutsches Museum asked the Zeiss firm of optical instrument makers to construct an "artificial sky in the form of a dome on which images of the stars and planets could be projected."³ The result was an optical projector capable of producing moving images of the stars, planets, the moon, and the sun. Today, this is

¹ Paper C: "Memorandum on the Science Museum's plans to build a planetarium considered in relation to those of Madame Tussaud's" for 5 Apr 55 in ScM Z193/2.

² King, *The London Planetarium*, Madame Tussauds, London, 1958, p. 3.

³ Jackson, 'The Planetarium: Astronomy by the New Invention, A Suggestion for London to the Editor of The Times.', *The Times*, 1926, pp. 13.

the definition that most people associate with the word planetarium. As soon as the first modern projection planetarium was erected in 1924, planetariums were the new must-have attraction for every major city and within approximately two years a dozen of them were under construction.¹ By the outbreak of World War Two, at least twenty-seven planetariums had been opened with Zeiss Instruments.²

Reasons Behind a Planetarium

People must have seen a lot of reasons for their construction for planetariums to be this popular. Those reasons included the education of schoolchildren, as a venue for entertainment, to train pilots in star identification, for the betterment of the general public, and, among other things, to make money. Though, for many, there were only two purposes for a planetarium – educational and cultural.³

A planetarium's educational value lies in its ability to do three things better than nature: visibility, time, and convenience. Even today, it brings the heavens to its audience, regardless of the weather or their location. It can control the speed of the passage of time and it can change the point in time that it shows, something impossible for nature. Plus, demonstrations can be done when it is convenient and when the largest audience can be guaranteed. Also, to increase the audience, planetarium programs were targeted at several segments of the population. Those targets can be defined into three distinct categories, which relate directly to three segments of the population: basic education for schoolchildren, infotainment for the general visitor, and technical training for students and others.

At many other planetariums, a large portion of the audience was composed of children attending the demonstration as part of a school trip. At the Deutsches Museum, as early as 1931, the compulsory attendance of schoolchildren counted for nearly a fifth of the total planetarium attendance.⁴ For the Science Museum, the planetarium was supposed to increase the Museum's value as an educational destination, particularly for school groups, because of the planetarium's ability to teach basic astronomy. Many professional astronomers hoped that through regular attendance at planetariums, the general public could correct their gross

¹ Jackson, *The Planetarium: Astronomy by the New Invention*.

² Paper E: "Proposals for a planetarium." for 13 Jan 53 in ScM Z193/2.

³ Paper E: "Proposals for a planetarium." for 13 Jan 53 in ScM Z193/2.

⁴ Attendance: 25,000 p.a. with about 5,000 schoolchildren. Given in Memo Marked ScM 95B/4/4 in ScM Ed79/38.



The first show for school children at the Jena Planetarium with the Model II projector. This show took place in 1926, shortly after the projector was installed.
(Photo Courtesy of Carl Zeiss Archive)

ignorance of astronomy.¹ Those seeking a planetarium at the Science Museum were confident that educational authorities would be more interested in attending a planetarium where they could “follow it up with further cultural activity,” rather than a visit to the waxworks.² In addition,

the emotional support triggered by mental images of amazed and wide-eyed schoolchildren gave planetariums a powerful educational aura. This convinced many of the need to have one in their city, despite very real criticism of the cost versus educational value.³

A planetarium’s entertainment value comes from two sources – as a novelty and through supplementation of the program. By the 1930s, it was widely agreed that the novelty value of a planetarium lasted for less than two years and could be expended as soon as a couple of months.⁴ In some planetariums, such as those in Berlin and New York, films on suitable topics were shown and topical or seasonal changes were made to the program in the interest of increasing attendance.⁵ In Berlin, to stimulate attendance, paid shows at the planetarium consisted of 20 minutes of “planetarium” and 100 minutes of “educational and cultural films.”⁶ Some planetariums gave special shows presenting the night sky at an important point in history, such as when Columbus landed in North America or when Galileo first looked through his telescope.⁷ In line with the general purpose of the Science Museum, entertainment was not a priority,

¹ Paper A: “Minutes for Meeting on 5 Apr 55” for 6 Oct 55 in ScM Z193/2.

² Paper C: “Memorandum” for 5 Apr 55 in ScM Z193/2.

³ “Memo on Planetarium” by Savage in ScM Nominal 1356/17/1.

⁴ Memo Marked ScM 95B/4/4 in ScM ED79/38; Letter by Calvert dated 10 Nov 52 in ScM Nominal 1356B.

⁵ Paper E: “Proposals for a planetarium” for 13 Jan 53 in ScM Z193/2.

⁶ Appendix II for Paper E: “Proposals for a planetarium” for 13 Jan 53 in ScM Z193/2.

⁷ ‘Planetarium Arrives’, *The Times*, 1957, pp. 4.

instead attendance at the planetarium was hoped to arouse an interest in astronomy and its applications, such as navigation, in every person that attended a show.

The main technical skill demonstrated by a planetarium was navigation. Be it for navigating through the air or across the ocean, many thought that the best method of teaching the necessary skills, such as star identification, was in a planetarium.¹ Before World War Two, individuals in Government called for the establishment of a planetarium in London to contribute to the training of commercial pilots.² During the War, the Luftwaffe installed small star projects, which were commonly referred to as planetariums, at several bases to help train pilots in star identification.³ This usage was seen as evidence that planetariums were useful in navigation training, and like the image of wide-eyed children, the mental image of military and commercial success hinging on experiencing a planetarium added another dimension to the picture being created by those who wanted to bring an instrument to London.

For many at the Science Museum and elsewhere, their arguments for a planetarium were not without faults. The primary weakness of the plans were financial, with questions of educational necessity being secondary, and usefulness following a close third. As an anonymous person from the Treasury said, the planetarium was “a single Science Museum exhibit with a long name and of doubtful interest.”⁴ This doubt extended to those inside the Science Museum, because in 1925 when the idea was first proposed, Lyons was not in favor of it. Only in 1931 did he change his mind and then, he only supported a small planetarium.⁵ In a 1931 report from Lyons explaining his change of opinion, he noted that he was swayed more by the number and quality of individuals that suggested having one at the Science Museum rather than his personal experiences of planetariums, which can be summarized by his finding that “no other municipality there [in Germany] will install one.”⁶

As von Miller told Lyons, a planetarium can never attract large audiences beyond the short period of novelty after opening.⁷ This presents a dramatic financial challenge for all planetariums. In figures presented in 1953, it was estimated that an attendance of 1,500,000

¹ Paper A: “Minutes for Meeting on 5 Apr 55” for 6 Oct 55 in ScM Z193/2.

² “A Super Planetarium for London” in ScM Nominal 1356B/2/1.

³ ScM Nominal 1356/19/1-13.

⁴ Letter by Calvert dated 10 Nov 52 in ScM Nominal 1356B.

⁵ “Short Summary of the Planetarium Story” in ScM Nominal 1356B.

⁶ Memo Marked ScM 95B/4/4 in ScM Ed79/38.

⁷ Memo Marked ScM 95B/4/4 in ScM Ed79/38.

visitors paying 2/- would be required to repay the capital costs, including interest. It was believed that this level of attendance would be achieved within four years – 500,000 for two years and then 250,000 for the next two years. On top of that, it was estimated that another 80,000 visitors paying 2/- would be required to cover the running costs of the planetarium.¹ In short, this would mean that the planetarium would need to attract nearly 600,000 paying visitors for the first two years and then over 300,000 for the next two years for it to meet running costs and repay the capital costs. The evidence received by the Government through correspondence reveals that even in New York, which was one of the most successful planetariums as measured by annual attendance with 750,000 in 1935 and 390,000 in 1947/8, the capital costs were never repaid and it was only able to pay running costs.² Despite the less than stellar financial forecast, many were willing to overlook the financial shortfalls because of a planetarium's supposed cultural and educational benefits.

Like the finances, the cultural and educational promises of planetariums were not without their faults. Unlike the financial front, where it was clear that both the Ministry of Works and the Treasury were against the project, there were few who spoke out on the educational faults of planetariums. Yet, there were a few issues that appeared. The first was the planetarium's actual, not ideal, value as an educational instrument. Closely allied with that, was the issue of the planetarium's use in navigational training, especially in the modern world of radio navigation. Finally, the main cultural argument against a planetarium was the fear of degeneration into pure entertainment, because of financial or organization pressure to increase attendance.

A planetarium's true educational value, in relation to its total cost, was questioned by a couple of individuals, including Sir Eric MacLagan and E.G. Savage from the Board of Education. As early as 1927, some were questioning the value of the presentation that planetariums made of the heavens, with the London County Council's Education Committee determining that "no education authority could contemplate acquiring one solely on its merit as a teaching device."³ First, some were of the opinion that planetariums did not "present a proper idea of the stars" and that, for the level of investment represented by a planetarium, there was a better and simpler method of presenting the movements of the stars.⁴ Simply, that a planetarium

¹ Paper E: "Proposals for a planetarium." for 13 Jan 53 in ScM Z193/2.

² Appendix II for Paper E for 13 Jan 53 in ScM Z193/2; NA Ed23/1057; ScM Nominal 1356B.

³ 'The Zeiss Planetarium: Education Committees' Report to L.C.C.', *The Times*, 1927, pp. 8.

⁴ Director's Note about Hinks dated 12 Dec 35 in ScM Nominal 1356.

installation “is a magnificent example of technical and scientific ability” but that “as an educational instrument it is not worth the money.”⁵ This type of complaint led to the conclusion that planetariums were not necessary to teach the technicalities of astronomy, and that to teach those basics, much less expensive instruments were more beneficial.⁶ In other words, “the expense and elaboration of the machinery was quite disproportionate to the effect produced.”⁷ Without the usefulness of offering a basic astronomy education, the planetarium was very likely to become nothing more than an expensive gadget, unless it could be put towards some form of more advanced training.

As mentioned, technical education was a popular reason for the construction of a planetarium, but after some investigations by the Science Museum, it was uncovered that this was not as beneficial as thought. When searching for both money and support, the Science Museum received unfavorable responses from the Armed Services. In early 1953, Taylor started seeking informal advice about the interest of the Services from Sir Henry Tizard. The opinion he received at this point was that the Services would be unwilling to spend money on the project because of budget constraints.⁴ Later in 1953, after official enquires to the Services, the Science Museum received another unfavorable response. The Services showed a minor interest in the use of the planetarium and its ability to increase general knowledge of astronomy, but they were not interested in it for specialist instruction and could not offer any financial support.⁵ At most, the Services would be interested in using it as an educational distraction for students and would use it “from time to time.”⁶ Like the Luftwaffe, they were mainly interested in smaller, cheaper, and more portable instruments. Additionally, with the advances in radio navigation and the experiences of World War Two without the supposed benefits of a planetarium, the usefulness of one in creating better pilots and navigators was highly suspect.

The ultimate argument against planetariums was the fear that they would degrade into pure entertainment – a drawback recognized by all involved in the planetarium debate. Planetariums were considered a cultural resource, but it was often worried that they would

¹ “Memo on Planetariums” dated 21 Jul 38 marked ScM Nominal 1356/17/1.

² Letter from Savage to Turnbull dated 8 Apr 46 in ScM Nominal 1356.

³ Letter by Eric MacLagan dated 17 Sep 37 in NA Ed23/784.

⁴ Letter from FST to Lord Halsbury dated 12 Feb 53 in ScM Nominal 1356B.

⁵ Letter from Carroll to FST dated 28 Jul 53 in ScM Nominal 1356B.

⁶ Letter to Director dated 11 Jul 46 in ScM Nominal 1356.

Location	Date Opened
Munich, Germany ^A	May, 1925
Wuppertal, Germany	May, 1926
Leipzig, Germany	May, 1926
Dusseldorf, Germany	May, 1926
Jena, Germany	July, 1926
Dresden, Germany	July, 1926
Berlin, Germany	Nov, 1926
Mannheim, Germany	Mar, 1927
Nuremberg, Germany	Apr, 1927
Vienna, Austria	May, 1927
Hanover, Germany	May, 1928
Stuttgart, Germany	May, 1928
Rome, Italy	Oct, 1928
Moscow, USSR	Nov, 1929
Hamburg, Germany	Apr, 1930
Chicago, USA	May, 1930
Stockholm, Sweden ^B	May, 1930
Milan, Italy	May, 1930
Philadelphia, USA	Nov, 1933
The Hague, Holland	Feb, 1934
Los Angeles, USA	May, 1935
Brussels, Belgium	June, 1935
New York, USA	Oct, 1935
Paris, France ^C	June, 1937
Osaka, Japan	Mar, 1937
Springfield, MS, USA ^D	1937-8
Tokyo, Japan	Nov, 1938
Pittsburgh, USA	Oct, 1939
^A This planetarium was displayed in Jena (at the Zeiss factory) in 1924 before being installed in the Deutsches Museum. ^B This planetarium was sold to UNC in 1948. ^C This planetarium was dismantled after the Paris Exhibition of 1937 and was not redisplayed until 1952 in the Palais de la Découverte. ^D This is the original Korkosz instrument and was the first non-Zeiss optical planetarium built. (From Paper E: "Proposals for a planetarium.")	

descend into popular culture, especially under commercial managers! Instead of being educational, the planetarium could be used for “popular mystagoguery in the form of astrology or for juvenile entertainment ... [like] space-fiction.”⁷ As mentioned, degeneration was a problem for both sides of the planetarium issue. For supporters, it was a danger to avoid through careful planning and, for the best results, government control. For the opposition, it was the perfect demonstration of the waste of resources that planetariums represented.

In contrast, the ultimate reason to have a planetarium was the national pride of having a planetarium, especially when everyone else had one! Pride for city, country, and Empire was at stake in this project. Within two years of its first demonstration in Germany, it was publicly suggested to have a planetarium in London.² At an early stage, the argument was simply that as “the greatest nation in the world,” Britain should possess a planetarium.³ This was also compounded by the view that the British were “pioneers in many fields of activity” and that they should not ignore the benefits of inventions because they were not of British origin.⁴ As self-constructed masters of the world, the lack of a planetarium could be seen as a sign of the decline of British dominance in science and technology, but before any momentum gathered behind the variety of plans, the war interfered.

¹ Paper C for 5 Apr 55 in ScM Z193/2.

² Jackson, *The Planetarium: Astronomy by the New Invention*.

³ Liddell, 'The Planetarium', *The Times*, 1935, pp. 10.

⁴ “A Super Planetarium for London” in ScM Nominal 1356B/2/1.

After World War Two, the absence of a planetarium, not just in London, or in the United Kingdom, but also, in the Commonwealth, was seen as a major reason to establish a planetarium in the heart of the Empire, London. In comparison, by the mid-fifties, nearly 30 planetariums had been built and displayed around the world. This meant that a planetarium in London was overdue. It was considered an embarrassment that Germany had twelve, the United States had six (including ones in New York, Los Angeles, and North Carolina - a place which was not known for its cultural or scientific contributions), Italy had two, and Japan had two. Yet, the Commonwealth had none.¹ An additional embarrassment, to those in London, was that several other cities in the United Kingdom had voiced plans to have planetariums.

The Science Museum and The Planetarium Question

As mentioned, the planetarium question was first raised at the Science Museum in 1925, but did not gain the support of Lyons until 1931. When Lyons decided that a planetarium was appropriate for the Science Museum, he thought that a small one, similar to the one in Munich, with a dome of 30-feet would be sufficient. The Science Museum's official position changed when Colonel E.B. Mackintosh became Director in 1933 because he was in favor of a larger 70-foot dome.² If the seed of the planetarium question was planted in 1925, then Mackintosh's support of a large planetarium was its first flowering. In 1935, the Science Museum's Advisory Council adopted a resolution supporting the construction of a planetarium.³ Additionally in 1935, several articles and letters appeared in the newspapers, including a large article in *The Times* on 22 June written by a "Special Correspondent."⁴ In reality, Mackintosh and a technical advisor, Dr Perry, wrote this article with the dual purpose of garnering public support and discouraging other efforts to open a planetarium.⁵ The agitation caused by the publication of the letters and articles raised the planetarium's profile and led to many offers of help, including the offer of an interest-free loan from the Sir Halley Stewart Trust.⁶ Unfortunately for the Science Museum, as it seemed that the pieces were falling together, rearmament and the shadow of the approaching war prevented any further progress by 1938.

¹ Paper E: "Proposals for a planetarium" for 13 Jan 53 in ScM Z193/2.

² "Summary of Planetarium History" in ScM Nominal 1356B.

³ ScM 1356/15/1 in NA Ed 23/784.

⁴ Science Correspondent, 'Stars To Order: The Planetarium at Work, Plans for the Science Museum', *The Times*, 1935, pp. 15.

⁵ "Planetarium at Science Museum: Director's Note" by Mackintosh dated 1 July 35 in ScM Nominal 1356.

⁶ "Short Summary of the Planetarium Story" in ScM Nominal 1356B.

Immediate Post-War Attempts

After a period of inactivity from 1938 to 1945, caused by the demands of World War Two, the Minister of Education, Miss Ellen Wilkinson, was questioned by Sir Alan Herbert in Parliament about the Government's ability to obtain a planetarium as reparations from Germany.¹ This question and Herbert's letter to *The Sunday Times* on 24 February 1946², was the beginning of the post-war push for a modern projection planetarium in England and at the Science Museum. This perennial issue continued to be discussed in the Science Museum, the Government, and the Press, until well after the planetarium was opened at Madame Tussauds in 1958.

Starting with Herbert's letter to the *Sunday Times* in February 1946, letters regularly appeared in the daily press calling for a planetarium in London. Later in 1946, after the death of Sir James Jeans in September³, Charles F. Hitchins suggested in *The Times*, "that the setting up of a planetarium in the heart of the Empire would be a fitting memorial to him."⁴ Many picked up the idea of a Sir James Jeans Memorial Planetarium but because of the amount of money needed to establish a planetarium, the venture did not progress beyond this initial interest. Like many previous mentions of a planetarium in the press, this started another small flurry of letters concerning the creation of a planetarium in London, with various ideas about how to fund it and where to house it. Some of the suggestions, such as funding it through a combination of public and private funds, were similar to the method pursued by the Science Museum, but some of the suggestions, such as housing the planetarium in Greenwich after the Royal Observatory moved,⁵ were new to those long involved in the quest for a London Planetarium. Similar to the pattern of pre-War interest, this peak of interest passed after a few months and by the beginning of 1947, it had abated.

As mentioned, in the immediate post-War period, reparation was proposed as a way to obtain a planetarium for London. It was seen as a quick and cheap way for the Science Museum to receive the long-awaited instrument.⁶ In contrast, other individuals, such as Wilkinson, saw

¹ "Summary of Planetarium History" in ScM Nominal 1356B.

² Herbert, 'A Star House for London', *Sunday Times*, 1946.

³ 'Death of Sir James Jeans, O.M.', *The Times*, 1946, pp. 4.

⁴ Hitchins, 'Sir James Jeans', *The Times*, 1946, pp. 5.

⁵ Simnett, 'A London Planetarium', *The Times*, 1946, pp. 7.

⁶ Jones, 'A Star House for London', *Sunday Times*, 1946.

the use of reparations in this way as theft and stressed that the Government should use only “legitimate means” to acquire a planetarium.¹ Fortunately, it did not take long for an official answer to be found because after further investigation, the request was denied. It was determined that seeking a planetarium as reparations was not possible because the projector could not be classified as equipment that contributed to Germany’s industrial war potential.² Therefore, the Museum had to find a different source for their planetarium.

Good news came in early 1946, when the Science Museum was informed that the RAF had “liberated” a ‘planetarium’ from a Luftwaffe base at Travemunde.³ After hearing about the instrument, Astronomer Royal Harold Spencer Jones, thought that it was actually a smaller star projector that Germans installed at Luftwaffe bases to teach star identification to pilots. Later, in March 1946, the Ministry of Aircraft Production set up the equipment and confirmed the Astronomer Royal’s idea that it was a smaller star projector, designed to show the fixed stars to a small crowd of about 25.⁴ The Science Museum decided that the star projector, despite not being a planetarium, would make a good addition to the Astronomical Collections. Over the next few years, the display of the star projection was investigated but never realized. The proximate causes for this were a lack of workshop time and insufficient money to purchase the twenty-foot dome needed for the instrument. The ultimate cause of these limitations was not overcome. It was a fear that displaying the smaller star projector would prejudice any attempts by the Science Museum to get a full-size planetarium.⁵ It was thought that the installation of the star projector would either be considered the Museum’s ‘planetarium’ or that a lack of attendance would be evidence that the public was not interested in a planetarium at the Museum. Therefore, the display of the star projector was delayed until the likelihood of acquiring a full-scale planetarium had passed.

In late 1946, after the confirmation that the liberated instrument was a small star projector and that Britain could not use reparations to appropriate a planetarium, the Science Museum and the Ministry of Education were in a tough situation. The Treasury had issued a dictum that no funding for a planetarium would be forthcoming in the near future. Without help

¹ “Summary” in ScM Nominal 1356B.

² Letter from FST to Sir Stanley Unwin dated 11 Feb 53 in ScM Nominal 1356B.

³ Box #2, ScM Nominal 1356.

⁴ Letters in ScM Nominal 1356/19/1-13.

⁵ “Summary” in ScM Nominal 1356B.

from the Government, this left three options available to the Science Museum. The first option was to simply do nothing. The second option was to make an announcement that the Government would support a planetarium at the Science Museum without concern for other proposed plans, but take no steps to acquire one. The final option was to take steps to obtain an instrument by any possible method.¹ Unfortunately, no matter which option the Science Museum chose, it would have to be undertaken without the financial support of the Government.

The Science Museum, with the Ministry of Education, decided that they should take active steps in obtaining an instrument from any available source, and there were many attempts to get an instrument from Europe in the few years immediately after the War. These early attempts were to obtain a pre-War instrument, mainly from one damaged during the War or from one of the lesser-used planetariums in Europe, because the Zeiss optical works at Jena were closed until the early 1950s. Since finding and negotiating for these planetariums was much more difficult than purchasing a new one, the Museum and the Ministry spent a lot of effort to uncover their exact status.

The first option explored was the dismantled instrument from the Vienna planetarium. During the War, the instrument was dismantled for storage and the main optics were stored at Schloss Thalheim. Individuals in both the UK and Austria believed that the instrument survived the War in a good condition and that it just needed to be located and put back together. It was hoped, that if it had survived in good condition, that it could be purchased for £2000 worth of foodstuffs. In July 1946, a letter was received from Major Hugh B.C. Pollard of B.I.O.S. Group 2, located in Vienna, concerning the state of the Vienna planetarium, and unfortunately it contained bad news. The main optics of the instrument had been stored at Schloss Thalheim but the Russians used the castle as a hospital. At some point during their occupation, they disposed of the planetarium in a small ravine used for rubbish. In the course of this operation, the instrument was covered in a mixture of other machines and hospital waste. Some small pieces of the instrument were recovered by digging a test pit through the rubble, but they were deemed to be “simply rusted scrap” despite the fact that some of the glass optics could have been recoverable.² In short, the Vienna planetarium was beyond repair.

¹ Minute Paper dated 3 Oct 46 by Turnbull in NA Ed23/1057.

² NA Ed23/1057.

After the Vienna planetarium was ruled out, an extensive correspondence passed between the Science Museum, the Ministry of Education, the Treasury, the Board of Trade, and the Control Commission for Germany about the possibility of importing a used Zeiss planetarium. This included attempts to purchase planetariums that were in use and those that had been removed during the War. In June 1947, a visit to the Hamburg planetarium by W.A.B. Hamilton found that it was a popular educational attraction and that it should not be removed.¹ Unfortunately, despite their best efforts, the Museum missed the only used instrument that was sold from Europe. It was the Stockholm planetarium and it was sold for about £7,000 to the University of North Carolina,² where it still resides today as the Morehead Planetarium and Science Center.³ In March 1949, the Museum made enquiries at the Milan Planetarium, which received a quick reply that it would open again in April.⁴ By this point, the state of all of the planetariums in Europe was known and the Museum had run out of options within Europe.

Another option for a planetarium was the purchase of an American-designed instrument, of which there were two choices during the period. The first, and most advanced, was the Korkosz instrument, designed by Mr. F.D. Korkosz, an employee of the Museum of Natural History in Springfield, Massachusetts. The instrument was built locally in Massachusetts, and was installed at the Museum in 1937.⁵ This development was known in London before the War through the plans of Mr. S Willner, the UK representative for Korkosz.⁶ In 1947, the investigation into this instrument was reopened. Immediately before the War, Mr. S Willner had contacted the Science Museum about the Korkosz but, at that time, it was deemed inferior by the Astronomer Royal.⁷ After the War, Willner continued to push for the establishment of a planetarium in London that used a Korkosz instrument. Regrettably for the Museum, he did not limit his push for a London Planetarium to South Kensington. This changed in 1949 when Willner broke his deal with Korkosz because Korkosz violated Willner's exclusivity deal and because of unfavorable reviews about the instrument. In a phone conversation with Calvert,

¹ NA Ed23/1057.

² "Summary of Planetarium History" in ScM Nominal 1356B.

³ See <http://www.moreheadplanetarium.org/> for more information.

⁴ "Summary of Planetarium History" in ScM Nominal 1356B.

⁵ The website of the Springfield Science Museum (http://www.springfieldmuseums.org/the_museums/science/about), as it is now known, states that the planetarium was opened in 1937 but the "Korkosz Planetarium Note" by Calvert dated 4 Nov 48 in ScM Nominal 1356B/2/1 states it opened in 1938. Here, the earlier date will be used.

⁶ ScM Nominal 1356/14/1; ScM Nominal 1356B/2/1.

⁷ "Summary" in ScM Nominal 1356B.

Willner informed him that, in his opinion, a Zeiss instrument was the only worthwhile option, especially since he had been in contact with the firm about improvements to their new model.¹ Compared to the Zeiss, the Korkosz was a fairly basic instrument that did not attempt to show the sun, moon, or planets. The second option, a Spitz projector, was similarly dismissed. The Spitz instrument was the cheap option; costing only about £250, it was designed for use in classrooms. In reality, neither the Korkosz or the Spitz was more advanced than the Zeiss star projector captured by the RAF.² So, neither of these sub-par instruments was a good option for the Museum, and they were again limited to purchasing a Zeiss instrument.

A final blow to efforts to establish a planetarium immediately after the War came in March 1947 when Sir Gifford Fox asked the Minister of Town and Country Planning about the Government's position concerning a planetarium. The response was that it would not be possible to erect suitable accommodations in the near future.³ After the 1947 pronouncement, the planetarium question hibernated for a year until the discussions concerning the provisions of the Centre Block were started in late 1948. On 4 February 1949 in a written reply to a Parliamentary Question, the Minister of Education, Tomlinson, announced that provision of a planetarium was included in the Centre Block of the Science Museum. This announcement was based on the August 1948 agreement between the Science Museum and the Festival of Britain to build the Centre Block earlier than planned.⁴ While this announcement was an advance on the previous position, it included no indication of any financial support from the Government - a constant difficulty that the Museum faced.

The plans to start the construction of the Centre Block, of which the planetarium was an important section, started another flurry of press reports and letters. Items about the planetarium appeared immediately in publications as diverse as *The Daily Express*, *The Manchester Guardian*, *The Star*, and *The Architect*.⁵ For the most part, these articles were a recap of the Minister's statement, and it was not until longer articles, such as one in *The Times* on 12 February 1949, that more information about the planetarium was revealed.⁶ Again, this flurry of press

¹ ScM Nominal 1356B/2/1.

² Paper E: "Proposals for a planetarium." for 13 Jan 53 in ScM Z193/2.

³ NA Ed23/1057.

⁴ ScM Ed79/181.

⁵ Press Cuttings, Nominal 1356.

⁶ Science Correspondent, 'A Planetarium in London: Progress of Scheme', *The Times*, 1949, pp. 3.

coverage did not provide any additional sustained financial or political support for a planetarium and announcements concerning the Festival of Britain quickly overshadowed it.

Festival of Britain Planetarium

A planetarium was one of the many varied attractions planned for the Festival. In the middle of 1949, J.F. Embling at the Ministry of Education contacted Shaw, the Science Museum Director at that time, about the investigation being conducted by the Festival Committee into obtaining a British-designed and -made planetarium instrument in time for 1951.¹ Individuals in both the Festival Office and the Ministry of Education saw a planetarium as “a most desirable feature of the Festival of Science and Technology at South Kensington” and the Telecommunications Research Establishment of the Ministry of Supply was willing to provide research support for the development of the instrument.² The Museum was supportive because the research would increase the technical knowledge in the UK and would provide an instrument for the Museum. As always with the planetarium, money was an issue because the Science Museum had approved no funding for the project. The only funding possibility was for the Museum to split the cost of equipment and furniture with the Festival, but not the cost of the dome, development, and other items that could not be moved to the Museum after the end of the Festival.³ As far as the Museum was concerned, a deal with the Festival Committee was an economical and mutually beneficial arrangement that could result in a planetarium in South Kensington.

At a meeting in July 1949 between the Ministry of Education, the Science Museum, and the Festival Office, it was decided to go ahead with research and development of a British planetarium. To start, the Festival would spend £1,000 on research and development, while the Museum would be closely involved with the development to insure that the resulting instrument would meet their requirements.⁴ Shortly after the research started, Dr Uttley of the Telecommunications Research Establishment informed the other parties involved that the research costs and timeframe had expanded. It was not going to be possible to produce an instrument without an investment of thousands of pounds and, even with that investment, an

¹ Letter from Embling to Shaw dated 22 Jun 49 in ScM Nominal 1356A.

² Copy of Letter from Munro to Embling dated 17 Jun 49 in ScM Nominal 1356A.

³ Letter from Shaw to Embling dated 27 Jun 49 in ScM Nominal 1356A.

⁴ “Planetarium for Festival of Britain 1951” dated 4 Jul 49 in ScM Nominal 1356A.

instrument could not be produced in time for the Festival.¹ Within five months of the original agreement, Col Angwin of the Festival Office phoned the Museum to inform the Director that the Festival had decided that the planetarium project was finished, as far as the Festival was concerned.² This was another failure for the Science Museum, and it meant the end to any hopes of a British-designed and built planetarium.

One positive step that came from the failed Festival attempt was the Science Museum's ability to copy a set of Zeiss planetarium plans. The plans had been liberated by American troops during World War Two and were on loan to the Festival Office to use in designing the British planetarium. The Science Museum was able to borrow and copy the plans from the Festival Office before they were returned to the United States.³ Once the plans were copied, it was expected that they would become useful by providing the basis for having a planetarium built in the United Kingdom, but this never materialized for both copyright and financial reasons.

The Planetarium in the Centre Block

Back in 1931, when Sir Henry Lyons decided that the Science Museum should install a planetarium, it was planned as part of the Centre Block – a building originally called for in the Bell Report of 1912. Yet, because of delays in funding and an eleventh-hour move in 1938 by the First Commissioner of Works, neither the planetarium nor the Centre Block was built before World War Two broke out.⁴ After the War, when work on the Centre Block resumed, the planetarium was still a major feature of the building. Unfortunately, because of conflicting advice from various government departments, the planning was, to say the least, difficult.

As mentioned, several Ministers of Education supported the planetarium plans, but the Ministry of Education never provided any financial support. Instead, the Ministry wanted the Science Museum to raise the funds from other sources, either from within the Government or from private sources. The only money that the Science Museum was able to secure was an interest-free loan of £20,000 from the Sir Halley Stewart Trust.⁵ This loan was promised before the War and its availability was reconfirmed during the 1940s. Since the Museum was unable to

¹ Letter from Embling to Angwin dated 13 Sep 49 in ScM Nominal 1356A.

² Note dated 20 Dec 49 in ScM Nominal 1356A.

³ ScM Nominal 1356A.

⁴ ScM Ed79/38.

⁵ Letter from Trust dated 25 Mar 53 marked ScM Nominal 1356B/6/6.

raise money to cover the £53,000 needed for a new Zeiss instrument,¹ the Museum was forced to turn to other Government departments for funding.

The two main departments that the Museum had to negotiate with were the Ministry of Works for the provision of the planetarium's physical plant, and the Treasury for the funds to procure an instrument. For this project, they both offered only "obstruction and opposition" despite the high level of support by many influential people.² The Science Museum was caught between demands from the two departments. The Treasury was not prepared to provide money for an instrument without the building being put on the MoW schedule. While, the MoW was not prepared to put a building on the construction schedule until an instrument was, at least, on order.³ These two demands put the Science Museum in a Catch-22 that meant, to move forward with their plans, they would need to find private or commercial backing for the planetarium.

As the planetarium was delaying the construction of the Centre Block, and as an attempt to get the planning for the Centre Block progressing, it was suggested that the planetarium be divorced from the Centre Block and be built separately. Taylor made this decision in 1954, when the planetarium was omitted from the space allocation for the Centre Block, and left it with the possibility of being returned to the Centre Block roof or built on the west end of the Museum. Within a short period, the MoW's architects were being asked to make plans for a separate planetarium, with it being designed as a portion of the future West Block of the Museum.⁴ This decision upset members of the Museum staff. The most vocal person was Calvert, the Keeper of Astronomy. He was especially disappointed in this decision because he felt that if the Centre Block had no planetarium then there would be "some public repercussion."⁵ In contrast, Taylor's solution tried to guarantee a speedy completion for both the planetarium and the Centre Block; more importantly, it was not an admission of defeat for the planetarium.⁶ The divorce of the planetarium and the Centre Block ended a relationship that had lasted a quarter of a century. Besides being a major change in Museum plans, this separation was also the end of all serious physical plans for a planetarium at the Science Museum.

¹ Quote from Meyerowitz dated 18 Dec 55 marked ScM Nominal 1356B/6/7.

² Letter from Calvert dated 10 Nov 52 in ScM Nominal 1356B.

³ ScM Nominal 1356.

⁴ ScM Nominal 1356/36/1.

⁵ Note from Calvert to FST dated 19 Sep 55 in ScM Nominal 1356/36/1.

⁶ ScM Nominal 1356/36/1.

Competition for the Science Museum

The educational and entertainment possibilities of a planetarium attracted attention from a variety of sources besides the Science Museum in London. A wide variety of groups spread across the United Kingdom, and the globe when including the Commonwealth, were interested in having one for themselves. Within the UK, competing schemes were voiced for locations as close to the Science Museum as Marylebone in London and as far as Armagh in Northern Ireland. Within the Commonwealth, both the Canadian and the Australian Government contacted the Museum about establishing planetariums.¹ These schemes were a mixture of public, private, charitable, and commercial ventures, but they were all based on the popularity and, idealistically, financial viability of planetariums.

Over the long period of time while the Science Museum debated installing a planetarium, its view of competitors changed dramatically. In the early years, the Science Museum attempted to dissuade potential competitors from advancing their plans. One of these attempts was in 1935 when the article “Stars To Order” appeared in *The Times* under the byline of a “Special Correspondent.” It pushed the educational benefits and scientific basics of a planetarium.² As mentioned, the article was ghost authored by Col. Mackintosh, with the technical details written by Dr. Pretty. Its main aim was to increase public awareness of the Museum’s plans for the planetarium as a key feature of the Centre Block, but Col. Mackintosh also wrote it to “ward off” any efforts to operate a planetarium as a “separate paying concern.”³ Yet, after 25 years of waiting, Taylor welcomed the competition. He thought that it would be “shaming” for the Treasury to have a private enterprise beat the Government in opening a planetarium.⁴ With this shift in opinion, the way the Museum dealt with any inquiries from competitors also changed. Whether or not this change affected the outcome is unclear, but it was one of the competitors welcomed by Taylor that beat the Science Museum to opening the first planetarium in the UK.

The Science Museum did not have the only publicly funded planetarium scheme that was seeking support. With several locations, including the Science Museum, being pushed as the best place to house a planetarium in London, the Museum had to actively convince all members

¹ “Notes on the present position of Planetarium prepared for the Director before his interview with Mr Bernstein on 9/10/52” by Calvert in ScM Nominal 1356B.

² Science Correspondent, *Stars To Order: The Planetarium at Work, Plans for the Science Museum*.

³ “Planetarium at Science Museum: Director’s Note” by Mackintosh dated 1 July 35 in ScM Nominal 1356.

⁴ Short Travel Description by FST dated Oct 52 marked ScM Nominal 1356B/6/1.

of the Government that it was the right place for one in London. Some organizations, such as the London County Council's Education Committee, examined the possibilities of having a planetarium and determined that without help from another source, it was not for them.¹ One slightly different early plan was to have the planetarium built between the London Zoo at Regent's Park and Camden Town, with it controlled by the Museum.² Some felt that South Kensington was not an ideal location, and that the area around the London Zoo would be better for a planetarium. After the War, this idea had lost its supporters, but the Museum did not forget it, especially when the specter of a planetarium at Greenwich was raised.

Also during the late 1930s, some of the first competing publicly funded planetarium schemes outside London were aired. In 1935, a letter from Alex B. Geddes suggested that a planetarium should be built in Glasgow,³ but the first serious competition came from the seaside resort of Blackpool. In the late 1930s, the Blackpool Town Council enquired at the Science Museum for information about constructing and operating a planetarium.⁴ They hoped it would be an additional tourist attraction that they could operate for profit. Unlike others, the Blackpool Corporation continued their interest in acquiring an instrument post-War. Similar to before the War, they approached the Science Museum for help and were given information about the American Korkosz instrument, despite it being considered inferior to the Zeiss planetarium.⁵ In late 1946, it was reported to the Ministry of Education that "sufficient money has been set aside ... to proceed" with the planetarium in Blackpool.⁶ But the project never proceeded because, from the Blackpool perspective, nothing was actually happening. According to the Blackpool County Archives, the Pleasure Beach and Winter Gardens Archives, and the local historical society, only one reference is found, and it is a single entry from the General Purposes Committee stating that no action will be taken on the proposal at that time.⁷ Besides the Town Council correspondence, the majority of the correspondence was with Mr. C.V. Bolton,

¹ *The Zeiss Planetarium: Education Committees' Report to L.C.C.*

² Letter dated 15 Jun 35 by Huxley to Mackintosh in ScM Nominal 1356.

³ ScM Nominal 1356/13/7.

⁴ ScM Nominal 1356/13/12.

⁵ "Notes on the present position of Planetarium prepared for the Director before his interview with Mr Bernstein on 9/10/52" by Calvert in ScM Nominal 1356B.

⁶ Minute Paper dated 25 Sep 1946 in NA Ed23/1057.

⁷ General Purposes Committee, 29 May 1946, Blackpool Council at Blackpool Central Library Archives.

of Wigan, the project's major financial backer.¹ The overenthusiastic evaluation of the Blackpool planetarium seems to have arisen through a rose-tinted reading of Bolton's correspondence by those in London. This reading allowed the Science Museum and the Ministry of Education to use the Blackpool plan to keep pressure on the Government for a planetarium.

Alongside all of the publicly funded plans, a couple of commercial plans were floated. In Brighton, it was suggested that a planetarium be included as part of a new conference center.² The one commercial planetarium venture that had frequent contact with the Museum was the Willner Planetarium. In early 1949, Willner informed the Museum of his plans to build a planetarium in London using a Korkosz projector. It was designed as a commercial venture backed by a group of British industrialists.³ Like others, this plan led to nothing. The Willner Planetarium was not the first commercial planetarium venture announced in the UK, and even today, new plans regularly appear in the press.

The Museum's Loss

The first planetarium to open in the UK was long in planning. In 1937, the Board of Madame Tussauds approved the plans for a planetarium to be built on Marylebone Road,⁴ and on 12 May 1938, they registered and incorporated The London Planetarium Company.⁵ Like with other plans across the country, before much could happen at Madame Tussauds, World War Two interfered. After the War, Madame Tussauds announced their post-War plans to open a planetarium in London as early as February 1946.⁶ Yet, it was over 14 years before The London Planetarium actually opened its doors.

In 1952, Madame Tussauds entered negotiations with the War Damage Commission for the reconstruction of the cinema - destroyed by enemy action in September 1940. The application was made on the basis that during 1943 the destroyed section was demolished to salvage the building's steel and, at that time, they were assured that reconstruction would be paid on a "cost of works" basis. Instead of reinstating the cinema, originally constructed in the 1920s, they wanted to install a planetarium. In January 1954, the War Damage Commission confirmed

¹ See ScM Nominal 1356 and ED 23/1057 at National Archives, Kew.

² Letter from James Lawrie to Brighton and Hove Herald on 26 June 1954 in ScM Nominal 1356.

³ ScM Nominal 1356B/2/1.

⁴ Copy of Letter from Ruttle to Eccles dated 11 Feb 55 in ScM Nominal 1356B.

⁵ "Statement concerning operation of The London Planetarium" from Madame Tussauds.

⁶ 'Star House For London', *Evening News*, 1946.

that they would pay £195,000 towards the construction of the planetarium and associated buildings, plus an additional 5% towards architect fees and scale for any Surveyor's fees that were required. This payment went towards a total estimated cost of over £259,000, of which about £181,000 was earmarked for the planetarium.¹ As noted above, paying the principal for the planetarium was the single largest financial hurdle, and with this award, Madame Tussauds seized a large head start over all other planetarium plans!

Despite being aware of the plans much earlier, in late 1954, Calvert contacted Madame Tussauds to find out the type and size of planetarium they were planning.² This contact was made after the Museum of Science in Boston confirmed that individuals from Madame Tussauds had visited to secure information about their planetarium, which was then under construction.³ The architect and one of the Directors of Madame Tussauds visited Boston, New York, Philadelphia, Pittsburg, and North Carolina to study the construction of the building, the operation of the instrument, and possible improvements that could be made to a planetarium. It was in the reply to Calvert's letter that the Museum found out how advanced Madam Tussauds' plans were for The London Planetarium. They informed the Museum that they were building a dome of about 70 feet to house about 500 people, with a Zeiss instrument, and that they would hopefully have it open towards the end of 1956.⁴ After the trip to the USA and the letter from Tussauds Director Ruttle, the Museum started to worry about the progress being made on The London Planetarium, because they had conquered several of the obstacles, mainly the finances and the instrument, that the Museum was never able to overcome.

The first reaction was that if the Science Museum failed at acquiring the first planetarium in the United Kingdom, it would be a "great pity" that Madame Tussauds would "only skim off the cream" available from the public's first burst of interest and enthusiasm, but that the Museum would handle the display in a more scientific and educational manner with their planetarium.⁵ At the Advisory Council meeting in April 1955, a paper was presented concerning the competing plans and the path the Museum should take. In this paper, Taylor recommends that "a great city

¹ War Damage Commission Correspondence from Madame Tussauds.

² Letter from Calvert to Directors at Madame Tussauds dated 17 Dec 54 in ScM Nominal 1356D/5/1.

³ Letter from Harrison to FST dated 15 Dec 54 in ScM Nominal 1356D/5/1.

⁴ Letter from Ruttle to Calvert dated 21 Dec 54 in ScM Nominal 1356D/5/1.

⁵ Note from Calvert to Director dated 22 Dec 54 & Note from FST to Browne dated 23 Dec 54 in ScM Nominal 1356D/5/1.

such as London” should be able to support two planetariums and he reminds the Council that Madame Tussaud’s proposal is not the first plan to be aired, and that all previous plans were abortive.¹ In short, during the middle of the 1950s, the Museum was not going to give up.

As Madame Tussauds’ plans progressed, the Science Museum’s resolve to have a planetarium gradually softened. When Madame Tussauds officially notified the Science Museum of their plans in 1955, their initial reply was that the Science Museum’s project would not go ahead immediately, but that the Government was entirely free to go ahead with a planetarium at any time.² Later in 1955, the Sir Halley Stewart Trust, whose £20,000 interest-free loan had gone unused, enquired about the progress of the Science Museum’s plans.³ The Museum’s reply was very downbeat because it had to admit that no progress had been made, that Madame Tussauds were building a planetarium near the Baker Street Station, and that the Museum regretted their inability to use the money.⁴ It was also at this point that the planetarium was divorced from the Centre Block, and despite the insistence that the divorce did not mean an end to the planetarium plans, it was clear that a shift in focus away from acquiring a planetarium had occurred at the Museum. One Museum Staff member who was not going to let the planetarium slip away without a fight was H.R. Calvert, who wrote a memo in 1956 to Shaw, shortly after the death of Taylor. He was pushing to have the planetarium rejoined to the Centre Block and constructed as soon as possible, supposedly to reduce costs.⁵ In many ways, this memo was the planetarium’s final chance to become reality at the Museum because, within a short period of time, it became clear that Madame Tussauds was going to open their planetarium.

In late 1957, newspapers around Britain started to report on the imminent opening of the London Planetarium at Madame Tussauds. The purpose of many earlier articles was to explain to the public what a planetarium is and how it would be used. The educational responsibility of operating this scientific instrument continued beyond generally informing the public to, as *The Manchester Guardian* said, the “considerable responsibility” of operating it in both an informative and entertaining manner.⁶ The concern expressed in this article and others echoed the many

¹ Paper C for 5 Apr 55 in ScM Z193/2.

² Letter from Fleming dated 2 Mar 55 in ScM Nominal 1356B.

³ Letter from Sir Halley Stewart Trust dated 10 Aug 55 in ScM Nominal 1356B.

⁴ Reply from FST dated 1 Sep 55 in ScM Nominal 1356B.

⁵ “Memorandum on the Planetarium” by Calvert in ScM Nominal 1356.

⁶ Science Correspondent, 'Britain's Only Planetarium for Madame Tussaud's', *Manchester Guardian*, 1957, pp. 5.

fears about opening a commercial planetarium and its possible degradation into popular mystagoguery. On the other hand, Madame Tussauds seemed to be more interested in finding a new name to call the planetarium. Phrases like 'sky cinema' were suggested, but they were unable to find one that combined "the genius of showmanship with the sobriety of what is, after all, almost a scientific instrument."¹ The arrival in October 1957 of Britain's first planetarium, and the world's thirty-second,² was the final signal of the Science Museum's failure to secure an instrument. This failure was announced to the world in *The Times* on 7 October 1957, when it was reported that "no provision for a planetarium" was provided for in the new plans for the Centre Block and even Calvert admitted, "their own hope of having one was dim."³ The Museum had lost, but national interest in planetariums was still high.

On 20 March 1958, the doors to The London Planetarium opened under the guidance of Dr H.C. King,⁴ lecturer-in-charge of the £70,000 Zeiss projector and Chief Astronomer of the London Planetarium.⁵ The normal program was a live presentation by one of the planetarium lecturers, but they also provided special educational programs for schools. In the early years, at least two types of programs were run for primary schools. Both programs started with a general introduction to the projector, the compass points, and the London skyline. The first program was concerned with the solar system, and the second program was concerned with the changes that occur in the sky between day and night, winter and summer.⁶ Besides the school programs, the planetarium was also providing programs to the Admiralty for officer training at the Royal

¹ Science Correspondent, *Britain's Only Planetarium for Madame Tussaud's*.

² Various newspapers reported slightly different numbers – *The Times* reported 32nd planetarium and *The Manchester Guardian* reported 33rd Zeiss instrument, while the actual number of planetariums in existence was at least two higher (because of Spitz and Korkosz instruments). If one is counting the number of planetariums that have opened, another three, at least, should be added to the total because of instruments that were sold (or moved) to new locations. Totalling this up, The London Planetarium could be called the 39th or 40th to open.

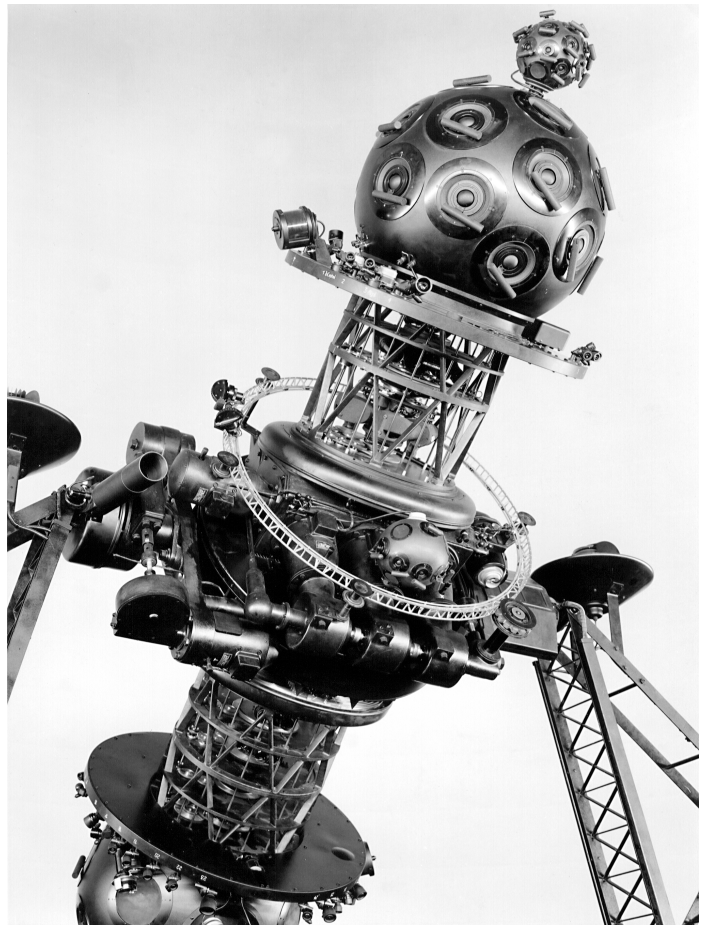
³ *Planetarium Arrives*.

⁴ Before Dr Henry C King was hired by Madame Tussauds, he had a career trajectory similar to Taylor's before he was hired at the Science Museum. King took his undergraduate degree in astronomy and mathematics from London University, followed by an MSc and a PhD in the history and philosophy of science. After his degrees, he took positions in industry and as a teacher. In 1955, he published his first major historical work, *The History of the Telescope*. It was quickly followed in 1957 by *The Background of Astronomy* and in 1958, he authored *The London Planetarium*, which was the handbook or guidebook to the instrument. Oddly, the book does not discuss the type or style of presentation to be expected at the Planetarium, except for a brief sketch included in the Introduction. This guide is half history of astronomy and planetariums and half basic astronomy text. Finally, in 1978, he wrote *Gear'd to the Stars: the Evolution of Planetariums, Orreries, and Astronomical Clocks* which, according to the preface, came from his work at the London Planetarium. Chapter 21, which is the final chapter of the book, deals with the optical projection of the heavenly bodies, and, like the rest of the book, is mainly a technical history of the development of projectors and related systems.

⁵ 'Watching Stars In A Man-Made Sky', *The Times*, 1958, pp. 7.

⁶ "Astronomy For School No. 1" and "Astronomy For Schools No. 2" from Madame Tussauds.

Naval College.¹ Well before any competition developed, Madame Tussauds' policy was very clear – to provide comprehensive and complementary forms of entertainment on their premises. For them, the planetarium was merely an alternative to the destroyed cinema, and it was part of the “general entertainment” they provided.² By the early 1970s, after competition had developed, some of the planetarium lectures had been replaced by a taped recording.³ Given the entertainment orientation of Madame Tussauds, it was inevitable that as soon as the circumstances changed, due to other planetariums opening in the UK, the educational services would suffer. Once the competition opened, The London Planetarium had to take actions to ensure its sustainability, mainly by replacing live presentations with recorded programs.



This Zeiss Model III planetarium projector is similar to the instrument that was installed at Madame Tussauds in 1957. These instruments were built in Oberkochen after Allied troops moved a portion of the Zeiss company there in 1945/6. (Photo Courtesy of Carl Zeiss Archive)

Madame Tussauds' Competition

Suddenly in the middle of the 1960s, several planetariums opened around the UK. On 4 March 1965, a press conference was held in Armagh, Northern Ireland to announce that a planetarium was to be built in connection with the Armagh Observatory.⁴ In November 1965, a planetarium opened in Greenwich at the National Maritime Museum.⁵ To complete the trifecta, in May 1966, the London School Planetarium was opened.⁶ Within a decade, the United

¹ Letter dated 30 May 61 by Lloyd Jones to Crane in NA Work 17/477.

² “Statement Concerning Operation of The London Planetarium” from Madame Tussauds.

³ Salmon, 'At the Planetarium', *The Times*, 1971, pp. 15.

⁴ Lindsay, *The Story of The Armagh Planetarium*, Armagh Observatory, Armagh, 1967, p. 14.

⁵ NA Work 17/477.

⁶ Richards-Jones, 'The London Schools Planetarium', *Physics Education* vol. 8, no. 7, 1973, pp. 486-7.

Kingdom went from having no planetariums to having four, with three in London. This quite dramatic change came about because of the effectuation of two long-running plans and the rapid development of a third.

The longest running plan realized during the mid-1960s was the Greenwich planetarium. The earliest reference to a planetarium at Greenwich came in 1935.¹ The idea appeared in print again in September 1946, when Mr. Simnett asked in a Letter to the Editor of *The Times* about using the old Observatory buildings for a planetarium.² The plan took a sudden step forward in 1961 when the NMM Trustees voted to use the Caird Fund to purchase a Spitz Planetarium from the USA and to adapt the Thompson Dome in the Old Physical Observatory to house the instrument. The Trustees felt they needed to provide a purely educational instrument for the use of the Services, Schools, and general public.³ After a few skirmishes with the Ministry of Works over funding for portions of the build, the scheme started in the middle of 1964 and was completed within 18 months. This planetarium was much smaller than The London Planetarium, holding less than a tenth of the people, but was specifically aimed at navigational and educational groups.⁴ This new planetarium had direct effects on The London Planetarium because until it opened, the Admiralty's Navigational School was paying for special shows at Madame Tussauds. As early as 1961, the Admiralty promised to use Greenwich instead.⁵ So, four years before its doors opened, Greenwich had stolen a portion of The London Planetarium's business, and it would only get worse for them, as more competitors opened.

The other development that really hurt The London Planetarium's business was the London Schools Planetarium that opened in 1966. Since it was owned and operated by the Inner London Education Authority and run specifically to enhance astronomical teaching in secondary and primary schools, it took business away from Madame Tussauds. Again, like Greenwich, it was smaller and designed with an emphasis on the interactions between the lecturer and students. Additionally, the Schools Planetarium was open to help those other than regular students, such as the handicapped, student teachers, and advanced students.⁶ It also

¹ ScM Nominal 1356.

² Simnett, *A London Planetarium*.

³ Letter dated 12 May 61 from Carr to Ogle-Skan in NA Work 17/477.

⁴ Work 17/477 at National Archives, Kew.

⁵ Letter dated 30 May 61 by Lloyd Jones to Crane in NA Work 17/477.

⁶ Richards-Jones, *The London Schools Planetarium*.

took away a portion of The London Planetarium's business because unlike at Madame Tussauds, the Schools Planetarium could target sessions to the specific needs of classes and their curriculum. In other words, it could provide schools a better service at a better price.

In contrast to the smaller planetariums that opened in London, the Armagh Planetarium was a much larger project, and like several of the others, it was a long running plan. On 30 March 1944, a local working committee met for the first time with the purpose of managing the Planetarium Fund. Unfortunately, by 1948 the Fund had managed to only raise about £3,000 and it was suggested to abandon the proposal, but Lindsay, Armagh's Director, had another idea. Taking a play from his dealings on the Armagh-Dunkirk-Harvard telescope, Lindsay was able to create an all-Ireland Planetarium Board. By 1950, this was accomplished, and the two Irish Governments had promised token sums towards the project. All that was left was raising the remaining money, which Lindsay thought would be easy to do throughout Ireland (about £20,000 for the building) and from the USA (about \$100,000 for the projector). To accomplish this, Lindsay landed in New York on 18 June 1950, but found it was not the right time to raise money. In Boston, one of his major fundraising areas, a \$500,000 campaign for a planetarium and auditorium was kicking off, but this did not deter Lindsay. He stayed in America, despite severe personal financial issues, until the end of the year, and returned with only about 1% of his goal. After this trip came a couple of years where other developments at Armagh took priority, and little happened with the planetarium, except for the preparation of architectural drawings and general administrative work.¹

In 1956, another push was made to fundraise for the planetarium and the coffers of the Planetarium Fund were filled by another £1,000 in donations – still far short of the amount needed. This was followed by another couple of inactive years, broken by the opening of the Queen Elizabeth Planetarium in Edmonton, Canada and the donation in 1960 of the complete architectural details of the much smaller scheme they had developed. Again, despite the greatly reduced price of about £12,000, this scheme failed, and Lindsay turned to Japan for some help. He enquired at the Goto Optical Works about presenting a projector to the Armagh Planetarium Board as an advertisement. This idea was received warmly at the London office but an answer was never received from the Head Office in Tokyo. By this time, it was 1964, and finally a breakthrough was made. After a new approach was made to the Northern Ireland Government,

¹ Lindsay, *The Story of The Armagh Planetarium*, pp. 5-11.

the Ministry of Commerce granted 60% of the total cost of the Planetarium. The City Council (providing 24% of the total) and County Council (providing 16% of the total) of Armagh met the rest of the cost. This permitted the announcement in 1965 about the impending planetarium opening as part of the Armagh Observatory complex. Yet, once it opened, the Armagh Planetarium did not have any noticeable effect on The London Planetarium. In fact, Lindsay thought that opening a planetarium in London actually helped Armagh's progress.¹ It was the last planetarium to open during the mid-1960s, and Armagh marks the end of the first group of UK planetariums.²

Conclusion

In exploring the planetarium plans beyond the Science Museum, it becomes clearer why the Museum failed in acquiring a planetarium. In each successful venture there was at least one major factor that the Museum lacked. From a major funding source to freedom from the Government, the Science Museum was handicapped in a variety of ways in their journey to obtain a planetarium. Drawing comparisons with the successful planetarium highlights the variety of problems faced by the Museum and its plans.

The factor completely in the control of those at the Museum was the scale of the plans they were trying to push to fruition. The London Schools Planetarium was successful because the Inner London Education Authority did not try to stretch their resources. It is likely that, if the Museum had stayed with Lyons original plans for a small planetarium with a 30-foot dome, they would have been able to secure funding for an instrument. Similar decisions on scale and instrumentation also contributed to Armagh's success. If they had not been so stubborn about the quality of all non-Zeiss instruments and chose a cheaper model, the Museum may have had a planetarium today.

Another factor is the interpersonal skills of those involved. When compared to Lindsay, who was able to raise money from hostile parties, particularly the two Irish Governments, all of the individuals that worked at the Science Museum were rookies. While Lindsay was willing to take *months* out of his schedule to fundraise in the USA, none of the Science Museum Directors during this period did anything similar. Lindsay was able to play the political game, as evident

¹ Lindsay, *The Story of The Armagh Planetarium*.

² The planetarium craze can be said to extend till today. The latest planetarium to open in the United Kingdom is the second planetarium to open in Greenwich at the NMM. It opened in May 2007. To get an idea of the number of planetariums that are currently open, see the incomplete list at http://en.wikipedia.org/wiki/List_of_planetariums.

by his repeated successes working with both Irish governments. His political connections also allowed him to be able to manipulate the system, as was evident by him being told informally that another attempt in 1964 with the Ministry of Commerce would be successful.¹ At the Science Museum, individuals did not even have the complete support of their supervisors, both within the Museum and the Ministry of Education. This meant that if a political opening had occurred, those in the Museum who could have taken advantage would have been out of the loop. If any of those at the Museum had been as devoted and skilled a fundraiser and public relations person as Lindsay, it is possible that the other issues would have been overcome and the Museum could have opened their own planetarium.

Beyond those factors, the whole story was essentially determined by money. Those who had it could make progress on their planetariums, while those, like the Museum, that were relying on the kindness and willingness of others, were constantly being stonewalled. Madame Tussauds not only had the finances of a large entertainment company, but they also had Government help through the War Damage Commission – an avenue not open to the Museum. As mentioned, this gave them a financial head start for The London Planetarium. Without the Commission's money, it is likely that the planetarium would not have opened on Baker Street. While the Government was paying Madame Tussauds money for the salvaged steel, the Museum's budget was under tight control by the same Government. Greenwich was a different story because they had two things that the Museum lacked: their own resources and freedom from the Government. As mentioned, the Museum was under tight budget controls, imposed by the Government, throughout this period. On the other hand, the Maritime Museum at Greenwich had buildings and funds at its disposal to use as it saw fit. All it took was a simple vote by the Trustees to put the planetarium plan into motion. In contrast, no matter how many times the Advisory Council of the Science Museum voted to support a planetarium, their actions carried no real weight because they controlled no resources. If, like many other National Museums, the Science Museum had resources, such as buildings and special funds that it controlled, their planetarium plans could have been successful.

Unfortunately for the Science Museum, the stars were never aligned in a favorable position for them to acquire a planetarium. Additionally, the obstruction caused by the Museum's numerous attempts to install a planetarium in South Kensington exacerbated the

¹ Lindsay, *The Story of The Armagh Planetarium*, p. 14.

delay to the Museum's general development, including the Centre Block construction and the arrangement of the galleries. Yet, the attempts highlight many of the difficulties faced by the Science Museum throughout the period, both within Government and as part of British national culture.

CHAPTER 5:

EDUCATION AT THE MUSEUM

The ordinary man must know something about various branches of science, for the same reason that the astronomer, even if his eyes are fixed on higher things, must know about boots. The reason is that these matters affect his daily life.¹

For J.B.S. Haldane, the ordinary man should be able to learn about science without having to know all of the minutiae of modern science. As the scientists did not need to know the minutiae of boot making, they should be given just a few facts not in textbooks and shown how those facts relate to everyday life.² Museum displays, much like the articles written by Haldane, could do just that. Museums were one of the main educational instruments for reaching the general public. They could provide a background of general scientific knowledge of the real world that relates to visitors' personal experiences and daily lives. After the Second World War, inculcating an appreciation of science and the scientific method was considered necessary for the general public to realize science's centrality to modern life. To create a scientifically-minded population, the education system needed reform and the masses needed to be engaged through a variety of mediums - newspapers, magazines, books, films, radio, television, classes, lectures, clubs, and museums.

This was not a new role for museums. They have always been viewed as educational institutions, even as their audiences and purposes have evolved. From their first Renaissance appearances in the sixteenth century, museums have had various educational purposes, including acculturating visitors, medical instruction, and technical training.³ An example of this early

¹ Haldane, *Science and everyday life*, Lawrence & Wishart, London, 1939, p. 7.

² Haldane, *Science and everyday life*, pp. 7-8.

³ The literature covering the Renaissance appearance of the early scientific collections is quite extensive. Silvio Bedini ("The Evolution of Science Museums" in *Technology and Culture*, vol. 6, 1965: 1-29) provides a useful chart of scientific collections until the nineteenth century including the types of collections and their uses (p2-6). Paula Findlen's work - particularly, *Possessing Nature* (1994) - provides a complete picture of the early situation, especially the philosophical and medical aspects of Early Modern Italian collecting. Arthur MacGregor ("A Magazin of all Manner of Inventions': museums in the quest for 'Salomon's House' in seventeenth-century England" in *Journal of the History of Collections*, vol. 1, 1989: 207-12) provides a brief overview of the English position and the establishment of the earliest English museums, both for scientific and general audiences. For a fuller treatment of English museums, Ken Arnold's *Cabinets for the Curious: Looking Back at Early English Museums* (2006) provides the fullest account of the English situation. Finally, for a comprehensive survey and bibliography of the history of early modern collecting, see Sir David Murray's *Museums: Their History and Their Use* (1904), Julius von Schlosser's *Die Kunst- und Wunderkammern der Spätrenaissance* (1908), the conference proceedings from the tercentennial of the Ashmolean Museum (Impey and MacGregor, eds., *The Origins of Museums: The Cabinet of Curiosities in Sixteenth- and Seventeenth-Century Europe*, Oxford, 1985) and MacGregor's new work, *Curiosity and Enlightenment: Collectors and Collections from the Sixteenth to the Nineteenth Century* (2007).

development is the Dresden *Kunstammer* that was started in the late 1500s by Augustus of Saxony. Tools, instruments, machines, and raw materials greatly outnumbered the decorative elements (painting, sculpture, et al) in the collection and, even at the early stage represented by Dresden, the museum's potential as a location for practical, didactic, and creative purposes was clear.¹ However, during this early period, education had little or no relevance for the vast majority of people. Only during the nineteenth-century, with the Industrial Revolution, did education become relevant to a larger percentage of the population. Also, mass education became increasingly important because of various social and political beliefs. The rise of the culture of international exhibitions played a role in convincing those in power that exhibitions could educate the masses. It was in this culture that institutions, such as the SKM, were founded. The SKM, whose evolution into the V&A and the Science Museum is covered in Chapter 1, was one of the first large museums to be founded with the purpose of popular education. At the same time, many existing collections were trying to shed their previous reputations and create new ones based on their importance to society, of which education played a key role. In 1873, education became the focus of a Royal Society of Arts Commission. Throughout the period, it was increasingly acknowledged that museums served an important function within the framework of national education. Yet, new developments proceeded slowly.

During the same period, the British educational system was undergoing gradual changes to reflect the needs of a modern, scientific society. As early as the 1850s, it was realized that the traditional British educational system (or, more accurately, the lack of a complete system) was inadequate to face the challenge of rapidly industrializing European nations and the United States. The competition from these nations was exemplified in the items that were awarded Council Medals - the highest accolade available at the Great Exhibition. Of the 31 Council Medals awarded for Class X: Philosophical Instruments, sixteen went to British exhibitors, nine to French, and six other countries received one each. Despite winning a majority, the medals won by other nations represented the speed at which they were developing their industrial and scientific capabilities.² To combat the increasing competition, major changes needed to occur within the British educational system.

¹ MacGregor, *Curiosity and enlightenment*, Yale University Press, New Haven, 2007, p. 16.

² For an explanation of the breakdown of the medals and the significance of each individual medal, see Bennett, *Science at the Great Exhibition*, Whipple Museum of the History of Science, Cambridge, 1983.

Throughout the nineteenth century, England and Wales (the Scottish system was separate) gradually improved its piecemeal educational system, but never attempted large-scale reform. The uncoordinated way of addressing problems with the system and the absence of any attempts to solve many entrenched issues created divisions in the system that can still be seen today. This included the divisions between state, public, and religious (or voluntary, as they were then known) schools. In 1884, Royal Commissioners reported that Germany's educational system was superior to England's schools for all classes. Yet this opinion did little to excite people and the lack of financial and administrative support for education led to failures in crucial activities throughout industry. So, when both Cripps and Bevin called for increased productivity during World War Two, they faced the failures of the late nineteenth and early twentieth century educational system. The only significant advance that occurred during this period was the recognition that the Privy Council responsible for education was no longer suited for its job. So, in 1899, the Board of Education Act was passed. It placed a minister in charge of the Board and, with the 1902 Education Act, simplified the 2500 local school boards into a much reduced number of local education authorities.¹ Despite these slight improvements, the British education system did not have a uniform structure, but was an ensemble of competing systems.

The 1944 Education Act was an attempt to expand the patchwork of existing schools and local systems into a unified national system of education, covering students from the age of two to eighteen.² The patchwork which the Education Act attempted to simplify was a complicated mix.³ In general, there were two systems: the grammar schools and the elementary schools. Of the two, the elementary school was lower class education, and at the outbreak of World War Two educated nine out of ten children between five and fourteen. Elementary schools were not all alike. About half were church schools (attended by a third of the elementary school pupils). By the 1930s many of these voluntary schools were falling dramatically behind their state equivalents. In 1925, 521 church schools were considered to have defective premises by the

¹ Hennessy, *Never again*, pp. 146-52.

² The original plan, as stated in the Act, was for nursery schools for children from two to five. Elementary education for children until age eleven/twelve, followed by secondary education until age fifteen, and part-time education extended until eighteen. Within the Act, both the nursery and part-time education were not compulsory and were therefore only haphazardly implemented.

³ In reality, the Act only attempted to solve the complicated mix of state-funded schools. It did not attempt to make any changes to integrate the existing public school system into the state-funded school system. The closest that the Labour government came to this was the Fleming scheme, based on the Fleming Report of 1944, and its recommendation that at least a quarter of the annual admission to public schools be made via local authority scholarship.

Board of Education. For the vast majority of elementary school pupils, it was a closed system. The only option for escape was the eleven plus examinations for scholarship places at grammar schools. A place at a grammar school was a chance to escape the working-class and the opportunity to earn a School Certificate, which was required for many white-collar jobs and for university admission. Yet, grammar schools were trying to serve dual masters: the aspirational working-class that attended on scholarships and the less affluent middle class that paid their fees. This provided grammar schools with the difficulty of educating the brightest working-class children and providing for those from the middle class who could not afford private boarding schools. In all, less than 12% of children attended a grammar school. This created a pre-1943 state system that was deeply divided between the substandard majority and the elite minority.¹ To fulfill the Act, a complete reorganization of the governance and implementation of education policy was required to make education more widely accessible.

The Act changed several things immediately - the Board became a Ministry, the number of local education authorities was reduced from 315 to 146, and central government control was greatly increased.² Despite the great volume of changes that occurred, there was little sign of any concern from the Government about the nature of the education provided. Throughout the late 1940s and early 1950s, the Ministry of Education's main concern was the provision of buildings, furniture, and teachers for the constantly increasing number of children in state schools. Within the system, most of the innovations with the curriculum occurred within secondary modern schools because of their vague position as being neither academic (the grammar school's role) nor vocational (the technical school's role). Considering that in 1950, two-thirds of the eligible children were in secondary modern schools, it was necessary for them to try to define themselves. Unfortunately, many of the innovations, particularly "project"-based curriculums, were too ambitious. By the early 1950s, many secondary moderns were (re)introducing more vocational subjects - a move that essentially killed secondary modern technical schools.³ Throughout most of the period, improving the state of education was simply seen to be a natural consequence of improving access. Thus, the Ministry provided little

¹ Addison, *Now the war is over*, pp. 142-4.

² Addison, *Now the war is over*, p. 141.

³ Addison, *Now the war is over*, pp. 141, 155, 161-2.

curriculum guidance for schools and even less for the other organizations under its remit, such as the Science Museum.

This meant the Science Museum relied on others to give it guidance about how it should use its collections to provide scientific and technical education. From 1912 through the 1950s, the Museum followed the guidance provided by the Bell Report. It was only after the Museum had recovered from World War Two and, particularly, with the appointment of Taylor, that significant movement beyond the Bell Report was made - a philosophical move that would not be completed until the 1960s. Yet, during this period, there were plenty of voices discussing the importance of science education and the museum's place within that education. Besides individuals like Haldane and those involved with the Festival of Britain, several national organizations also presented their views about how museums could be used to benefit scientific education. For example, in 1947, the Association of Scientific Workers published *Science and the Nation*. In this work, they dealt with both science education and the museum's place within society. Their aims for science education were straightforward. First, to teach the scientific method and how to test hypotheses. Second, to teach how scientific and technical advances have contributed to economic and social changes. Finally, to teach the general scientific background of students' daily lives.¹ More than any other goal, this type of scientific education was not designed to create scientists; instead its aim was to create scientifically-minded individuals. At the same time, the Association felt that museums "are potent educational instruments" because they provide a valuable illustration of the scientific background of daily life against which visitors can compare their experiences and knowledge.² Without forcing the comparison, museums were seen to operate as an extension of the education provided in elementary and secondary schools, but most of the Government's energy was spent on what to teach and not how to teach it.

Additionally, in the immediate post-War period, only one major academic study on exhibitions and education was published. In 1949, Alma S. Wittlin published her doctoral research as *The Museum: Its History and Its Tasks in Education*. As one of the only British studies that actively experimented with different styles of exhibits, Wittlin's work was regularly referenced both within the papers of the Science Museum and throughout the wider academic

¹ Association of Scientific Workers, *Science and the nation*, Penguin, Harmondsworth, Middlesex, 1947, pp. 216-7.

² Association of Scientific Workers, *Science and the nation*, pp. 207-8.

sphere.¹ The book was divided into two sections, as denoted by the title – Part One concerns the history of the museum from “Economic Hoards” to the modern public museum, and Part Two contains suggestions for the future development of the educational offerings contained within different types of museums. In the preface of the work, Wittlin states her belief that museums “hold special potentialities for the fulfillment and furtherance of educational requirements” and that her experimental experience showed that traditional museum displays “have little beneficial effect on people” and are actually a waste of money and energy.²

Wittlin compared the museum with all other kinds of communication – books, lectures, newspapers, films, et al – and noted that for any of them to be effective, they had to be aware of four factors: the consumers, the ‘credo’ of the creator, the subject, and the form. Just as a book is aimed at a specific audience, so must be an exhibition. To paraphrase Wittlin, it is an insoluble proposition that an exhibition can be designed to provide information on a variety of loosely connected subjects and appeal to people of varied social and cultural backgrounds, to scholars and laymen, and to adults and children. A ‘credo’, as defined by Wittlin, was the sense of values held by the creator of a communication. These values were important because it was impossible to teach all the facts necessary to match the complexity of modern life, and that it was the values embodied in this ‘credo’ that would train the audience in the correct responses and attitudes needed in the “new world.” The subject of all communications influence their form; for example, imagine a book about photography without pictures, or a film about Beethoven without music. For museums, this is especially true because many are defined by their collections, regardless of the wishes of visitors or curators. Finally, Wittlin saw the visual style of exhibition as key to the educative qualities of museums. To back up her claim, she lists three results of her experimental exhibitions: (1) that the visual exhibition style conveys more facts in less time than possible through words, (2) that the visual exhibition style is suitable for presenting numerous facts simultaneously, and (3) that the museum offer space for cooperative/experiential learning within exhibitions.³ Following her advice, there was considerable scope for museums to contribute to national education planning.

¹ An example of her influence can be seen in: Harrison, *Museums in Education*, UNESCO, Paris, 1956.

² Wittlin, *The museum: its history and its tasks in education*, Routledge & Kegan Paul, London, 1949, pp. vii-xiv.

³ Wittlin, *The museum*, pp. 185-9.

In a direct challenge to many of her fellow museum workers, Wittlin states that it is not a lack of money, but a poverty of the mind that is hurting the functioning of museums. To create the richness of mind required for effective museum work, an understanding of museum practice and a program for the active development of exhibitions was needed, and this was Wittlin's goal for the last section of her book. For her, there was no distinction between education and entertainment, when it came to the functions of museums. This was because museums were dealing with "objects of aesthetic qualities which are sources of general education" and they could be enjoyed while simultaneously educating the viewer. Thus, one task of any museum should be to expose the fallacy of the distinction between education and entertainment because, within the museum, they should be combined within the same experience. Her scheme also involved distinguishing between two main types of museums – the storehouse museum and the display museum – even when they may be combined in a single building or institution. Her reason for this division was that combining the two functions – storage and display – within a museum's galleries often hampers both or, at least, complicates any exhibition. So, for her, a definitive separation of the accommodation for storage/preservation from exhibition space was a necessity. Wittlin's storehouse museums were utilitarian warehouses. Through centralized planning, the storehouses were designed to collect specimens of all subjects represented, to preserve the collection for as long as possible, to be a central location for loans (both single specimens and representative groups) without interference from political, commercial, or social interests, and to perform this work "with economy of cost." On the other hand, display museums were educational institutions and, as such, had to respond to their audience. In Wittlin's future, display museums would become less obvious and more genuine – schools would have collections fit for their purposes; temporary circulating exhibitions would be standard features in museums, clubs, libraries, stores, and elsewhere; and sites of special interest, such as natural features or historic houses, would be illustrated by appropriate collections. Beyond those specialist museums, larger collections would have to respond to their audience. To simplify this problem, Wittlin subdivides display museums into three types: the research museum, the student gallery, and the "Museum as a Centre of Training in Basic Facts". The research museum was essentially the university museum – a collection that acted as an aid to continued research and instruction. The student gallery, though similar to the research museum, was to be displayed in the method of a library and was designed to be approached with a body of specialist knowledge that the general

public would not likely possess. Finally, the museum as a centre of training in basic facts was a new idea. It was about educating the adult student, the teacher, the undergraduate, and similar individuals. In short, educating the masses on the basic facts of modern life.¹ This was a goal with which no one at the Science Museum would quibble and a category into which the Museum could easily be reconfigured.

In reality, within Wittlin's scheme, the Museum straddled types. It was both a museum of storage and display, and was one of the worst combinations of the two because of the Museum's serious space constraints and its reliance on crowded gallery space to ease storage constraints. While Wittlin is referenced at the Science Museum as an example of good practice and possible goals, the majority of the Museum's development was left to the personal opinions and experiences of the staff. At times, this resulted in significant developments, such as the Children's Gallery and the *Science Museum Bulletin*, but more importantly, it made development uneven and generally disconnected from any general plan for the Museum and any national strategy for science education. Despite this trend, there were points between the Second World War and the early 1960s when it appeared that an overarching educational program was going to be developed at the Museum.

In May 1950, Dr Herbert Shaw, the Director since only 1945, died suddenly and Dr Frank Sherwood Taylor was appointed as his replacement.² This appointment was significant for the Science Museum. First, Taylor was the first external appointment to the Directorship since the Science Museum gained independence in 1909. Second, and most importantly, it was one of the earliest signals of the change in direction that occurred at the Science Museum after World War Two.

An Educator at the Museum: Frank Sherwood Taylor

According to the Oxford DNB, Taylor was a chemist and historian of science.³ In his biography, Simcock refers to him as a chemist, teacher, researcher, historian, curator, editor, and author.⁴ Yet, none of those labels completely describe Taylor's profession. More than anything else, he was an educator. For many people, being a successful author, a freelance lecturer, or the

¹ Wittlin, *The museum*, pp. 190-7.

² AC 1940-51, p3-4.

³ Greenaway, *Taylor, Frank Sherwood (1897-1956), chemist and historian of science* in DNB, OUP, 2004.

⁴ Simcock, *Alchemy and the World of Science*.

curator of a major museum would be enough, but for Taylor they were all part of his work as an educator. This work, despite the difficulties, would be at its most wide-ranging during his short time at the Science Museum.

Taylor was born on 26 November 1897 in Kent to Seaton Frank Taylor, a prosperous solicitor, and Helen Sennerth Davidson. After an education at the Sherborne School, he won a classical scholarship to Lincoln College, Oxford. Instead of immediately attending Oxford, Taylor served as a private in the Honourable Artillery Company during World War One. At Passchendaele in October 1917, he was seriously wounded and underwent approximately fourteen operations in the next nine months. Finally, in October 1919, Taylor arrived in Oxford, but to study chemistry, instead of classics.¹ This change had been long in coming. At an early age, *Science for All*, a multivolume collection of introductory essays on general science, influenced him to perform some basic experiments, but it was really his war experiences that changed his academic course. He found the numerous surgeries very interesting and was greatly affected by the death of his brother, who on his deathbed wrote: "This is what modern science has done for me".² No matter how his brother's censure of science affected him, it is clear that the words had a profound effect on Taylor's life.

In 1921, after graduating with distinction, Taylor became a chemistry teacher. In 1923, he continued his education by enrolling as a part-time student at University College London (UCL), and he received his BSc from Oxford for work on Greek alchemy. In 1928, Taylor published his first small textbook, *Elementary Practical Physical Chemistry*. In 1931, he received his London PhD for work on alchemy and he published his first substantial textbook, *Inorganic and Theoretical Chemistry*. This text would eventually run to ten editions and, along with his *Organic Chemistry* (1933), would be used by students until the late 1960s. In 1933, Taylor moved from secondary to university education when he became an Assistant Lecturer in Inorganic Chemistry at Queen Mary College (then known as East London College). In 1934, he published his first children's book, *The Young Chemist* – a book that was inspired by his early experience with *Science for All*. Also, in 1934, he published scientific research in the *Journal of the Chemical Society*. In 1937, after being involved with the foundation of the Society for the Study of Alchemy and Early Chemistry the previous year, he became the Honorary Editor of its journal, *Ambix*. This was a

¹ Greenaway, *Taylor, Frank Sherwood (1897-1956)*.

² Simcock, *Alchemy and the World of Science*, pp. 122-3.

position that he would hold for the rest of his life. At this point, Taylor decided to leave UCL and, more generally, full-time employment.¹

While at UCL, Taylor's focus changed to the wider history of science and to the popularization of science to the general reader. In 1936, he published *The World of Science*, an encyclopedic work that would be his best-selling book for many years. It was with this work that he staked out his position as a mediator between science and the common man. His first historical publication outside of chemistry was in 1938 with *Galileo and the Freedom of Thought*. This was also his first venture into issues of science, religion, and freedom. These became constant themes in Taylor's writing for the rest of his life.²

Taylor had independent means of income from a legacy, from a small chain of village general stores, and from his publishing royalties. Being a professional writer, he was a considerable asset to his agent, David Higham, and publisher, William Heinemann Ltd and in 1939, he published *General Science for Schools* (a three-volume textbook), *A Short History of Science*, and *Science Front 1939*. To add financial stability and prestige to his writing career, he sought a position that would allow him to devote himself to the study of the academic subjects he fancied. In late 1939, Taylor came into contact with the elderly R.T. Gunther, who was searching for his successor as Curator of the Museum of the History of Science, Oxford. After an informal interview, he was asked to start in spring 1940, when he would receive training before assuming his full responsibilities.³ Unfortunately, Gunther died before Taylor arrived, leaving the Museum in disarray because of preparations for War. In August 1940, he was named temporary Curator (later upgraded to full Curator in 1945).⁴ For Taylor, the freedom the position allowed was very useful.

When Taylor arrived in Oxford, the Museum was closed because of the War. Shortly after taking charge, he opened a reduced display in 1941. The Museum closed again at the end of the War for renovation and redecoration, with a temporary exhibition opening in 1947. Gradually the Museum reopened but not fully until 1949 when the Museum was able to use the entire Old Ashmolean building for the first time – fulfilling a long-term goal of the Museum.⁵

¹ Simcock, *Alchemy and the World of Science*, pp. 122-6.

² Simcock, *Alchemy and the World of Science*, pp. 125-6.

³ MHS Old Ashmolean Letters: Last Letters under Robert T. Gunther, 1938-40.

⁴ Simcock, *Alchemy and the World of Science*, p. 127; Greenaway, *Taylor, Frank Sherwood (1897-1956)*.

⁵ MHS Annual Reports from 1940 to 1950.

Taylor's time at Oxford was some of the most successful of his life. He established himself as a museum professional. Besides utilizing the whole building for exhibition space, he also expanded the collections substantially. The largest and most notable acquisition was the Clay Collection of Optical Instruments. It consisted of over 700 items, including about 328 microscopes, and it filled a noticeable gap in the collections. In the Tenth Annual Report of the Museum, the Clay Collection was called "one of the Museum's principal glories."¹ Upon opening the newly displayed Museum, he published the first (and only) complete guidebook.² As part of his wartime duties, Taylor was able to give "the first systematic instruction in the history of science" at Oxford to RAF probationers, which later led to the production of his *Memorandum on the Teaching of the History of Science in Universities*.³ The memo was a plan to integrate the history of science into all subjects and included plans for postgraduate degrees in the subject. It also



In 1930, Taylor adopted this symbol as his emblem. It is a serpent swallowing its own tail, coiled around a Greek motto, and can be translated as "the unity of all things". It can be found on the cover of many of his publications.

(From the cover of *General Science for Schools, Part I*)

expressed Taylor's preferred method of teaching the subject, which was a combination of books and instruments – an education that Oxford was uniquely positioned to provide.⁴ On the publishing front, Taylor continued to be successful. He published books on popular science, popular history of science, and textbooks, including his most important academic work, *The Alchemists* in 1949. In addition, the Museum's collections inspired him to expand his repertoire to include the history of scientific instrumentation.⁵ Finally, Taylor, after converting to Catholicism in 1941, started to publish works on Catholic science education and the synthesis of science with religion.⁶ His first major publication along this line was *The Fourfold Vision* in

¹ MHS Annual Report for 1943-4.

² Taylor, *A brief guide to the Museum of the History of Science, Oxford*, Ashmolean Museum, Oxford, 1949.

³ MHS Annual Reports for 1941-2 and 1945-6.

⁴ MHS FST 258.

⁵ Simcock, *Alchemy and the World of Science*, p. 127.

⁶ Simcock, *Alchemy and the World of Science*, p. 132.

1945, where he intended to prove “that science, art and religion can be altered and fused into one wisdom” which explained everything from subatomic particles to God.¹ With these successes behind him, Taylor applied to the vacant directorship at the Science Museum.

Despite his success in Oxford, his real interests lay outside of the reasonably narrow scope of the Museum of the History of Science.² Starting in the 1930s, Taylor increasingly turned toward presenting modern scientific and technological subjects in his publications, and these were areas in which the Museum in Oxford was very weak. So, for Taylor, a position at a larger institution was attractive. Having been unable to secure a visiting professorship in the United States³ and with deathwatch beetle destroying the upper floors of the Old Ashmolean,⁴ he applied to the Science Museum and was named Director – the prestigious and well-paid post he sought.

As soon as his appointment to the Directorship was announced, letters of congratulations started to appear in Taylor’s mail. These were from a wide-range of individuals and are a great indication of the connections that Taylor had developed by this point in his career. They included letters from officers at the Association of Women Science Teachers, the editor of the *School Science Review*, industrial publications such as the *Iron and Coal Trade Review*, and academics such as R.S. Clay. Many of the writers had personal knowledge of the Museum and some, like Clay, felt that the Museum would benefit more from Taylor’s appointment than he would from working in London.⁵ So, from outside of the Museum, Taylor had plenty of support from his friends and acquaintances.

Taylor’s appointment as Director was unique for several reasons. For the staff of the Science Museum, Taylor’s appointment was a shock. As mentioned, it was a signal of the changes that the Museum was undergoing, and Taylor’s appointment was an intentional break with tradition. On the surface, there were three reasons that he was a shock appointment: he was an outsider, he was an historian, and he was known as a popular educator. Under the surface, he was greeted with indifference and hostility by the Museum’s older staff for other

¹ Taylor, *The Fourfold Vision: a study of the relations of science and religion*, Chapman & Hall Ltd, London, 1945, p. 106.

² One of Taylor’s largest successes in Oxford was his post-War redisplay of the entire collections into the whole Old Ashmolean Building. Before the Second World War, the scientific instruments had to share the building with other purposes, but after the reopening in 1949, all other institutions had been removed from the building.

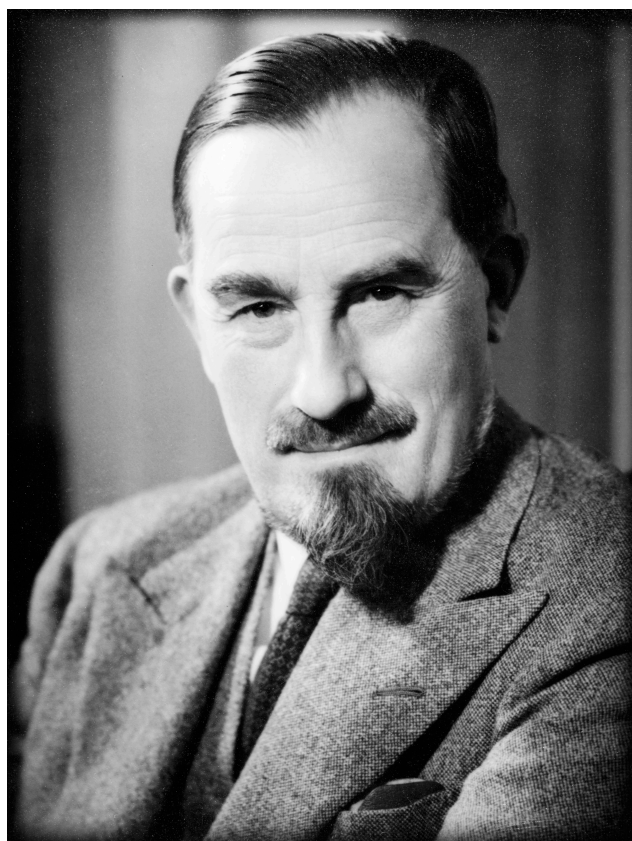
³ MHS FST 78.

⁴ MHS Annual Reports for 1949-50.

⁵ MHS FST 47.

reasons. These mainly revolved around his well-publicized views on the relationship of science and religion.¹

Despite some congenial letters of congratulations from Science Museum staff members, his general reception at the Museum was not warm.² Not being from within the Science Museum, or at least, the civil service, Taylor was unique. Since Major-General ER Festing was named the first director of the Science Museum in 1893, the Director had always been an internal appointment with civil service experience. Additionally, since Festing's time, the Director had either been trained as a scientist or engineer, and in the words of R.S. Clay, "not one of them" had made any contribution to the history of science.³ Finally, the previous directors of the Museum were not media savvy. Despite being the Director of a national institution, they did not actively pursue publicity, with Lyons being known to have never given a formal address and only rarely speaking on informal occasions.⁴ Taylor, in comparison, was very different. He was not a civil servant and he did not enjoy his administrative duties at the Museum.⁵ Despite



Portrait of Frank Sherwood Taylor (circa 1950)
(Image Courtesy of Science Museum/Science & Society)

having received a portion of his formal training as a chemist, Taylor was best known for his historical work, especially on alchemy and popular science. Finally, Taylor was far from shy. Beyond writing, Taylor was a prolific speaker and appeared at a wide assortment of events, including academic conferences, government functions, grammar schools, and religious gatherings.⁶ So, the choice of Taylor as Shaw's replacement was a shock and signaled a change

¹ Simcock, *Alchemy and the World of Science*, p. 129; Greenaway, *Taylor, Frank Sherwood (1897-1956)*.

² MHS FST 47.

³ Letter dated 9 Oct 50 from R.S. Clay in MHS FST 47.

⁴ Follett, *The Rise of the Science Museum*, pp. 159-60.

⁵ Simcock, *Alchemy and the World of Science*, p. 129.

⁶ For the range of talks Taylor gave throughout the years, see MHS FST 93, 206, 208, 236, 237, and 262.

for the Museum. Taylor was not the first Director to face difficulties from the staff, especially the older staff, but unlike Lyons, Taylor faced these issues before he tried to make any changes.

Beyond the purely professional issues that the staff had with Taylor, there was also a personal issue that many of the staff had with him. On 15 December 1950, Taylor received a communication¹ from the Keepers concerning issues they had with him, particularly the recent publication of *Man and Matter* (1951). His strongly-worded draft response addressed two main issues: first, his general policy concerning publications by staff members and, second, the particular case of *Man and Matter*. In official documents, his policy was that the Keepers must follow the facts of science and history and only in certain instances was it appropriate to make judgment calls. In those instances, he relied on the personal judgment of the author to interpret the facts, even if he disagreed with the interpretation. Outside of official documents, Taylor placed only the limits of the law and the regulations of the civil service on the opinions of the staff, and members of staff were free to express their opinions, as long as they were not identified as the opinions of the Museum. In a strongly-worded concluding section on his general policy, Taylor expressed his belief that “any restriction ... [was] entirely contrary to the spirit of science and scholarship” and that in Britain, unlike communist countries, following a party line was not required of scientists and scholars. Concerning the publication of *Man and Matter*, it is clearly the source for many issues addressed in the letter from the Keepers. In the response, he addresses five separate points. The first issue was the question of whether the book was written by the Director of the Science Museum. Taylor’s answer was a resounding no – it contains no reference to the Museum, it was written before he was named Director, the preface was dated from Oxford, and the only mention of his office was on the dust jacket designed by the publisher without his approval. Taylor also had to answer to allegations of bias. He felt that these were without support and that they were insulting. He states, in the response, that he holds opinions because he believes them true and that he would probably have similar questions about the validity of other’s opinions, if he knew them (or if those complaining were confident enough to publish their opinions). In short, he determines that these allegations “deserve no notice” but

¹ As far as can be determined, this original communication does not survive. The legend is that this communication was a ‘round robin’ letter from an unidentified group of staff. The oral (now in a written version, in the autobiography of Frank Greenaway, *Chymica Acta: An Autobiographical Memoir*, Jeremy Mills, Huddersfield, 2007.) is that the group mainly consisted of the older staff at the Museum. Unfortunately, there is no documentation to either support or discount this version of events. The only evidence of the incident is Taylor’s draft response (in MHS FST 265), which appears as an open letter to all Keepers at the Science Museum.

that, on a different subject, they have damaged the working relationships at the Museum. It is right for individuals to question actions that may be detrimental to the work of the Museum, but the allegations, made without supporting evidence and in a devious manner, damaged personal and professional relationships within the Museum. There was one specific criticism leveled at *Man and Matter*. It stemmed from a review in *The Times*, where the reviewer inferred that Taylor viewed evolution as an open question. In Taylor's normal fashion, his answer is quite clear – the reviewer was wrong. To correct the mistake, he refers the Keepers to the second paragraph on page 88, where he stated that evolution is the most convincing theory to explain the current evidence, it is consistent with Catholic doctrine, and therefore, it should be accepted. Finally, to prove that he was fit for the office of Director, Taylor makes clear that those who hired him knew of his published opinions and that “they *explicitly* placed no restrictions” on his writing.¹ Having come from the relaxed academic atmosphere of Oxford, these personal attacks were quite disturbing for Taylor and, as is illustrated by the defense he had to construct, he faced open hostility from the staff that was supposed to support him as Director of the Science Museum.

So, upon taking the Science Museum job, Taylor found himself in a difficult situation. Not only did he have to leave Oxford, with its comfortable academic atmosphere and his lovely garden,² but he was faced with severe personal and professional issues. On top of the matters discussed, Taylor found the restrictions placed on him by the work and his bosses at the Ministry of Education awkward. The core of the work was administrative paper shuffling, rubber-stamping government plans, pacifying Keepers and the Ministry, plus struggling with internal and external Committees. Taylor found this work very taxing, and dealing with the restrictions placed on his personal speaking and writing was onerous. Specifically, Taylor had to constantly restrain his publishers, editors, lecture organizers, and others from referring to him as a “Director of the Science Museum” unless he had official approval from the Ministry.

Despite all of this, Taylor was still a productive writer and speaker with his position as Director increasing his importance and the demands on his time. With an indefatigable schedule of talks in addition to his Museum duties, Taylor addressed a wide range of audiences: the British Society of the History of Science, the Association of Women Science Teachers, the

1 “Draft Response to Keepers” in MHS FST 265. [emphasis original]

2 Several letters of congratulations in MHS FST 47 specifically mention that the writers knew he would greatly miss his garden in Oxford.

British Association for the Advancement of Science, Keble College in Oxford, Nuneaton Grammar School, the Museums Association, Blackfriars in Oxford, the Royal Philosophical Society in Glasgow, and many others.¹ Throughout this period, Taylor maintained his connections with the Chemical Society, where he was President from 1951 to 1953,² and the Society for the Study of Alchemy and Early Chemistry, where he continued to edit *Ambix* until his death. Publishing was never far from Taylor's mind. He continued to publish small journal articles, book reviews, and other pieces. He also wrote several books during this period - his popular *An Illustrated History of Science* (1955) and two works published posthumously, *A History of Technology* (1956) and *A History of Industrial Chemistry* (1957). These and a final article in *Ambix* on the alchemy of Newton³ were Taylor's last publications.

Beyond his lecturing and publishing, Taylor was also a broadcaster. During the 1940s and '50s, he appeared on radio discussing both the history of science and the relationship of science to religion. In addition to the standard radio broadcasts, he also prepared educational dramatizations on aspects of the history of science. His first experience before television cameras was with a second performance of one of his Christmas Lectures. In 1954, at the invitation of producer David Attenborough, he appeared on the early BBC panel game show on "Animal, Vegetable, Mineral?" where three experts tried to identify items taken from British museums.⁴ Overall, Taylor was comfortable with the modern technology and used it to extend the ways he could reach his audiences.⁵ Whether it was in print, in person, on the radio, on the television, or within a museum, Taylor's main goal was to educate people about science's influence on the modern world.

During 1953, Taylor fell ill. Again in 1955, he was ill for much of the summer and fall. On 5 January 1956, he died at his home in Crowthorne, Berkshire. It was felt by many of his friends, as they expressed in correspondence, that his professional life had taken a toll on his

¹ Various MHS FST files.

² A special note should be made about Taylor's 1953 Presidential Address to the Chemical Society because it is an important statement of the discipline and should be read by students of the subject today. For a copy of it, see: Taylor, 'Presidential Address: Reflections on the Writing of the History of Science', *Bulletin of the British Society for the History of Science* vol. 1, no. 10, 1954, pp. 239-45.

³ Taylor, 'An Alchemical Work of Sir Isaac Newton', *Ambix* vol. 5, 1956, pp. 59-84.

⁴ For information about the show, see: "Animal, Vegetable, Mineral?": *TV series 1952-1959*, retrieved 2 July 2008, <<http://www.imdb.com/title/tt0247850/>>.

⁵ Simcock, *Alchemy and the World of Science*, p. 130.

health.¹ This is an opinion that is not surprising, considering the stress he encountered at the Science Museum and the work that he undertook outside of those responsibilities. Unlike other Directors of the Science Museum, Taylor was not happy to maintain the status quo, especially in relation to the Museum's educational provision. Under his direction, the various innovations of previous directors, especially Lyons, were built upon to create an educational program that could be used by children in all levels of education. On the first page of the first volume of the Science Museum Bulletin, Taylor expressed his vision for the Museum:

I welcome young people to the Science Museum, which more than any other National Museum they have made their own. *I want to make the Museum as useful to them as is possible.*²

It was with this goal that he expanded previous developments, such as the Children's Gallery, and tried to involve children and educators in developing the Museum's educational programs.

The Children's Gallery: Entertainment, Education, History, & Science

The Children's Gallery is ... intended to give besides entertainment and historical surveys an introduction into the whole field of Science, excluding biology ... by showing the fundamental experiments or other illustrations which give the important principles of science, principles which one must know and understand before one can really combine the details of each branch into the entity 'Science'.³

The Children's Gallery, as opened in 1931, was Lyons' most innovative and long lasting project. Whereas Lyons followed the recommendations for improvements provided in the Bell Report for most projects, the Children's Gallery was "peculiarly personal" for him, and he even designed the Gallery with the co-operation of his family.⁴ When compared to other galleries opened during this period, the Children's Gallery was completely different in its design, contents, and purpose. The Gallery's philosophy, as outlined above, was pretty simple. It was designed to be an entertaining introduction to science through models and working exhibits.

Though it was unclear where Lyons' ideas for the Gallery originated, it cannot be viewed as a coincidence that he visited the Deutsches Museum during the planning of the Gallery. The Deutsches Museum, from its opening, followed the tradition laid out by the Patent Museum. It

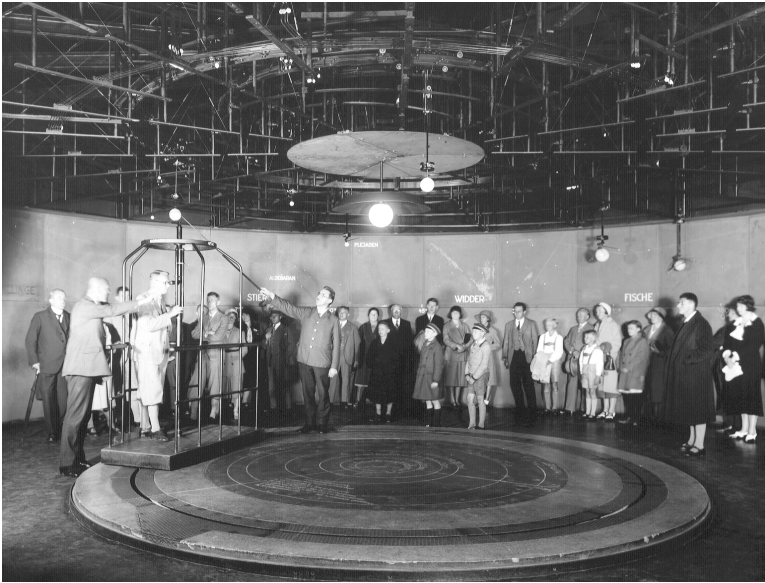
¹ Various personal correspondence files in MHS FST archive.

² Science Museum Bulletin, Vol. 1, Fosh & Cross Ltd, London, 1955, p. 1. [Emphasis added]

³ "Childrens' Gallery Scheme" (pg. 1) in ScM Z253 (Box 1).

⁴ Dale, 'Henry George Lyons. 1864-1944', *Obituary Notices of Fellows of the Royal Society* vol. 4, no. 13, 1944, , p. 803.

showed historical apparatus, but it went much further. It emphasized how technology worked by using vivifying exhibits – working models, cut-away exhibits, and explanatory panels – and



One of the vivifying exhibits that Lyons saw was the Copernican Planetarium, where a passenger ‘becomes’ the earth revolving around the Sun. It, like the optical planetarium, was built by Zeiss, but this one was completed in 1911.
(Photo Courtesy of Carl Zeiss Archive)

strove to illustrate the connections between pure scientific research and its technological application.¹ In Germany, Lyons was impressed by the display techniques and narratives used at the Deutsches Museum.² The effect this trip had on his ideas for the Children’s Gallery is unclear, but the trip did change his opinion on a planetarium at the Museum.

Therefore, it is likely it also influenced his ideas about how science should be presented, especially to younger

audiences, because he accepted the arguments of those pushing the planetarium and he used many ideas seen on his trip in planning the Gallery. Despite Lyons’ provision of many ideas behind the Gallery, he was not responsible for its implementation. That was left to Mr F St A Hartley.

Hartley joined the Museum staff in 1920 as one of the first batch of recruits after the First World War. He was an Assistant Keeper when he became involved with the Children’s Gallery. He was responsible for coordinating the involvement of other Museum officers, the Museum’s workshops, and outside artists to produce the dioramas, working models, and explanations that filled the Gallery.³ It became his main personal interest throughout the rest of his career at the Museum⁴ and, since the Gallery became one of the Museum’s best-known features, it was also his most important contribution to the Museum’s development.

¹ Alexander, *Museum masters: their museums and their influence*, AltaMira, Oxford, 1983, p. 360.

² “Visit to Deutsches Museum” (ScM 95B/4/4) dated 27 Apr 1931 in ScM ED 79/38.

³ Follett, *The Rise of the Science Museum*, pp. 114-6.

⁴ It was not his job to manage or curate the Children’s Gallery. During this period at the Science Museum, there was no specific curator in charge of this area, and the responsibility came to Hartley because of his willingness to manage the Gallery.

Despite a target audience of children, the display in this special gallery was not just for children - a fact referenced in the title of the gallery. After opening, references to the Gallery gradually changed, and by 1933, it was referred to as “the Introductory Collections (formerly the Children’s Gallery)”. This change was not permanent, and in the 1933 Advisory Council Report (published in 1934), the section concerning it was entitled “Children’s Gallery (Introductory Collection)”.¹ Even after the Second World War, the subtitle of the Children’s Gallery guide referred to them as the “Introductory Collections”.² Yet, the confusion behind the name changes was based on reality. From the beginning, it was used by both adults and children. Additionally, many museum professionals, both within and outside the Science Museum, felt that it was as beneficial, if not more, for adults than for children.³ The proof of this appeal can be seen in the attendance numbers. After the Gallery opened, the Science Museum became the second most popular museum in Europe, ahead of the BM but behind the Louvre.⁴ The appeal that the Gallery held for visitors was caused by its dual purposes.

The Children’s Gallery had two clearly stated purposes – entertainment and education. As entertainment, the Gallery was designed to attract attention and excite the curiosity of visitors, both young and old. As education, it was designed to present both the history and the science behind objects, both those in the Children’s Gallery and those in the main galleries. As the Guide to the Gallery stated, its purpose was “to show what things *mean*, that is, their significance in our daily lives, rather than how they *work*.”⁵ The best illustration of the difference between the Children’s Gallery and the main galleries can be seen in the treatment of transportation. In the main galleries, a visitor would be presented with series of ships, locomotives, and aircraft. For the most part, they were devoid of social context, except where they were exceptional (the first, the fastest, the largest, et al) but with the emphasis being placed on their technical specifications. In contrast, the Children’s Gallery presented transportation as a single historical story – the “life blood” of civilization – moving from simple to complex methods based on socio-historical reasons, instead of purely technical ones, and how the fundamental

¹ Follett, *The Rise of the Science Museum*, pp. 116-7.

² Hartley, *The Children’s Gallery*.

³ Follett, *The Rise of the Science Museum*, pp. 116-7.

⁴ Follett, *The Rise of the Science Museum*, Back Cover.

⁵ Hartley, *The Children’s Gallery*, p. 3. [Emphasis Original]

principles of science created increases in speed and power that ‘improved’ the world.¹ Exhibits within the Gallery could be entertaining, educational, historic, or scientific and for the gallery to fulfill its purposes, all of the displays needed to have at least three of those characteristics.

To meet those demands, the Gallery was created as a unique combination of dioramas, models, and working exhibits.² Unlike the rest of the Science Museum, which relied on many outside sources for exhibits, the Children’s Gallery was an isolated “museum within a museum”

that allowed the staff involved to have a lot more freedom than normal. Museum staff designed all the Gallery exhibits, and the Museum’s workshops or specially commissioned outside artists prepared them.³ The freedom allowed for the development of a new style for the Science Museum, of display that



Children looking at the transport dioramas in the Children's Gallery in 1949. (Image Courtesy of the Science Museum/Science & Society)

involved the use of dioramas, models, original objects, and ‘philosophical toys’ to express an idea or development which would have otherwise been presented solely by ranks of original objects.

Original objects received the least attention of all types in the Gallery. They were used sparingly, mainly to illustrate science and technology in everyday life. An example of this use was the Time display. It was a single case of exhibits that showed common methods of time telling and keeping throughout the ages, with no reference to the individual technological developments of sundials and clocks (water, sand, and mechanical).⁴ They were small objects similar to things visitors would recognize from everyday life. This allowed the original objects to educate visitors about their history and to illustrate the science behind them.

¹ Hartley, *The Children's Gallery*, pp. 26-32.

² The information about the contents of the Gallery has been garnered from Hartley's *Guide*, archive information, and photographs of the Gallery.

³ Follett, *The Rise of the Science Museum*, p. 116.

⁴ Hartley, *The Children's Gallery*, pp. 6-7.

Miniature and working models were used frequently throughout the Museum, not just within the Children's Gallery. The Science Museum has always been a museum with working exhibits, but the exhibits featured in the Introductory Collections were of a different type. Outside the Children's Gallery, working exhibits were historical machines presented 'in motion' – operated by hand, compressed air, or small electric motors. These were the types of working exhibit described in the Bell Report,¹ and by the Second World War over 300 of these exhibits were found within the Museum's galleries.² Instead, the working exhibits in the Children's Gallery were designed for children to experience the science explained in other exhibits throughout the museum. To illustrate mechanical advantages as presented in the displays on Power, a popular exhibit allowed children to lift heavy weights with the help of pulleys and jacks.³ These working models, especially the pulleys, offered "immense delight" to visitors.⁴ The Science Museum has also always been a museum with miniature models, and many of the models within the Children's Gallery served the same purpose as those in the main galleries – to represent items too large to house within the Museum, ranging from beacon fires to the Watt Beam Engine. The difference in their use came from what they represented. In the main galleries, series of miniatures were exhibited to represent technical progress, compared to the Children's Gallery, where they were used to represent socio-historical aspects of the technologies modeled. For the designers, models were multipurpose tools; they could be entertaining or educational and could show history or science, depending on their subject and their use.

The classification of 'philosophical toys' was a miscellaneous collection of exhibits that enabled visitors to be "little sorcerers" playing with the "mysterious forces of nature." It was unnecessary for the exhibits to explain a fundamental scientific principle, as long as they demonstrated the power of science.⁵ Many of the original philosophical toys came from a special exhibition of photoelectric cells, and included many of the famous exhibits, such as the automatic door (which opened 33 million times between 1933 and 1960, when the original mechanism failed), the golden ball, the burglar alarm, and the automatic ball sorter.⁶ As later studies proved,

¹ *Bell Report (Part 1)*, p. 9.

² Follett, *The Rise of the Science Museum*, p. 108.

³ Hartley, *The Children's Gallery*, p. 38.

⁴ 'The Children's Gallery at the Science Museum', *Museums Journal* vol. 31, 1932, p. 443.

⁵ "Children's Gallery" dated 21 November 1958 in ScM Z253 (Box 1).

⁶ Follett, *The Rise of the Science Museum*, p. 116.

these were some of the most popular exhibits within the Gallery and did much to attract children.¹

Yet, the most groundbreaking of all the exhibits in the Gallery were the dioramas. The museum diorama, as opposed to the diorama used for entertainment, is a type of three-dimensional model commissioned to show a scene, event, or landscape as part of a specific exhibition. Depending on the museum's needs, there are two main types: the painted background and the modeled scene. Painted background dioramas are most common in natural science museums. They are designed to provide context for a scale model or a museum object, and they can be miniature, life-sized, or magnified, depending on their purpose. Charles Willson Peale at his Philadelphia Museum pioneered this type of display in the United States during the 1780s.² Only much later was this method widely used elsewhere, especially in Europe.³ The modeled scene was a much later development, only becoming well known during the mid-1920s during the British Empire Exhibition at Wembley. Modeled scenes are complete scenes, generally using a skewed perspective, containing both three-dimensional models and a painted background.⁴ Most early dioramas, of both types, were three-dimensional representations of nature designed to educate a lay audience about natural history.⁵ Only later did the subjects they covered expand and they were used to display other scenes, particularly of human activity. In the Children's Gallery, they were used in this new way to show the socio-historical context of human activity.

The purest example of this was the series on transportation technologies. Designed by Raphael Roussel, the leading diorama artist of the period, they were a series of dioramas illustrating the development of transportation from the prehistoric (by three dioramas showing early boats, sledges, and pack-animals) to modern technologies (by two dioramas showing road, rail, water, and air transportation).⁶ The concluding scene, *Marble Arch at Night*, one of Roussel's finest works, was still featured in the late 1970s as part of an extended series of exhibits. This

¹ There are a total of three studies conducted in the early 1950s and they can be found in ScM Z253.

² Alexander, *Museum masters*, pp. 60-1.

³ Anderson, *Transcript of 'Circa 1951: Presenting Science to the British Public'*, 2007, retrieved 15 Jan 2008 <<http://osulibrary.oregonstate.edu/specialcollections/events/2007paulingconference/video-s2-3-anderson.html>>.

⁴ Insley, 'Little landscapes: dioramas in museum displays', *Endeavour* vol. 32, no. 1, 2008, pp. 27-8; Ch. 16 in Greenaway, *Chymica Acta: An Autobiographical Memoir*, Jeremy Mills, Huddersfield, 2007.

⁵ One of the few works on dioramas is: Wonders, *Habitat Dioramas: Illusions of Wilderness in Museums of Natural History*, Almqvist & Wiksell, Uppsala, 1993.

⁶ Hartley, *The Children's Gallery*, pp. 8-21.

series included the first dioramas installed at the Science Museum and made an immediate impact in Museum attendance, with it increasing during January 1932 to 171,000 (more than twice December's attendance).¹ The atmosphere created by the use of dioramas dominated the exhibition space and provided a background for the working exhibits, which filled the central area of the Gallery.

Purposefully avoiding the traditional classification and display methods of technological museums, the Children's Gallery was a first for the Science Museum for several reasons. It told a socio-historical story of science and technology. It focused on how science affected the daily life of visitors. It attempted to educate visitors about the basic principles of science and key technological developments. For example, a visitor would find examples of early astronomical equipment in the main galleries, but in the Introductory Collections of the Children's Gallery, the visitor would find an explanation of the basic principles that govern the solar system.² Combining its purposes, goals, and these other factors, the Children's Gallery was an incredibly innovative undertaking for 1930s England.

Even before its opening on 12 December 1931, opinions about the Gallery's effectiveness and its exhibits were being voiced. In early 1931, the Science Museum held an informal gathering to unveil Roussel's transport dioramas and the *Museum Journal* was there to report on them. The *Journal* stated that the Museum's plan was "going too far and not quite in the right direction" and that the Museum's "ordinary exhibits already appeal so forcibly to the young that a trifle more elementary exposition is all that can be needed."³ Yet, within a year, the *Journal* had changed its opinion. The ordinary exhibits were now "hardly intelligible to ... the younger visitors" and the new gallery was "so attractive ... that we expect to see it visited by a large portion of grown-ups."⁴ It is not clear why the *Journal* made such a dramatic change of opinion, but the *Journal*'s first opinion was based on a small sampling of exhibits taken out of context. Additionally, the *Journal*'s points of comparison were American ideas concerning children's museums. In American museums, according to the *Journal*, children were engaged in making their own models, not looking at them. By the time of the second article, two things had changed. First, the Gallery was complete, but more importantly, the *Journal*'s point of view had

¹ Follett, *The Rise of the Science Museum*, p. 117.

² Hartley, *The Children's Gallery*, pp. 4-7.

³ 'News from the Museums: Science Museum, Staff Reception', *Museums Journal* vol. 31, 1931, pp. 39.

⁴ 'The Children's Gallery at the Science Museum', *Museums Journal*.

shifted away from the American ideas espoused in the first article, and towards European ideas about children in museums. Similar to the Deutsches Museum, the Science Museum tried to attract and excite children with scenes that they would recognize. This was recognized by not just academic journals, but also by the popular press, such as *The Times* and *The Daily Telegraph*.¹

Between its opening and the Second World War, the Children's Gallery continued to develop. Within two years, it had doubled in size and had undergone many developments – this was the period when many of Gallery's star attractions were added, including the automatic door.² Following this expansion and the retirement of Lyons, the Gallery remained static, under the continued care of Hartley, and despite its popularity was paid little attention by the subsequent directors, Mackintosh and Shaw.

During World War Two, the Children's Gallery closed. It reopened in February 1946 but many of the exhibits needed serious work. It was rehabilitated in 1948,³ but other than that, it received little attention from Museum staff. At the beginning of the 1950s, it needed redecoration again.⁴ At this point in the Gallery's development Taylor became involved with the Museum and the development of the Children's Gallery.

As expressed several times in Advisory Council meetings, the Children's Gallery was in need of redecoration, and after the first few years of Taylor's service, the need had become pressing. In 1954, Ronald Dickens, an outside designer, prepared a report concerning the redecoration of the Children's Gallery, under the direction of Advisory Council members. The report assumed that the Gallery would be reorganized within the next five years, and it contained nothing controversial – mainly repainting, recovering, and protecting areas of heavy wear with formica or metal nosing.⁵ Partially because it lacked controversial changes, the report generated a flurry of controversy and sparked a much larger debate. Hartley, who at this point had been in charge of the Gallery for over twenty years, felt that some Advisory Council members had overstepped their boundaries and were trying to do a Keeper's job, specifically questions about details of decoration and gallery lay-out. Beyond the encroachment into his

¹ For the full range of press coverage that the Gallery received, see the Press Clippings in Z253.

² 'News from the Museums: Science Museum, Extension of the Children's Gallery', *Museums Journal* vol. 33, 1934, pp. 452.

³ AC 1940-51, p32.

⁴ ScM Ed79/188.

⁵ Dickens Report in ScM Ed79/188.

territory, he felt those Council members had put the Museum in an invidious position with the Ministry of Works and their architects, who were the normal contacts for redecoration advice. The tame recommendations presented by Dickens in his report magnified this. In Hartley's opinion, nothing was included that the Ministry of Works' architects would not have recommended, if given the chance. In the words of Hartley, "this intervention at a higher level by someone who has no authority whatever to speak for the Museum in a purely administrative matter would certainly be resented."¹ To solve this problem, Taylor paid Dickens 10 guineas for his effort. This payment was, quite literally, a pay-off to keep him quiet. Yet, this only sparked a much larger debate about the use of external designers within the Museum – a debate that continued for years.²

In July 1951, the Committee on Provision for Children's Interest in the Museum was formed, with Taylor as chairman. In the first meeting, the "importance of a systematic investigation into the use of the Museum by Children" took priority.³ So, to push forward with the research, Taylor contacted the Professor of Educational Psychology at the University of London's Institute of Education, Philip E. Vernon, to ask if any researchers were available to work at the Science Museum. In an early communication, three names are put forward: Mr. James Hemming, Miss Rhonda Dawson, and Dr. Alma Wittlin. Vernon's first choice was Hemming, with Dawson put forward as an option for more frequent work, and with Wittlin put forward because of her experience.⁴ In the second meeting, the Committee made the decision to commission a study of children in the Museum, with Hemming making a preliminary study before the next meeting in four months.⁵ This was only the first of several pieces of research commissioned by the Committee over the next few years.

The report Hemming produced in 1952 seeks to address five concerns about children's use of the Museum. Before directly addressing the needs of children, Hemming points out two important considerations for any academic study within a Museum. First, the needs of children are not independent from the needs of adults and, more significant than age, variation in "the capacity of people to understand displays" is important to consider. Second, that if a 'National

¹ Response to redecoration plan dated 20 August 54 in ScM Ed79/188.

² Memos in ScM Ed79/188.

³ Letter dated 17 Sept 51 in ScM Z194.

⁴ Letter from Vernon to FST dated 5 Nov 51 in ScM Ed79/132.

⁵ Minutes of meeting on 19 Feb 52 in ScM Z194.

Science Museum' is to serve as wide an audience as possible, then it needs to arrange material in an hierarchical manner, with visitors being given help to move up the hierarchy as far as their backgrounds and abilities enable them. In closing his preliminary thoughts, he states the crux of the Science Museum's display issues: the difficulty of combining both simplicity and completeness within the limitations created by shortages of money, space, and objects.¹

Hemming, throughout the report, but especially when talking about these limitations, agrees with Wittlin's presentation of an ideal museum. Hemming continues by identifying a group of educational functions that displays within the Museum should fulfill. From those functions, he determined that the Museum had a number of inadequacies. First, a lack of an intermediate display level that bridges the simple presentation within the Children's Gallery and the displays within the main galleries. Second, compounding this issue was a lack of a simple frame of reference for each gallery. Hemming points out two ways to present this frame of reference – through a story displayed as an integral part of the gallery or with a simple introductory chart displayed prominently. Third, there was a series of issues surrounding exhibit labeling and the ability of children and adults to understand the labels without requiring excessive time in each gallery. Finally, there was an absence of any display specifically dealing with the scientific method.² In the Committee meeting on 19 June 1952, these inadequacies were noted and discussed, with most of them agreed to by those present.³ The only disagreement was over some of Hemming's proposals for further studies, which Hartley deemed a "waste of time".⁴ Overall, Hemming's conclusions were quite reasonable and therefore, little discussion concerning them occurred after their introduction in June 1952. In July 1952, his work with the Museum was terminated.⁵ His report is important because it provides a baseline for comparison with later reports submitted to the subcommittee, some that were totally inadequate and some of which drew stinging criticisms from Museum staff.

Besides the formal research projects undertaken for the Museum, professional opinions were sometimes requested. This occurred both on an individual and group level. As will be

¹ "A Preliminary Report: Considering the use by children of the Science Museum, South Kensington, and the development of the Museum in order that the interests of children may be better served." by James Hemming on 19 May 52 in ScM Z253 Box 1.

² "Preliminary Report" in ScM Z253 Box 1.

³ Minutes of meeting on 19 June 52 in ScM Z194.

⁴ Note to Director from Hartley dated 21 May 52 in ScM Ed79/132.

⁵ Minutes of meeting on 8 July 54 in ScM Z194.

discussed below, a conference for teachers was held, partly to garner any opinions and suggestions they may have about the museum's provision, but this would not happen until 1954. In July 1952, at the same meeting when Hemmings was terminated, the Staff Inspector for Science from the Education Officer's Department of the London County Council was present, and afterwards he presented his thoughts to Taylor in a letter. Again, like many of the thoughts about the Children's Gallery and other educational provisions at the Museum, this letter offers little in the way of new ideas. It suggests instituting a Junior Science Club, like the Junior Naturalists Club at the Natural History Museum, to be held on Saturdays, but this idea was already suggested months before this letter was written.¹ It is evident within the letter that Richard Palmer, the author, had little knowledge of the Children's Gallery or of the Museum's standard exhibitions, despite attempts to hide his inadequate knowledge. This is so noticeable that Taylor made a marginal note about the sentences containing recommendations for new exhibitions, because the recommendations resemble displays that existed in the galleries, in some cases, for years.² This letter is typical of the opinions and suggestions the Museum received from friends, random visitors, and other governmental agencies. Many of the recommendations were not useful, either because they were unrealistic or filled with old ideas. Second, many of the letters show an inadequate knowledge of the Museum. This fact shaped the curators' ideas about their superiority concerning the Museum's educational provision.

This opinion was made clear when Miss Joyce Brooks, a Masters student working under Prof. Vernon at the Institute of Education, submitted her thesis for consideration by the Science Museum in 1953. Compared to the work done by Hemming, this thesis was a fully-fledged piece of research.³ Over the course of her research, Brooks did a sample count of approximately 5,000 visitors to gain an idea of the Children's Gallery's true audience, graphed the movements of 49 children through the Gallery, interviewed 100 unaccompanied children, and provided a detailed analysis of both the movements of children in the Gallery and the answers they provided when questioned. According to her research, the Gallery's audience is surprising, it was comprised of 60% adults and 40% children under 16 (28% boys, 11% girls, and less than 1% children under

¹ One of the earliest mentions of the foundation of a Science Club was in February 1952. See the Minutes for 19 Feb 52 in ScM Z194.

² Letter from Richard Palmer to FST dated 8 July 52 in ScM Ed79/132.

³ Various copies and extracts of the thesis are in ScM Z253.

six).¹ Besides the motion charts created, she produced statistics on the activity and attention of children in the Gallery. The average time spent was 22.5 minutes for boys and 14.5 minutes for girls. This research also determined that only one third of exhibits were examined during any visit, and produced statistics about the frequency and duration of children's interaction with each exhibit. On the basis of these statistics, the summary written by Taylor indicated that many exhibits could be removed from the Gallery unless children's attention could be drawn to them.² Brooks also offered several proposals to either increase the use of exhibits or to increase the understanding of them. For instance, she recommended creating a clearly stated comprehensive theme for the Gallery to replace the patchwork of themes that was covered in each main group of exhibits. Unfortunately, Miss Brooks was "an inexperienced young person" who criticized "a senior Museum officer of very long experience" – primarily, Hartley.³ Hartley's first reaction to the thesis was exactly along those lines; he felt he was being put in a position to answer criticisms before an Advisory Council subcommittee, and that it was not fair.⁴ In a later more extensive letter, Hartley spells out many of his numerous issues with the thesis. He considered the research inexpert and without value. Furthermore, he considered anything more than recognition of the research by the subcommittee a waste of time. Turning to the specifics of his objections, only one of them – the question of ventilation and redecoration of the Gallery – is based on fact, and this was possible because he, as curator, had privileged knowledge, specifically that the Ministry of Works had put the items on their schedule of works. Beyond that objection, Hartley offers no basis, other than his personal opinions, to refute the Brooks's research.⁵ In short, his two main arguments were simple: Brooks presents nothing new and that he, as an experienced Museum officer, knows best.

¹ It should be noted that these figures are based on the estimates that she provides in the report for the total number of visitors to the Gallery. In the results compiled by Prof. Vernon for the subcommittee, there is a comment about the doubtful nature of the figures, but it is noted that these are underestimates, not overestimates. It is also likely that the percentage of children, as determined based on her numbers, is an under-representation, but it is still interesting that the first academic attempt to quantify the audience returned with these unexpected results.

² From the records contained in the files, it is unclear whom was the author of the "Results from Miss Joyce Brooks's 'Enquiry into children's visits to the Science Museum'" contained in ScM Z253 Box 1. Prof. Vernon or Taylor are the two options for authors and within the records, both of them volunteered to write the summary and the final product does not have a listed author. Doing a careful study of the content of the comments, they are filled with numerous references that require a working knowledge of the Museum's current activities and thus Taylor is the likely author.

³ Minutes of meeting on 17 June 54 in ScM Z194.

⁴ Letter from Hartley to FST dated 25 Mar 53 in ScM Z253 Box 2.

⁵ Letter from Hartley to FST dated 9 Apr 53 in ScM Z253 Box 2.

One would think that a disagreement over a Masters thesis could not be a defining moment for the Science Museum, but this situation developed into more than a disagreement between an inexperienced youth and a senior Keeper. This was mainly because of the involvement of two other individuals: Director Taylor and Prof. Vernon. They were both involved with the project from the beginning, but their later involvement was really important. Their clash during the subcommittee meeting on 9 February 1955 was significant enough for Vernon to resign from the subcommittee. What caused such a divergence of opinion between these two? From the minutes of the meeting, much of the actual argument is not recorded, but the largest disagreements seem to center on the research's usefulness in improving the Gallery and protecting their underlings.¹ Taylor stated this opinion eight months before the meeting and it was relayed to other members of the committee as guidance when reading the thesis.² His guidance echoes the arguments made by Hartley and was probably greatly influenced by Hartley's passionate response to the thesis.

Considering the lack of any great difference between the conclusions of Hemming and of Brooks, what caused the reaction from Hartley and others at the Museum? At least part of the reaction can be traced to Hartley's opinions that such studies, as noted above, are a "waste of time" and that they only provide a "pseudo-scientific confirmation" of the things that were known.³ His other worry was that Brooks would be considered an expert, with knowledge or skills that Hartley did not possess. In comparison to Hemming's report, which was not created for any academic purpose, the Brooks thesis was an academic paper. It was therefore more analytical and more critical of the Museum's current educational provisions, especially as they related to unattended children. This contrast, both of purpose and of the conclusion's nature, is likely why Hartley felt it necessary to defend himself. In addition, within his writings about the thesis, Hartley uses Brooks's age and sex as an argument in support of his position.⁴ To further support his position, Hartley also compared her research to that of a concerned friend who could

¹ Minutes of Meeting on 9 Feb 55 in ScM Z194.

² Letter from Secretary to the Advisory Council to Mr Robin Darwin dated 10 June 54 in ScM Z194 – Correspondence of the Children's Interest Subcommittee of the Advisory Council.

³ Letter from Hartley to FST dated 25 Mar 53 in ScM Z253 Box 2.

⁴ In Hartley's correspondence about Brooks' report, it is clear that does not respect her. He repeatedly misspells her name and throughout his letters, uses language that would have been inappropriate if he had been referring to someone that he considered an equal. If his letters are similar to the lines of attack that he took during meetings, the reasons that Vernon resigned could also be because of Hartley's attitude. Unfortunately, there is no direct evidence about his behavior during meetings because the minutes from the meetings are fairly sketchy.

produce a critical but inexpert report.¹ In short, Hartley did everything in his power to undermine and demean Brooks's work on the Children's Gallery, without responding to any criticisms or offering any real suggestions of his own.

Interestingly, during Hartley's campaign, Taylor changed his own mind about Brooks's thesis and the other research done in the Children's Gallery. At the meeting on 17 June 1954, which was the first time that the Children's Interest Committee discussed Miss Brooks's work, Hartley seems to be alone in decrying the thesis. The others in attendance, including Taylor, supported having a summary of the thesis presented to the Advisory Council.² This summary, which appears to have been written by Taylor, is generally positive about the results and recommendations of the thesis. Yet, by the meeting on 9 Feb 1955, the differences in opinion between Taylor and Vernon, who was supportive of it, were so severe that Vernon asked to be relieved of his duty.³ Thus, by the time of this meeting, Taylor had become hostile towards the research. Considering Vernon's reaction to Taylor's position, the change was likely politically, not intellectually, motivated and was based on Taylor's need for Hartley's cooperation in developing the Gallery and other educational provisions.

Unfortunately, Taylor fell ill before further changes could be made and before the *Interim Report of the Committee on Provision for Children's Interests in the Museum* could be issued. The *Interim Report* was included as part of the Advisory Council report for 1955, issued in 1956, and it covered many of the recommendations made both internally and by the research done in the Gallery. From the labeling and suitability of the exhibits to why children visit, the *Interim Report* not only covered the same ground but also made many of the same recommendations that were presented to the Committee during their meetings.⁴ Many of the proposals that Hartley opposed so vehemently were included in the *Interim Report*, but there is little evidence of his opposition at this point. Hartley likely was not vocal about the *Interim Report* because all references to the academic research, especially to Brooks and her work, had been removed. The selective filtering makes it read like a simple internal report written by the Director. In many ways, this was one of Taylor's finest political moves and shows that he was developing a sense of how to deal

¹ Letter from Hartley to FST dated 9 Apr 53 in ScM Z253 Box 2.

² Minutes in Z194.

³ Minutes in Z194.

⁴ AC 1956, p6-9.

successfully with the internal politics of the Museum. This *Interim Report* provided both a sense of the Children's Gallery's and educational program's status and highlighted short- and long-term goals for the development of the Gallery.

Increasing the Museum's Educational Provision

Education had always been one of the Museum's main priorities. Before the Bell Report, students and researchers were the target audiences of the Museum - both groups that would use the regular galleries to educate themselves and find answers they sought. Their use of the Museum was based on their formal education received elsewhere. By creating the Children's Gallery, the audience expanded to include all children - a group that needed the Gallery's introduction because they lacked a formal scientific education. The Gallery's opening, along with the beginnings of the Lecture-Guide service, marked the first steps towards an educational outreach program at the Museum. Yet, the programs' reach would remain stable from the 1930s until Taylor's appointment in 1950.

As noted, with Taylor, the Museum got a dedicated educator and a person with teaching experience in a range of situations and subjects. Taylor wanted to increase the Museum's educational provisions for all audiences - young children, old children, and adults (who, in Taylor's words were "children in the world of science"¹). To do that, the Museum needed to provide a wider range of opportunities than traditionally provided for the unaccompanied visitor and for the teacher-led group. For the unaccompanied visitor, these ranged from the "infantile pleasure" of button-pushing to the edifying entertainment of a guide-lecturer or scientific film. For teachers, Taylor needed to provide the chance for them to familiarize themselves with the Museum and its contents. The range of opportunities developed during Taylor's directorship aimed to develop a relationship with visitors that went beyond the traditional role of the Museum as a place for preservation and specialist learning.

Teachers at the Museum

One of Director Taylor's main objectives was to enable visitors to make better use of the Science Museum. Teachers were his most frequent target. Shortly after being named Director, Taylor oversaw the foundation of the Children's Interest Subcommittee² during the middle of

¹ Taylor, 'Children and Science in the Museum', *Museums Journal* vol. 55, no. 8, 1955, p. 205.

² Within the archives, this group is always referred to as the Children's Interest Subcommittee but when the Advisory Council referred to the group, it was called the Committee on Provision for Children's Interests.

1951. In the *Interim Report of the Committee on Provision for Children's Interests in the Museum*, the Committee had two main recommendations for children accompanied by teachers – that direct teaching by Museum staff was impractical, and that teachers should be knowledgeable in their use of the Museum.¹ This was, quite unsurprisingly, mirrored in Taylor's personal views. With his teaching experience, he realized two things about the relationship between teachers and the Museum. First, that Museums must provide teachers with easy access to the information they need, and second, that consultation was the only way to determine what assistance they needed.² So, to develop this important relationship, Taylor, shortly before his untimely illness and death, unveiled two ideas that he hoped would benefit teachers and increase their use of the Museum. The first and most influential was the creation of the *Science Museum Bulletin*. The second was the organization of a Teachers' Conference on the Use of the Museum, which was held on 7 May 1955.

Dealing with the latter, first, the Teachers' Conference was announced in the first *Bulletin* and was designed to provide teachers with information that would improve their visits to the Museum. It was designed to provide a platform for teachers unfamiliar with the Museum to gain an understanding of it and the services provided.³ If teachers were expected to have a relationship with the Science Museum, then the Conference was a first date. To start the Conference, Museum staff introduced themselves before the floor was opened for discussion. With 54 teachers in attendance, there was plenty of discussion about teachers' needs and the Museum's facilities. Issues ranging from the labels (both criticism and praise) to the loan collection of slides were discussed and both sides were able to gain important information.⁴ This was very significant because it provided the Museum with a hit list of topics to develop and provide for teachers. It was the source of many things advertised and published in the *Bulletin*.

The *Bulletin* was designed as an outreach tool, to allow a "rapport" to develop between its readers – who were mainly teachers – and the Museum. The *Bulletin* was used to distribute information that Taylor felt was vital to develop a relationship with visitors. For Taylor, if teachers were to feel confident in the Museum, it was vital for teachers to be armed with as much

¹ AC 1955, p9.

² Taylor, *Children and Science in the Museum*, p. 204.

³ *Science Museum Bulletin*, Vol. 1, p. 2.

⁴ *Science Museum Bulletin*, Vol. 2, p. 6.

information as possible, because without it, they could not make knowledgeable and efficient use of the Museum and its services. The *Bulletin* covered a wide range of topics, including the Museum's layout (recent changes mentioned in No. 1, with a full gallery plan printed in No. 6), the Guide Lecture Services (first description in No. 1, with mentions in every volume), special exhibitions (first appeared in No. 2, with regular mentions of new exhibits), Museum publications (first mentioned in No. 2, with updates of new publications regularly), and the daily schedule of lectures and films (first appeared in No. 2, with any changes noted in later volumes). In addition, to keep the *Bulletin* from being boring and repetitive, it was filled with short pieces designed to entertain and educate. Over the years, it covered a wide range of topics. These included a report on the 1955 Algerian earthquake that the Museum's working seismograph recorded,¹ interesting stories like the use of 'Puffing Billy' coal (which was probably contemporary with the locomotive) in a lecture-demonstration to produce coal gas,² items on technological developments like the ramjet engine,³ and pieces meant to introduce the Curators to the readers, including one that labeled them as "men of adventure".⁴ Like any quality niche news source, the strength of the *Bulletin* was its ability to distill the world's news into a form useful for teachers interested in the Museum.

As noted, the goal of these two ideas was to increase Museum use by schoolchildren accompanied by their teachers. In addition, Taylor wanted teachers to feel comfortable with the Museum and free to approach the Museum with any problems or suggestions.⁵ Determining the effect of these two initiatives is difficult because the Museum did not keep track of the number of school groups that attended the Museum. The best estimate of their impact can be taken from Special Lecture attendance. Between 1954 and 1955, the attendance at the Special Lectures, which had to be booked and were designed for classes, swelled by over 2,000 visitors to 7,690 and marked the highest attendance at the Special Lectures since 1949.⁶ This significant bump can be attributed to the Museum's actions to involve teachers and was an important change in direction for the Museum. The *Bulletin* regularly mentioned the high level of participation,

¹ *Science Museum Bulletin*, Vol. 1, pp. 3-4.

² *Science Museum Bulletin*, Vol. 2, p. 7.

³ *Science Museum Bulletin*, Vol. 5, p. 9.

⁴ *Science Museum Bulletin*, Vol. 6, pp. 5-6.

⁵ *Science Museum Bulletin*, Vol. 1, pp. 1-2.

⁶ Attendance figures have been taken from the relevant Advisory Council Reports.

suggestions, and comments from school groups.¹ Taylor's work to create a relationship with teachers experienced limited success, but was hampered by geographical considerations and the decentralized nature of the British educational system.

The Lecture and Film Services

Whether you are a student of science, layman of science or specialist in science, the Lecture Service can make these objects more meaningful and thus your visit to the Science Museum more profitable and enjoyable.²

Under the heading of "Methods of Promoting the Various Uses of the Museum" in the Bell Report, the Committee made two very important recommendations. They recommended that a large lecture theatre be constructed as part of the Museum's new buildings and that, when space in the galleries allowed, lecturer-guides should be available at set times to "give suitable exposition" of the exhibits.³ As mentioned in the section about the Museum's early history, Lyons established a program of lecture-tours in 1924, and throughout the late 1920s and early 1930s, it expanded to a peak attendance of 41,794 in 1932. Unfortunately, by the outbreak of war in 1938, attendance was greatly reduced and the lectures only attracted 24,187 people. Lectures were suspended during World War Two and resumed during 1946. During their first full year after the War, the lectures attracted 26,962 people. Attendance at lectures continued to decline throughout the late 1940s and early 1950s, hitting a low in 1954 of only 12,154 people. The Museum's Film Service was started in 1951 as an adjunct to the Lecture Service.⁴ During 1951, only 480 people came to the monthly showings of scientific films, with attendance more than doubling for the next few years. Yet, by the late-1950s, a decline in numbers was so severe that it was reported to the Advisory Council.⁵

There are several reasons for the steep decline in attendance, especially at the public lectures, which had dropped to nearly a third of the post-war high by 1954. Internally, there were problems concerning advertising times and in the lack of flexibility and variation of the topics presented. Externally, the Museum was facing new competition for the audience's free

¹ *Bulletin*, Vol. 2 mentions the increase at Special Lectures; Vol. 3 notes a 25% increase in school use of the Lecture Service; Vol. 5 recognizes the large response for comments and suggestions; and Vol. 7 reports that many requests for reprints of Vol. 6 (which contained a museum plan) have been received and more are available.

² ScM Z194 - Lecture Services Brochure.

³ *Bell Report (Part I)*, p. 11.

⁴ AC 1940-51, p10.

⁵ AC 1956, p5.

time. Television was the largest of those competitors, and a quick overview of its development, particularly the dates of certain important events, is warranted.

Having been invented between the Wars, television was still relatively new at the outbreak of the Second World War in 1939. The London Television Service, operated by the British Broadcasting Corporation, opened successfully in November 1936, but a single broadcast standard was not chosen until February 1937. On 30 September 1938, British Prime Minister Neville Chamberlain was the subject of the first major news broadcast, when, upon his return from Munich, he proclaimed there would be “Peace in our Time”. On 1 September 1939, with no advance notice, the London Television Service was shut down. At this point, over 500 sets a week were being sold, with more than 20,000 sets in use across the London area. The transmitter was switched off and the cameras were packed away until broadcasting began again on 7 June 1946. Immediately after the War, television was still a preserve of high culture and that did not change until the early 1950s. In the UK, the first major televised event was the coronation of Queen Elizabeth II in 1953. This single event provoked a sudden growth in the number of viewers and sets sold. It helped to solidify a British televisual culture.¹ The final major change came with the Television Act of 1954, which broke the BBC’s monopoly and created its first commercial competitor, ITV.² With a wider range of programming available, television became a significant competitor to the Museum for people’s free time.

Yet, television could also be used to reach a much larger audience, providing a platform for the Museum’s educational message. By 1955, the BBC was receivable in 95% of the UK, and the commercial broadcasts were not far behind in providing extensive coverage.³ As mentioned, Taylor appeared on an episode of “Animal, Vegetable, Mineral?” in 1954, and in 1955 the Museum was featured as a destination for children in “Have you seen the Science Museum?”.⁴ During the 1950s, the Museum was presented in two ways on television. Models and objects from the collections were used as props on programs.⁵ Second, the Museum was shown through the eyes of a visitor - which was how it was presented in the “Have you seen the Science

¹ *Television: An International History*, pp. 29-32, 84, 118, 170.

² *History: ITV plc History*, retrieved 24 June 2008 2008, <<http://production.investis.com/itv/about/history/>>.

³ For a chronology of the development of British broadcasting, see *British Television: A Chronology*, 2009, retrieved 20 April 2009 <<http://www.nationalmediamuseum.org.uk/pdfs/TVchronolgy.pdf>>.

⁴ *BFI | Film e3 TV Database | Have You Seen The Science Museum? (1955)*, retrieved 20 April 2009 <<http://ftvdb.bfi.org.uk/sift/title/228706>>.

⁵ AC 1955, p5-6.

Museum?” program and on the BBC’s Children’s Hour on 9 January 1959.¹ Overall, the Museum was used by television but it was not able to use television to benefit itself. This meant that the Museum was not able to turn its exposure on television into a noticeable increase in visitors, especially at the Museum’s lectures.

So, to combat the decreasing number of the public attending lectures, Taylor turned to an audience he knew well – schoolchildren. Linking up with his ideas for the *Science Museum Bulletin* and the Teacher’s Conference, Taylor wanted to change the balance of the Lecture Services. Previously, the Lecture Services were focused on the public lectures, as demonstrated by the pre-World War Two attendance figures. The changes Taylor instigated were to increase the offering for school groups. In the first issue of the *Science Museum Bulletin*, the Guide Lecturers and their services are repeatedly described.² In the second issue of the *Bulletin*, the first changes to the services were introduced – the Special Lecture Demonstrations. In part, the famous Children’s Christmas Lectures Taylor gave in 1952 at the Royal Institution inspired the Museum’s series.³ The Museum’s first series of eight lectures in July 1955 were “over subscribed”.⁴ By 1957, the program consisted of 21 lectures and attracted over 3,500 schoolchildren to the Museum, and for 1958, it was expanded to two sessions – in March and in July.⁵ The Special Lecture Demonstration was so successful that the idea was replicated twice.

In 1956, the first Joint Industrial Lecture series was given at the Museum. The idea was similar to the Special Lecture Demonstration, except for one key fact that individuals who were not Science Museum staff did the presentation. Organizations like the Glass Manufacturers’ Federation gave them. Like the Special Lecture Demonstrations, the Joint Industrial Lectures were advertised to school groups and were designed to interest schoolchildren in industrial careers.⁶ The attendance was low the first year at only 538, but by 1960, this lecture series was the most popular of the special lecture series the Museum presented, with an attendance of over 4,000. The Holiday Lectures, which started in 1958, were another special lecture series started

¹ For a description of the live broadcast of Children’s Hour, see *Science Museum Bulletin*, Vol. 9.

² *Science Museum Bulletin*, Vol. 1, pp. 1-3, 7.

³ These lectures were published in 1955 as *An Illustrated History of Science*. The book follows the actual lectures given at the Royal Institution by Taylor. When given, the lectures were accompanied by demonstrations and therefore, when they were published, Taylor wanted them to be accompanied by a realistic illustration. This volume was the result of Taylor’s wish to produce an illustrated history.

⁴ *Science Museum Bulletin*, Vol. 2, pp. 1-2.

⁵ *Science Museum Bulletin*, Vol. 7, pp. 2-3.

⁶ AC 1958, p4.

by the Museum. These were of a slightly different nature – given at Christmas and Easter, they were open to the public and covered less academic subjects.¹ By 1960, tremendous changes had occurred to the Lecture Service, most of which had roots in Taylor’s work during the early 1950s.

The Film Service followed a similar trajectory to the Lecture Service during the 1950s. After its inauspicious start in 1951, the Film Service expanded quickly, before problems were noticed in 1956. According to the Advisory Council report for that year, attendance had declined at film showings, and it was at least partially blamed on the increase in scientific and technical programming on television.² Increasing publicity was the solution to the falling attendance and this was done for 1957, with the result of uneven, but increased, attendance. Yet, the Advisory Council Report for 1957 noted that basic steps to increase the audience, such as announcing showings on the Museum’s public announcement system, were not taken.³ During the last years of the 1950s, attendance did increase for the Film Service. Unfortunately, this was not because of the increased publicity. In reality, the rise seen between 1958 and 1960 was based on an increase in the average number of showings per week. In 1953, the Museum had only 100 shows (two per week).⁴ In 1955, before problems were noted, there were three showings per week.⁵ In 1959, this had increased to an average of 4.4 showings per week, with a further increase to 4.6 showings per week in 1960.⁶ Meanwhile, average attendance per showing, from the figures preserved in the Advisory Council Reports, maintained an apparently steady level.⁷ In 1953, it was 30 per showing. It was the same in 1959 and increased to only 34 in 1960.⁸ Despite the holes in the record, no matter how much publicity the Museum attempted, it was difficult to increase the attendance at each showing beyond about 30 people per showing. Increasing attendance beyond that level would have required the Museum to convince people that the Film Service offered something which was unobtainable elsewhere.

¹ *Science Museum Bulletin*, Vol. 10, p. 9.

² AC 1956, p5.

³ AC 1957, p4.

⁴ AC 1953, p4.

⁵ AC 1955, p2.

⁶ These averages were calculated from the figures provided in AC 1959 and AC 1960.

⁷ For some unknown reason, complete attendance figures for the Film Service was not included in the Advisory Council Reports from 1954 to 1957. Thus, no averages, either for shows per week or attendance per show, can be calculated for these years.

⁸ These averages were calculated from the figures provided in AC 1953, AC 1959, and AC 1960.

Making the argument that the Museum offered something unique in the Film Service was not possible within its original organization and operation. The Film Service, as created in 1951, was a monthly show of a scientific film provided by the Scientific Film Association.¹ The Scientific Film Association was created in 1943 to promote the use of film to spread an understanding and awareness of the scientific method, particularly as it related to progress. Its main task was to collect and distribute information about suitable films, with relationships, like the one with the Science Museum, being a key part of its strategy. Importantly, despite pledging to provide scientific support, it was not directly involved in creating or financially backing scientific films.² At the opening showing at the Museum, two films were presented - "Ermites du Ciel", a French film about the Pic Du Midi Observatory (date unknown), and "Heating Research in Houses", produced by the Building Research Station (1949).³ Both of these films from the Scientific Film Association could have been borrowed by any scientific film society that had a relationship with them. The growth of smaller film societies was recognized several years before the Film Service at the Museum began.⁴ The combination of established film societies and the Museum's reliance on the Scientific Film Association and others for free loans,⁵ meant that it was trying to compete for a limited audience - those interested in scientific films - without a unique selling point. These disadvantages can be seen as the main reasons why the Museum was unable to significantly increase attendance.

By 1960, when David Follett became Director, the Lecture Service had been transformed from the basic program offered after World War Two into an extensive service. The Film Service, in contrast, had hit its ceiling and would not show major improvements until dramatic changes were made to its organization and operation.⁶ Together, these two services provided the Museum's main outreach components, but did little to increase the Museum's overall attendance figures. To achieve that, both Services would have to undergo dramatic changes which would

¹ AC 1940-51, p10.

² 'Scientific Film Association', *Nature* vol. 152, 1943, pp. 745-6; 'English Scientific Film Association', *Nature* vol. 151, 1943, pp. 613.

³ 'Scientific Film Shows at the Science Museum', *Nature* vol. 165, no. 4186, 1950, pp. 101.

⁴ 'Science and the Public', *Nature* vol. 157, no. 3978, 1946, pp. 110-1.

⁵ As mentioned, the records for the Film Service are incomplete but according to AC 1953, 130 of 135 films were loaned for free and in 1958, £50 was spent on film hires, while 120 films were shown during the year. In 1959, that amount was reduced to £35, while the number of films increased to 129. In 1960, only £11 was spent on hire for the 123 films shown.

⁶ An example of the type of effect that was hoped for, can be seen in the opening of the IMAX theatre at the Science Museum. This addition to the Museum's offering should be seen in light of the Museum's earlier film services.

transform them beyond their original purposes - a reconstruction that eventually replaced the original Services with a new Educational Department and activities.

Conclusion

Today, the Science Museum is truly an educational institution, and many of the developments addressed here are still visible in the Museum's fabric and programs. For example, the Children's Gallery no longer exists, but some of its displays can still be found in The Secret Life of the Home galleries in the basement. Additionally, Launchpad, now in a new location and a revised form, is the Museum's main gallery-based provision for children. Other developments of the 1950s, like teacher training, are still important aspects of the Museum's programs despite having changed drastically during the last 50 years.¹ Significantly, these were the ideas of single individuals, and were originally created by very small groups within the Museum. This 'lonely innovator' type of development was characteristic of the Museum's early educational programs, because individuals championed their own ideas and were not required to follow any definitive plan, format, or narrative.

The development that occurred at the Museum led to uncoordinated and uneven expansion. Since the Museum's educational program relied on the personal motivation of staff members, instead of any guiding organizational principles or plan, not only was implementation of changes sporadic, but it was also quite slow. A perfect example of the way many developments progressed was the Science Club. As mentioned above, the idea of a Science Club was aired as early as 1952.² In 1955, it barely featured in the *Interim Report of the Committee on Provision for Children's Interests in the Museum*.³ The Science Club was not formed until 1960, when it held 45 meetings for a dozen children at each meeting, but was never able to fully meet demand. At this point, it received immediate press notice, being featured on BBC's "Panorama" and in *The Guardian*, but its continued existence was questionable.⁴ It took nearly eight years to establish the Club and after one year, its value versus the input required was questioned at the highest levels. This was because, unlike the *Bulletin* or the Children's Gallery, the Club did not have a champion who wanted it to succeed and develop.

¹ The information about the current, as of 2009, educational program and gallery contents are from the Museum's website: <http://www.sciencemuseum.org.uk/>.

² Minutes for 19 Feb 52 in ScM Z194.

³ AC 1955.

⁴ AC 1960, p2, 4.

The need for innovations to have champions resulted from the lack of a general developmental plan for the Museum's educational program. In many ways, this was the purpose of the Committee on Provision for Children's Interests in the Museum, but it never resulted in a plan that could be implemented. One of the main reasons why was Taylor's death, which occurred just before the Committee's first report was published as part of the Advisory Council Report for 1955. Without his driving force to improve the Museum's entire educational provision, the Committee quickly lost momentum and died.¹ His untimely death and his replacement by Morrison-Scott, who was a capable administrator, delayed the maturation of the Museum's educational program. The Museum lost an individual who, while he was finalizing the structure of the Centre Block, could have created a comprehensive educational plan. If such a plan had been developed during the 1950s, the Science Museum's history during the second half of the twentieth-century could have been very different. Yet, without a central plan, the educational program's transformation into a single, coherent scheme was delayed until decades later, when a Director with an educational focus was chosen.

¹ The last entry in ScM Z194 is dated 26 Nov 58 and is the only meeting after the death of Taylor. It appears from the Minutes that it was held to deal with the observations of Mr G.B.L. Wilson on the Children's Gallery.

CHAPTER 6:

PLANNING A NEW SCIENCE MUSEUM

Despite being referenced as the guiding plan of the Museum, the Bell Report had become out of date by the end of the First World War because of the construction delays and the great expansion of science and technology that had occurred. It was still considered relevant, however, by Directors until well past World War Two. Relying on the Bell Report was a mixed blessing for the Museum. It was beneficial because it legitimized arguments for expansion and collection. Yet, it was problematic because it also limited those same arguments. Mackintosh began to move away from the Bell Report as the guiding plan of the Museum and this movement did not finish until after the construction of the Centre Block.

At some point after World War Two, Mackintosh wrote a long note entitled, “The Future”, which he had marked secret.¹ In tone and style, this short piece fits with his *War History*, but is not included in the official archive copy. Within that work, he limits his comments on the Museum’s future to a few ‘hints’ and ‘pointers’, and with only passing reference to his wider goals of a Museum laid out in “a logical sequence.”² In his secret note, he goes much further explaining his vision for the Science Museum - a vision that clearly reflects Wittlin’s influence. For Mackintosh, the Museum should be a well-indexed and exhaustive record of its chosen subjects and, should act as a clearing house of information. This information should not be presented passively but through active (and vocal) forms of presentation. His ideal institution was the Palais de la Découverte, where the contents were constantly changing to show up-to-date scientific and technical advantages. He felt that many museums had become dumping grounds, making them glutted, oversized, and expensive for the State to maintain. Mackintosh’s solution was two-fold: more temporary exhibitions, even if it meant curtailing the permanent collections, and creating a logical sequential layout. For him, the layout would run from the structure of matter and natural phenomena to the application of science to industry. Physically, the main line of development would be the central spine of the Museum, and the various applications would be wings off that main spine. At the Museum, each technical application of science would become its own wing, with its own historical development and current practices

¹ ScM Z183/1 - E.E.B.M.’s Notes.

² ScM Z101, p82-4.

displayed in that space.¹ It is unclear why this was never widely circulated throughout the Museum or presented to the Advisory Council. The most likely reason is that his ideal museum would have required creating a new institution that would complement the permanent collections at the Science Museum - just as the Palais de la Découverte complemented the Musée des Arts et Métiers in Paris.

While Mackintosh's secret plan did not garner much attention, other attempts did achieve much wider circulation. Many of those plans were not as grand as either the Bell Report or Mackintosh's, but significant plans were presented to the Advisory Council during the 1950s. As mentioned previously, major changes started to occur under Taylor's Directorship. The beginning of this process was a report on the history of the general strategy of the Museum in 1951. The first half of the report was a recapitulation of a 1923 report, which itself was a condensation and refinement of the Bell Report. The second half summarized the current strategy, but lacked any real suggestions for the future.² Questioning the Museum's strategy did provoke some discussion about the Museum's ability to present the "current state of development" because of the need for "constant change" of displays and exhibitions. Taylor recognized the difficulty of presenting cutting-edge developments, while others felt that the importance for visitors and public relations possibilities out-weighed the potential difficulties.³ Those, including Hartley, who were pushing for displays of current practice and cutting-edge technology, were still operating under the Bell Report's purpose for the Museum, while Taylor was trying to move beyond that position. At this early point in the discussions, another report raised the issue of museum confusion. For the lay visitor, what was the difference between the Science Museum, the Natural History Museum, and the Geological Museum and how did they relate? Prof. Dingle, who raised this issue, thought the provision for the public display of science was "wholly inadequate, very irregular and unequal in both sufficiency and character, and almost entirely uncoordinated."⁴ While offering few ideas for improvement besides changing the Museum's name, Dingle did raise a very important issue: the lack of any overall plan, either for the Science Museum or for the nation's scientific collections.⁵ While these

¹ ScM Z183/1.

² "Paper C: Report on the Broad Strategy of the Science Museum" for 9 Oct 51 in ScM Z193/2.

³ "Paper A: Minutes of the Last Meeting" for 8 Jan 52 in ScM Z193/2.

⁴ "Paper C: The Scope and Co-ordination of our Museums of Science by Prof Dingle" for 8 Jan 52 in ScM Z193/2.

⁵ Paper A for 8 Apr 52 in ScM Z193/2.

discussions did not result in an overall plan, they did contribute to the creation of a work of reference that replaced many of the Bell Report's suggestions.

That work of reference was *Appendix I: The Policy of the Science Museum, 1952*, and was written to define the purposes, scope, collections, visitors, and displays of the Museum. It defined the Museum's purpose as:

The Science Museum should bring before the public, in a pleasing and intelligible form, the principles and practices of science as such and of the particular branches of science within the Museum's field, the applications of these sciences to the Arts and Industries, and the total effect upon the life of man. This is to be achieved by the exhibition of scientific instruments, apparatus, machines and any objects or representations that may contribute to these purposes, and also by the provision of information concerning the collections. The maintenance of such collections and provision of information concerning them necessarily involves the preservation of objects illustrative of the history of science and technology, and also such researches as may elucidate their history and significance.¹

When compared to the Bell Report, there are several important differences. First, the Museum's basic purpose was essentially the same but, in a change easily identifiable with Taylor, science's effect on daily life was included. Additionally, references to current practice and recent advances were removed. Finally, there is a much greater focus on history - a subject that is only used to determine an object's collectibility, under the Bell Report. While the changes made to the Museum's purpose are important, they are partially undercut by the policy's statements on displays. They were supposed to "arouse interest in science and its applications, to illustrate and explain them" but nowhere within the description of the displays are historical interests addressed. The type of visitor was redefined into three groups: those without knowledge of science, those with a framework of scientific knowledge, and scientific and technological experts. The first group was mainly children under eleven, but included many older adults, especially women. The second group included students, young adults, and adult males. The final group was very limited - mainly professional scientists and engineers - and even within this group, it was recognized that "few will be experts in as many as a tenth of the subjects that the Museum shows"; so, many scientists would therefore still fit into the second category for most exhibitions. In a move away from the Bell Report, displays were not targeted at experts. Instead, individual displays within each exhibition should target the first two types of visitors.² Finally, the policy

¹ AC 1952, p29.

² AC 1952, p34-5.

formalizes the Museum's commitment to modern display techniques, placing design and "the beauty of the presentation" in opposition to the traditional naturally-lit galleries.¹ Taken together, this policy could have formed the basis of an effective overall plan for the Museum, but it never successfully gained the status of the Bell Report, especially among the older staff.

The next attempts at redefining the policy of the Science Museum came in the early-1960s, under the Directorship of David Follett. In 1960, Follett submitted his opinions on the Museum's future policy to the Advisory Council, and, in 1961, he submitted his opinions on the presentation - his word choice instead of display - of the Museum's collections.² Together, these papers represent the final stages of the changes to the Museum's purpose and exhibition. Here, Follett outlines his vision for the development during the next few years; a vision that would shape the modern development of the Science Museum. His vision had three specific objectives: 1) the development of the Museum as a centre for historical research, 2) the development of historical exhibitions in the same spirit as those used at other National Collections, and 3) the development of the Lecture Service. More than anything else, Follett's Museum was going to be a historical institution with little focus on technical or scientific education, in the traditional sense. He wanted to create a Museum where visitors came to "learn painlessly something of what science and technology mean".³ To create this new Science Museum, Follett felt that presentation, mainly the selection and grouping of exhibits, had to be addressed. He only provides very basic guidelines for implementing these changes. Displays should include introductory sections and more displays should link technological development with social history. These would provide more visitors with a way to understand the exhibitions. On the specifics of display, he expresses support for the previous documents, mainly the 1955 report and the 1952 policy statement, put forward at the Advisory Council.⁴ While nothing in his vision was ground-breaking, Follett's emphasis on history and historical presentation moved the Science Museum onto the same cultural level as the British Museum and other historical collections.

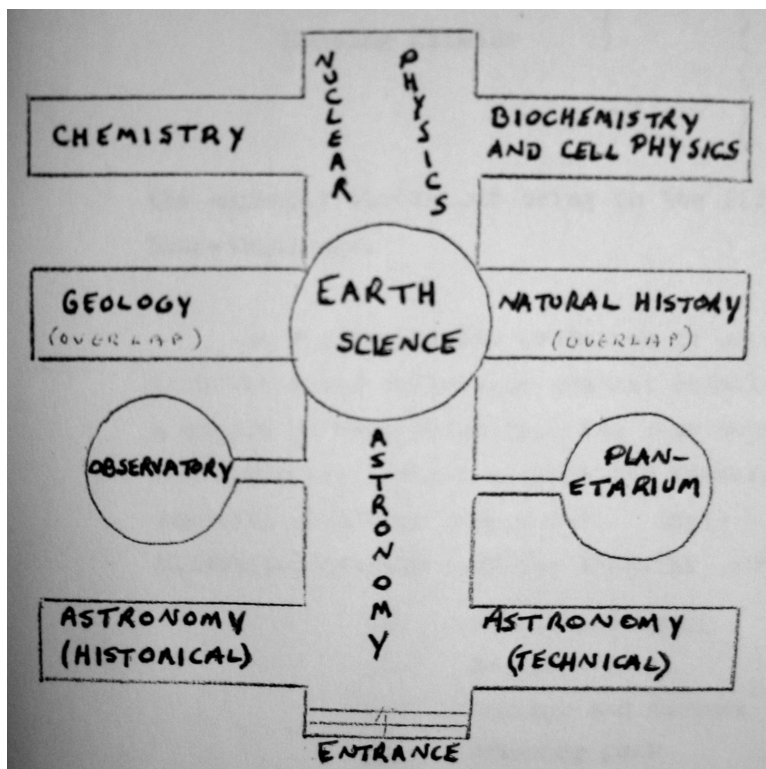
¹ AC 1952, p36-8.

² "Paper E: Future Museum Policy" for 21 June 60 and "Paper C: The Presentation of the Museum's Collection" for 14 Feb 61 in ScM Z193/3.

³ Paper E for 21 June 60 in ScM Z193/3.

⁴ Paper C for 14 Feb 61 in ScM Z193/3.

After Follett's statement, another document about the possible future of the Museum was created, entitled *The Ideal Lay-out for a Science Museum*. This was a fanciful re-establishment of the Museum. Despite its quixotic vision, it had a very practical purpose. It was written to stimulate conversation, and it presented clear preferences in styling, display, content, and emphasis. In stating those preferences, the Festival of Britain's narrative structure and style, especially as presented in the Science Exhibition and at the Dome of Discovery, were recalled as examples of the atmosphere that should be cultivated by displays of science and technology. Furthermore, it emphasized mixing the historical and



This diagram illustrates the ideal architectural layout envisaged in *The Ideal Lay-out*, but it also reflected the arrangement proposed by Mackintosh in "The Future."

(From Paper D for 20 June 1961 in Z193/3)

the contemporary together to provide context for both of them. Finally, it emphasized the need to create a 'Master Plan' to guide the development of the institution. It laid out the essential steps that were needed to plan such an institution: 1) extended planning to create a complete Master Plan, 2) detailed sectional planning before the Master Plan is finalized, 3) involvement of architects and designers from the beginning, and 4) approval of Master Plan before any commitments could be made.¹ This vision did start a conversation. During late 1962, several papers were submitted to the Advisory Council in reply to *The Ideal Lay-out*. This discussion revolved around rearranging the entire Museum after building the West Block. They realized that a carefully considered "new master plan" was needed before the construction of the West Block could begin.² So, before the Museum had even settled into the Centre Block, it was discussing reorganizing the collections again, but the story of organizing and displaying the East Block, and later the Centre Block, holds some warnings for the plans for the West Block.

¹ Paper D for 20 June 1961 in ScM Z193/3.

² Papers for 23 Oct 62 in ScM Z193/3.

Reorganization and Redisplay

During the period when the Centre Block was under consideration after World War Two, action was taken to reorganize and redisplay the space available within the Museum. On 14 February 1946, the Science Museum reopened with a total of twelve galleries displayed for the public – four for the permanent collections and eight for the special exhibition about German Aeronautical Developments during the War. Between then and the end of 1948, the Museum continued to open galleries and to redisplay the Collections to benefit visitors. During this period, the displays were mainly reconstructions of pre-War exhibitions in their pre-War locations. Very little new material was displayed and very few new displays were created.

The first displays that utilized modern display techniques occurred at the Museum before World War Two. The main experimentation occurred in the Children's Gallery, where many modern display techniques were first used, including artificial illumination and illustrating historical techniques and periods with dioramas. While post-War galleries, such as the Illumination and Agriculture gallery were to "give full scope" to modern display principles, the Advisory Council carefully noted the pre-War developments made in the Children's Gallery. Yet, despite the recognition of that work, the Advisory Council was comparing the new techniques used in the early 1950s to those developed outside the British Isles during World War Two, particularly those developed in Sweden and not those previously used in the Museum.¹

Though not recognized by the Advisory Council as such, the first deployment of new European techniques was in *Darkness into Daylight*, a special exhibition about artificial illumination that opened in 1948. The exhibition was organized by Department 5 of the Museum, which was mainly concerned with Aeronautics and Sailing Ships, and headed by Davy. The special exhibition covered historical developments of illumination methods, followed by "a large number of technical demonstrations of the properties and usages" of various illumination technologies. The exhibition was very successful because it was visited by approximately 500,000 during the five months it was open and was used as the basis for the new permanent Illumination Gallery.² The exhibition contained the first displays, outside the Children's Gallery, that were illuminated artificially. Yet, many at the Museum, including Advisory Council members, did not consider that it followed the newest exhibition techniques.

¹ AC 1940-51, p3.

² AC 1940-51, p24.

According to the Advisory Council, the first fruit of the Museum's expansion into "display techniques more attractive than the traditional Museum use of standard cases on the walls and floor" was the Agriculture Gallery, opened in July 1951.¹ Like many new additions at the Museum, this gallery had been long in planning. A new scheme for exhibiting the Agriculture Collection was planned in 1923. Along with plans for a new gallery, the Collection's space constraints caused drastic changes to occur. In late 1923, the Museum was forced to refuse offers for new exhibits from the Ministry of Agriculture and Fisheries, and had also returned all items that were on loan to their owners because the Museum could neither exhibit nor store the items where they were accessible for study.² The severe space restrictions placed on the Collection greatly influenced the resulting gallery plans. The final scheme consisted of two main series: the historical and the modern. The historical series covered ploughs, hoes and harrows, rollers, carts and wagons (till 1800), drills, reapers, and threshing implements. The modern series covered tilling and cultivating, sawing, reaping, barn- and farm-yard appliances, and dairy equipment. In the final proposal, models would illustrate all of these.³ In 1928, with the official opening of the East Block, a new Agriculture Gallery opened. It was very traditional, with models and other small items housed in standard showcases interspersed with freestanding larger items.⁴ The scheme that was followed in the late 1940s and early 1950s was very similar and was even more restricted than the pre-War gallery. When the exhibition opened on 25 July 1951, it in the words of O'Dea, it used the "most up-to-date display techniques."⁵

When this new Agriculture Gallery opened, it was located in the building constructed as part of the deal with the Festival organizers to house the Science Exhibition within the Museum. The new section had been designed to be illuminated completely with artificial light by excluding windows from the side walls and installing a solid roof, rather than the more traditional glass roofs of the East Block. The resulting spaces were ideal for introducing modern display techniques. The decision taken in the early 1920s to divest the collection of many of its larger pieces and to rely on models as the core of the Collection and display, meant that this was one of the few collections that would work within the constraints of the new display techniques. The

¹ AC 1940-51, p3.

² Letter from Lyons to Secretary for Agriculture dated 8 Dec 23 in ScM Ed 79/116.

³ ScM Ed79/116.

⁴ J Insley, 'Little Landscapes: Agriculture, Dioramas, and the Science Museum', *ICON* vol. 12, 2006, pp. 5-14.

⁵ ScM Ed79/116.

resulting display, which can still be seen 58 years after it was installed,¹ consists of three bays covering tilling, cultivation and harvesting, and the farming calendar as it relates to arable



A view of the Agriculture Gallery showing the use of a single large item - the 1917 Fordson tractor - within the bay full of models and topped by the wrought-iron cyclorama.

(Image taken by Thad Parsons, III on 4 Feb 2009)

farming. Filling the three bays was a small selection of large items, a run of dioramas, and more than 80 models, many set against scenic backgrounds. To add some drama to the exhibitions, above the run of specially-designed cases there was a sculptural mural illustration of Egyptian, Medieval, and Modern farming practices.

Overall, the gallery was designed to highlight the advantages created by

the advanced, scientific farming principles of modern agriculture.

On 26 July 1951, *The Times'* Museums Correspondent reported on the collection's reopening, commented on the modern lighting ("perhaps not everywhere brilliant enough"), the mural ("an ingenious and decoratively effective feature"), the lack of space provided ("the comparatively small space"), and the dioramas ("some of them extremely good").² *The Times* also included an image of the exhibition, showing the mural and the displays, including many of the models.³ Overall, the gallery got positive reviews from the daily press but did face some criticism on its restricted coverage. In its original (and surviving) layout, the gallery only covered arable farming. This situation was, according to O'Dea, created by the postponed expansion of the Museum and the resulting restriction of exhibition space.⁴ Yet, for O'Dea and others, the gallery was important because of the display methods it used.

In the *Museums Journal* for March 1952, O'Dea published an article about the "professional aspects of the display methods employed" in the Agricultural Gallery.⁵ Because he

¹ The gallery was extended to cover the dairy industry in the mid-1960s but that was removed to install the lifts, leaving the original 1951 installation visible today. For a discussion of the reasons behind the survival of this gallery, see Insley, *Little Landscapes*.

² Museum Correspondent, 'Progress of Work on the Land: Science Museum Display', *The Times*, 1951, pp. 8.

³ 'New Forest Agricultural Show', *The Times*, 1951, pp. 12.

⁴ O'Dea, 'The Science Museum's Agricultural Gallery', *Museums Journal* vol. 51, no. 12, 1952, p. 299.

⁵ O'Dea, *The Science Museum's Agricultural Gallery*, p. 299.

did not aim to defend the gallery's contents, the article was about his philosophy and practice of exhibition and gallery design. Therefore, while it may not be representative of the whole staff, the article provides a useful insight into the exhibition style that was developing at the Science Museum during the early 1950s.

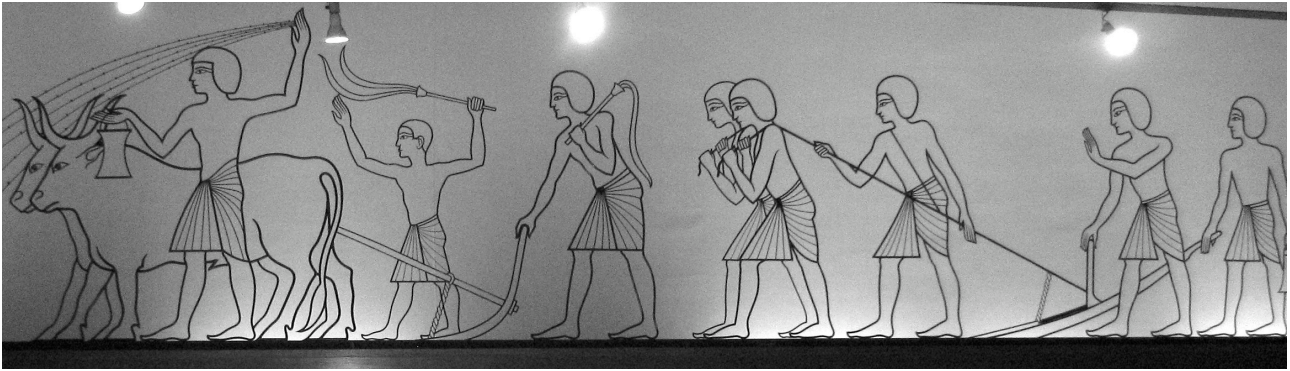
Using the Agriculture Gallery and the Museums Journal article as guidance, a clear style developed and was used for all new galleries until the Electrical Power gallery opened in 1957. The style is defined by four main features: artificial illumination, large decorative features, reliance on models and dioramas, and concern for visual appeal over technical details. O'Dea, a proclaimed illumination expert, believed in the superiority of artificial lighting and felt that designers should fight "the inelastic and restrictive tyranny of daylight." His opinion was supported by Shaw and Kendall, the Ministry of Works architect. During the design of the lower floors of the Centre Block, they created a series of windowless spaces ideal for artificially illuminated galleries, and, not coincidentally, for climate control that could maintain ideal conditions for preservation.¹ As mentioned in *The Times*, the artificial lighting was not seen as a success by everyone but the Museum was successful in creating a flexible display space that was quite unlike the East Block with its large engines and glass-roofed atrium. Another new aspect of the Agriculture Gallery and similar exhibitions was their use of large decorative features. Previously, the largest and most dominating features of galleries were generally objects. In the Agriculture Gallery, the most dominating feature was, and still is, the 100 foot-long wrought iron cyclorama on top of the cases against the long wall of the gallery.² This piece was commissioned for the gallery by O'Dea³ from Ralph S. Lavers, A.R.I.B.A.⁴ This artwork, and pieces in other galleries, were installed to enhance the atmosphere of the galleries and to connect with people on an emotional, versus intellectual, level. Following the example of the Children's Gallery, the

¹ O'Dea, *The Science Museum's Agricultural Gallery*, p. 299.

² O'Dea, *The Science Museum's Agricultural Gallery*, p. 300.

³ Interestingly, the final form of this piece was dictated as much by financial/procedural issues as by artistic questions. This was because, for it to be considered an exhibition purchase and receive an inventory number, it had to be detachable from the wall. Otherwise, the mural would be considered decoration and would have been the responsibility of the Ministry of Works. The importance of this factor should not be underestimated because the design was out of the control of the Ministry, O'Dea (and the Museum) was more involved in its creation. For the conversation discussing this situation between O'Dea and Taylor, see letter dated 12 December 50 and Taylor's reply in ScM Ed79/116.

⁴ Little is known about Lavers (b.1907 - d.1969) except for his work at the Science Museum and his design of the 1948 London Olympic Torch (V&A M.3:1, 2-2006) - a design that was reused for the 1956 Melbourne Olympics. At the Museum, not only did he work on two permanent galleries, but he was also involved in the "Metals in the Service of Mankind" temporary exhibition. For details about his involvement with the Museum, see ScM Nominal 8880. For details about the torch, see: <http://collections.vam.ac.uk/objectid/O123217>



The section of the Agriculture Gallery cyclorama illustrating Egyptian practices.
(Image taken by Thad Parsons, III on 4 Feb 2009)

Agriculture Gallery relied on dioramas and models to represent the items and processes of daily life. Unlike in the Children's Gallery, all of the dioramas were designed and built at once, many by top diorama artist, Raphael Roussel. This allowed the Museum to guarantee design consistency and uniformity of scale.¹ This level of design control was replicated in many of the other galleries installed during the middle of the 1950s, and is different from the freedom that many model suppliers had experienced previously with the Museum. Finally, many of the smaller touches - arranging models in the cases according to scale instead of development, the simplistic labeling style, et al - highlight the gallery's aim to be visually appealing to the general public. Overall, it was not designed for the "earnest type of student".² By increasing the visual appeal of galleries, particularly at the cost of catering to 'earnest students' or experts, the Gallery followed the 1952 policy recommendations, which were being developed at the same time it was being designed. These four features mark a distinct phase in the design of exhibitions at the Science Museum during the 1950s.

At the end of 1952, the new Mining Galleries opened. They were considered an "outstanding development" by the Advisory Council because not only was it another gallery using modern display techniques, but it also received a large amount of industrial support. For the Agriculture Gallery, the Museum received about £10,000 in support. In contrast, the Mining Galleries received more than £40,000 in support.³ While the support for the Agriculture Gallery was mainly financial, the Mining Industry provided full-sized equipment, models, and financial support.⁴ Since the time of Lyons, the question of industry support weighed heavily on the

¹ O'Dea, *The Science Museum's Agricultural Gallery*, p. 300.

² O'Dea, *The Science Museum's Agricultural Gallery*, p. 301.

³ AC 1940-51, p3.

⁴ AC 1952, p3.

Museum because of the limited governmental funds they received. It was necessary to find additional funding. After the successes of the Agriculture and Mining Galleries, staff hoped they would create distinct patterns of support that other industries could duplicate. In addition, because of the quality of the galleries produced, these sections of the Museum were used to highlight benefits the Museum could have on industry. For example, the National Coal Board filmed portions of the Mining Galleries, particularly the full-sized reproduction mines, for inclusion in the film series, *Mining*

Review.¹ Throughout the 1950s, industries - including gas manufacturing, industrial chemistry, and aeronautics - had various levels of involvement with the Science Museum, and none of the related galleries were the Museum's exclusive product. As



This diorama depicting medieval ploughing (Inv. 1944-40) was presented by the British Council and constructed by Roussel as part of the series in the Agricultural Gallery. This series of dioramas was one of the successes of the Gallery.

(Image taken by Thad Parsons, III on 4 Feb 2009)

Insley notes about the Agriculture Gallery, the tone was influenced by industrial sponsors and

therefore, it had overtly promotional aims that were not present in many of the more traditional displays.² This change in tone and the incursion of non-educational aims into the Museum was an important shift, and would eventually become established as the standard operating procedure for creating new galleries.

The next important new gallery to open was the Gas Gallery on 25 May 1954. It covered the manufacture and distribution of gas and was considered a “collective contribution by the industry as a whole” to the Museum.³ As noted, support came from the entire industry. The largest single donation of £27,000, was from the Gas Council, the public face of the nationalized Gas Industry.⁴ At this point in time, gas was facing increasing competition from electricity as the

¹ AC 1953, p16.

² Insley, *Little Landscapes*.

³ AC 1954, p2.

⁴ AC 1950, p14.

source of energy for cooking, heating, and lighting.¹ By 1955, the gas industry had lost the competition for lighting,² but it considered the Gas Gallery as a part of its campaign to secure gas's future. To achieve this, the gallery was aimed at the widest possible audience - the educated layperson. Yet, the Gas Council saw the gallery doing more. It provided an "exposition of the subject in the most general terms for the casual visitor, a more detailed exposition for the interested layperson and a series of exhibits of particular value to the student."³ Different gallery sections and features were designed to meet the needs of the three types of visitors.

Following the format expressed in the 1952 policy statement, the casual (or low-level⁴) visitor was expected to use the six dioramas arranged along the main corridor to gain an appreciation of the general development, from the early experimenters to the modern retort house. The interested layperson, many of whom were anticipated to be professional engineers, was expected to be drawn to the scale models, which illustrated the developments in gas production from early plants to modern industrial complexes. Finally, the student was expected to use the 21 illuminated and animated descriptive panels that were installed along the south side of the gallery under the cyclorama. Besides those features, the gallery had three other major features that contributed to the overall atmosphere - two painted murals, a five-panel cyclorama, and a full-size model of the discharge end of a bench of eight horizontal retorts. The Advisory Council believed that the Gallery's display methods represented a significant development over previous attempts to exhibit technical material because they were attractive and presented material in a dignified, but lucid manner.⁵

The most attractive and atmospheric works in the gallery were the two paintings and the cyclorama. Each end of the gallery was dominated by the murals, with one end showing the industrial pioneers of the gas industry and the other end illustrating a modern kitchen, full of gas

¹ Busch, 'Cooking Competition: Technology on the Domestic Market in the 1930s', *Technology and Culture* vol. 24, no. 2, 1983, pp. 222-45; Sprenger, & Webb, 'Persuading the housewife to use electricity? An interpretation of material in the Electricity Council Archives', *British Journal of the History of Science* vol. 26, no. 1, 1993, pp. 55-65; Pursell, 'Domesticating modernity: the Electrical Association for Women, 1924-86', *The British Journal for the History of Science* vol. 32, no. 1, 1999, pp. 47-67.

² The Gas Council qualified this as the development of the industry as one that provided light to one that provided warmth. This also featured a shift in focus from the domestic to the industrial uses of gas. For more details, see the history given in: The Gas Council, *The Gas Gallery: A Permanent Exhibition at the Science Museum South Kensington*, Gas Council, London, 1955.

³ Gas Council, *The Gas Gallery*.

⁴ This was the label given to the broadest class of visitor at the exhibition in AC 1954.

⁵ AC 1954, p19-20.

appliances. Quite interestingly, during a period of controversy between the gas and electric industries, the Museum chose to illustrate a fully-equipped gas kitchen. The Gas Council greatly influenced this decision and it would be raised in the late 1950s during the design of the Electrical Power Gallery. Again, the cyclorama was designed by Ralph S. Lavers and illustrated five different historical periods: 1812 – gas lighting in London streets; 1830 – gas lighting at the Mansion House Ball; 1860 – gas lighting in a private home; 1890 – incandescent gas lighting; and contemporary industrial gas use.¹ Both murals reinforced the idea that gas had moved from being a source of light to providing heat. Finally, to add “a mark of realism” and a sense of scale to the exhibition, the full-size model of the discharge end of a bench of eight horizontal retorts was included at one end of the gallery.²

Both the Museum and the Industry considered the gallery a success, and it received a favorable reception in the press.³ Unlike the Agriculture Gallery or the Mining Gallery, it experienced several problems shortly after opening. Within a year, many of the working models, including some of the descriptive panels, needed repair. The panels, which had been designed to “present a maximum of technical information” through movement and selective illumination,⁴ required redesigning because they, and other working models, could not withstand visitors’ continual use. The Museum expressed the opinion that “they were all so constructed that their attractiveness and educational value are not seriously impaired when they cease to operate”, it was not the opinion of everyone involved because the Museum used precious workshop time to redesign and rebuild the exhibits while there were still outstanding work orders from the 1948 reopening.⁵ Despite these problems, this gallery was used alongside the Agriculture and Mining Galleries, as an exemplar for industrial contribution to the Museum.

On 20 May 1957, the Electrical Power gallery opened. It was the last East Block gallery completed and was the main feature of the Museum’s entire year. This gallery, like the previously discussed ones, was supported by the industry with a donation of £50,000, which was three-quarters of the total cost. While still containing working exhibits and dioramas, the

¹ Lavers, 'Cyclorama designed for Gas Gallery in five wrought metal sections (Inv # 1993-1602)', Blythe House, Science Museum, 1951; Gas Council, *The Gas Gallery*.

² Gas Council, *The Gas Gallery*.

³ For example, see: '150 Years Of The Gas Industry: New Collection At Science Museum', *The Times*, 1954, pp. 10.

⁴ Gas Council, *The Gas Gallery*.

⁵ 'AC 1955, pp. 5-6, 21-2.

Electrical Power gallery was different from some of the previous displays. To begin the gallery, a reproduction and diorama of Faraday's original experiments and laboratory were presented, along with a couple of additional dioramas illustrating the early uses and installations of electricity. Yet, quite unlike the other new galleries, the display focused on equipment, with historical pieces coming from the Museum's collections and modern pieces provided by the electrical industry. Besides that, a variety of working exhibits, including a one-million-volt impulse generator, were demonstrated to visitors. The generator's impressive optical and acoustical display was the highlight of many visitors' experiences at the Museum. Besides the impressive visuals offered in the gallery, it did break new ground for the Museum because it presented the development of atomic power. This was done by presenting the work of Einstein, J.J. Thompson, Rutherford, et al., and with panels discussing the generation of power from Calder Hall, Bradwell, and Dounreay.¹ Like the previous new galleries, the new electrical displays were aimed at the largest possible audience, the educated layperson, and industry contributed to it as part of their wider public relations attempts. Unlike the Agriculture and Gas Galleries, the focus on presenting actual equipment meant that the gallery, while still being proclaimed as a type of modern display, was a return to the type of galleries that filled the Science Museum before World War Two.

The basic pattern established during the mid-1950s was followed throughout the Centre Block, most of which were paid for by various industrial concerns. The Museum received £60,000 from British Iron and Steel to modernize the relevant sections of the metallurgical collections. To complement that modernization, the Goldsmiths' Company of the City of London supported creating a series on assaying and hallmarking. The Federation of British Rubber and Allied Manufacturers donated £4,000 for a new rubber display.² For the most part, the donations were quite straight-forward because organizations sponsored galleries that were directly related to their business. This incursion of commercial interests was becoming the standard procedure for developing new galleries. Two galleries - Chemistry and Aeronautics - challenged that process. At their most basic, the other recently-opened galleries were sales pitches: buy a new plough, use gas appliances, or use electric appliances. These two galleries

¹ Museum Correspondent, 'Science Museum's New Gallery: Electric Power Exhibits', *The Times*, 1957, pp. 12; AC 1956; AC 1957.

² AC 1959, p1.

were different because they were not trying to sell the items on display, instead they were concerned with other issues.

The new chemistry galleries were developed for the East Block second floor in preparation for the Centre Block's completion and divided into two sections: Pure and Industrial. The exhibitions of Industrial Chemistry were formed by a hodge-podge of single displays, each designed with the help of the related industry. For example, the series of cases illustrating oil and petroleum was designed with the input of a "Petroleum Sub-Committee" and funding from the Institute of Petroleum. This partnership designed cases to show the visiting public how the products they regularly used were created.¹ In contrast, the Pure Chemistry sections were about the development of "*ideas* rather than *things*."² Throughout the planned displays, this policy was strictly adhered to because the gallery was seen as a 'Basic Science Gallery' and its purpose was to show the fundamentals of chemistry, not its applications. Unfortunately, the virtual elimination of chemistry's applications meant that industry needed to be convinced that it could benefit them. The Museum argued that the Gallery would benefit industry because it would stimulate interest.³ The prospect of building positive associations and creating a consumer with a better basic chemical knowledge was attractive to many in the chemical industry and the Museum received over £30,000 for displays and development. Additionally, members of the Scientific Instrument Manufacturers' Association loaned modern equipment and several biochemical firms helped create a separate display on chromatography.⁴ The Gallery's success showed that some industries were interested in supporting exhibitions that were not directed towards exhibiting their products.

The Aeronautical Gallery posed similar problems for the Museum. The aeronautical industry, particularly manufacturers, had little reason to be interested in an exhibition at the Science Museum because their customers were large institutions, mainly governments and airlines. Since they were not financially dependent on museum visitors as customers, another reason to contribute to the Gallery's development needed to be found. To garner financial support and the contribution of objects for exhibition, the Museum reverted to its traditional

¹ ScM Ed79/134.

² "General Policy" section of ScM Z116. [Emphasis Original]

³ "Procedure and Cost" section of ScM Z116.

⁴ Press Notice: "A New Chemistry Section at the Science Museum" for Press View on 17 June 64 in ScM Z213/1; Museum Correspondent, 'Science Museum's New Galleries: Chemistry Displays', *The Times*, 16 June 1964, pp. 14.

arguments based on its role in technical education. In a brochure requesting industry assistance for the new Aeronautical Gallery, the Museum was “to stimulate the interest of young people in ... Science and to encourage them towards a career in the field.”¹ While this reversion to traditional rhetoric was used to encourage industry to contribute, it was accompanied by impressive new designs for the gallery, including a vaulted barrel roof, suspended aircraft, and raised walkway.² Unfortunately, this appeal was slow to create financial support. In the first year, the Museum only received £1000 from the Society of British Aircraft Constructors Ltd., but Museum staff did not let the lack of immediate support impede their progress.³ By late 1961, the planes were being ‘flown’ into place and suspended from the ceiling supports. Throughout 1962 and early 1963, the final touches were added to the gallery, including rearranging over 200 models and the display of over 70 aircraft engines. Then, after being closed nearly three years, the Aeronautical Collections were reopened to the public on 11 July 1963.⁴ Unfortunately, the Museum was not able to convince the aeronautic industry that the Museum could benefit them by influencing visitors. Even when the dramatic change in exhibition design was included, few financial supporters within the British aircraft industry could be found.⁵

While planning new galleries to fill the Science Museum after the Centre Block’s construction, staff were generally able to convince various industrial concerns that supporting the Museum would benefit them, either by increasing their customers or by creating positive associations for the industry concerned. This pattern became the standard procedure for most exhibitions during the mid and late 1950s and was not challenged until the Museum tried to duplicate it with galleries that could not be directly connected to consumer products. These two galleries - Chemistry and Aeronautics - resulted in very different levels of industrial support and illustrated the problems the Science Museum faced in engaging various audiences in the Museum’s future.

¹ ScM Z183/1.

² AC 1958, p18.

³ AC 1959, p2.

⁴ Press Notice: “Science Museum: Aeronautical Gallery” for Official Opening on 10 July 63 in ScM Z213/1.

⁵ There may be another reason why little support came from British industry but it is not mentioned in the Museum archives. During the late 1950s and early 1960s, the industry was undergoing a series of financial and technical crises. Scanning the headlines of *The Times* during the period, one regularly sees stories concerning the difficulties faced by the industry, including lay-offs and discussions of nationalization.

Planning for the Future

Few schemes for development¹ successfully produced permanent galleries. Not all schemes for development were designed to produce galleries: some aimed to create new collections, some became parts of larger schemes, and some were unsuccessful, never producing a single display. This was not wasted work, however, because within the mass of the schemes created were the roots of several special exhibitions and this was one of the few locations where the Museum could negotiate its coverage and methodology. This meant, that while not always directly impacting the visitor's experience, the schemes explored the possibilities open to the Museum. Exploring the results of these 'failed' schemes highlights some of the themes of gallery and collection development that are hidden by the examination of the schemes that produced major galleries.

A minority of the schemes for development were concerned with developing collections, instead of the development of galleries and exhibits. Their purpose ranged from creating a new collection to trying to update older collections. The questions these schemes addressed ranged from the addition of a single item to the coverage of entirely new subjects. On the small end was the acoustic instrument collection, its scheme centered around the need to play recordings in the Lecture Theatre. The previous system, which had been on loan, was returned to its owner and a replacement was needed. The audio system was a demonstration item and a resource for Museum programs held in the Theatre. So, the Museum decided to purchase the necessary components to build a system.² The discussion surrounding this purchase shows that the Museum staff, while interested in highlighting modern technology, were also aware that other factors, such as cost and usability, were equally important. On the other end of the scale, some schemes showed that the Museum was making legitimate additions to its Collections or was pushing the limits of its coverage. A perfect example of this was the proposal for a collection of kitchen technologies, which was unsuccessful because none of those involved were sure about how the collection would fit into any of the future displays planned at the Museum.³ In comparison, radar was considered very important for the Museum to cover immediately after

¹ Within the Science Museum archives, there are approximately 20 files that are labeled "Scheme for Development" and outside of those files are several other collection proposals which, for the purposes here, are to be considered together. All of these files fulfill the same basic purpose, they are a curator's vision for the future of a collection.

² ScM Ed79/115.

³ ScM Ed79/121.

World War Two. In early 1947, a scheme to upgrade the collection of radio communication and radar equipment was begun. Its purpose was to show the “intensive development” that occurred during the War. Uniquely, the Government supported it, through both the Radio and Cable Board and the Air Ministry. Unfortunately, it did not immediately receive the support of Director Shaw and others had to convince him that acquiring these materials would be beneficial. He was convinced by two of his curators, Ward and Garrett, that they should accept the items because the Air Ministry had no museum, the items would fill gaps in the Collection, and the Museum would want similar items in the future. In 1948, the Museum acquired a long list of radio and radar equipment used on the ground and in aircraft.¹ This bulk acquisition included many items which could have been sent to the IWM or the NMM - a conflict that appeared several times during the immediate post-War years. Finally, in the mid-1950s, a proposal was made for an entirely new collection. It was for an Automatic Control collection because it would be of “interest to all who may attend the Museum” and it connected with many fields of inquiry, ranging from biology to engineering. This proposal was seriously considered but no final decision was made. If any action occurred, it was done within individual collections.² Comparing the last three schemes, it is clear that the staff were constantly negotiating the exact areas covered at the Museum, that they were aware of the future wants and needs of the Museum, but that they were not motivated by those wants and needs. In fact, whether it was personal, like Collop’s interest in Automatic Control, or external pressure, as experienced by Ward and Garrett, the source for the majority of the proposals made were from outside the Museum’s official structure.

As noted, most schemes and proposals concerned creating new displays and exhibitions. Many were written in expectation of the space created by the Centre Block’s construction and the Museum’s ability to display a larger portion of their Collection. All the galleries discussed previously started as schemes for development and were gradually expanded, edited, reinterpreted, and redesigned until a final form was reached. It is also important to examine schemes where no final agreement could be reached and they were aborted. These fall into three different categories: 1) those that failed to create displays, 2) those that became part of another gallery, and 3) those that became a special exhibition, instead of a permanent gallery.

¹ ScM Ed79/142.

² ScM Ed79/119.

One scheme that completely failed to produce any displays was about science and the scientific method. In late 1952, Taylor opened the file concerning this scheme because the Advisory Council questioned the treatment of science and scientific method, as distinct subjects, from the science and technology presented within the galleries. Yet, the biggest problem facing this scheme was that no one could decide on the correct way to exhibit the scientific method (or even if there was a single method that could be exhibited). Taylor's first recommendation was to illustrate several 'typical researches' from beginning to end, with reference to both the mental and physical processes required by the scientific method. This solution was plagued with problems from the outset because of disagreements about what constituted a 'typical research'. By the end of 1952, Ward was raising much more fundamental issues because he questioned what qualified as the scientific method. In his words, the "'Scientific Method' is not a single, invariable approach" but was a variety of techniques and approaches - of which Ward listed six styles of investigation. They ranged from simple observation to the most complex mathematical investigations, and, in Ward's opinion, museums were unsuitable to present this type of information. Everybody did not hold this point of view, and in 1953 Westcott produced a proposal for a collection that would illustrate the "Methods of Science" by ignoring the problems raised by Ward and creating a display entitled "Science, its (History,) Method and Relations to Society". Westcott's vision, based on a series of dioramas illustrating historical scenes, ignored Ward's objections by limiting the exhibition to presenting historical versions of the scientific method, instead of trying to explain it.¹ Westcott's plan, while addressing the scientific method within specific historical socio-cultural frameworks, did not satisfy the Advisory Council's main aim, which was to provide an introduction to science and its method as distinct from any particular science. This scheme was abandoned very soon after Westcott's proposal, but the discussion showed that the Museum was exploring the limits of its exhibitions. Furthermore, it showed that those involved realized some aspects of science could not be shown through the medium of museum display and that, for those special areas, another solution would need to be found, if the Museum was to offer any explanation. Finally, this scheme touches on important aspects of development at the Science Museum as addressed in the 1955 Report, mainly the questions about the Museum's general function and purpose. In some ways, this scheme was another try at creating an Introductory Gallery, but instead of providing historical background

¹ ScM Ed79/143.

as was the intention of the Children's Gallery, it would provide a methodological and philosophical basis for understanding the scientific and technical problems that were addressed within the Museum's exhibits. More importantly, this scheme was completely scientific and could help defend the Museum against claims that it was an antiquarian institution, or too focused on technical developments.

Again in 1952, a scheme for developing a gallery to illustrate the properties of materials was proposed. It was a proposal for a new display that would stress the function of new types of materials. In this early form, it was specifically not focused on chemistry, but on the material sciences (or engineering). The new gallery's purpose was to explain the special properties of materials and the techniques to make and use them. Also, like the section on Automatic Control, it would link to many other sections throughout the Museum, from building technologies to chemistry. From the archival evidence, little work was done on this scheme and it was abandoned in favor of more pressing concerns.¹ One of the main reasons why this scheme was quickly abandoned has to do with competition within the Museum. This scheme, because of its interdisciplinary nature, was competing with the industrially-supported chemistry galleries, and was likely used as a negotiation tool between Museum departments during the gallery's planning. The main body of the proposal became part of the Industrial Chemistry gallery's final layout, including the links to other sections of the Museum.

In November 1948, after the significant developments experienced during World War Two, a proposal was put forward for a collection that would focus on instruments of position and direction finding. In short, it was a Navigation Collection. The proposal, made by Ward, was to show the history and development of navigational instruments. Unlike other proposals, this would not be a completely new section, but would be partially formed out of other collections, such as terrestrial magnetism and geography. As the full scheme was developed, it was divided into three sections - land, sea, and air - with three specific problems being addressed - unmapped land navigation, submarine navigation, and horizon detection/take-off and landing aids. Immediately after the full scheme was developed, the Museum noticed that portions could conflict with the coverage of the NMM, but this was ignored while the plans were pressed forward.² While this scheme produced a new collection, its main purpose was to create a new

¹ ScM Ed79/140.

² ScM Ed79/133.

exhibition. It did not completely fail because the planning became part of the 1953 special exhibition entitled *Navigation Today*.¹ The special exhibition was based on the improved design for the permanent gallery and contained five main sections: 1) The Navigator's Problem and His Environment; 2) Principles of Position Finding; 3) Marine Navigation; 4) Air Navigation; and 5) Land Navigation.² As it is easy to see, these sections fit perfectly with the scheme developed for a permanent gallery and some of the exhibits featured in this special exhibition were later incorporated into the permanent exhibition installed as part of the Shipping and Sailing Gallery of the Centre Block a decade later.³ So, while the expressed purpose of the special exhibition was to show the navigational improvements made during the War⁴, it was able to fulfill a hidden purpose, to enrich the collections and displays of the Museum.⁵ The resulting accessions then gave the new collection further leverage when allocating Centre Block space, because it had ready-made (not to mention, modern) exhibits that could be quickly installed.⁶

Using special exhibitions to build the permanent collections was a common theme throughout the Science Museum's history. Starting in 1876, special exhibitions were one of the main ways the Museum built its collections and, for many exhibitions, they were proposed and designed with the accession of items as a priority. As noted, nearly the entire special exhibition *Daylight into Darkness* was converted into the Illumination permanent display.⁷ The *Science of Weather* special exhibition was also used to make several important accessions into the Astronomy and Geophysics permanent collections.⁸ In *Appendix 1: The Policy of the Science Museum* of the 1952 Advisory Council Report, this position became official. The four purposes listed for special exhibitions were: to present important material that the Museum did not possess, to

¹ ScM Ed79/169.

² Chilton, *Navigation Today: A Special Exhibition held at the Science Museum, London, from April - September, 1953*, HMSO, London, 1953, p. 1.

³ One example of this is that a version of the Ship's Bridge that was displayed during Navigation Today can still, in 2009, be seen in the gallery.

⁴ Chilton, *Navigation Today*, p. 1.

⁵ ScM Ed79/133.

⁶ For an example of the importance of ready-to-install exhibits, see ScM Z258 Box 1 and the discussions concerning the development of collections.

⁷ The recycling of the special exhibition handbook, *Darkness into Daylight: An Account of the Past, Present and Future of Man-Made Illumination* (1948), into the permanent exhibition guide, *A Short History of Lighting* (1958), is evidence of the conversion of the special exhibition into the permanent collection. Comparing these two publications, they are virtually identical, the difference in length is based on slightly different layouts for in-text images, headings, and quotes. The only real update to the second work is on page 30, as compared to page 26 of *Darkness into Daylight*, and consists of changes to roughly two paragraphs.

⁸ AC 1940-51, p31.

commemorate significant historical events, to initiate new sections of the permanent collections, and to provide for the needs of the blind. They were also expected to attract visitors and to have material presented by outside bodies.¹ If one discounts the provision for the needs of the blind,² special exhibitions were seen as a main source of growth for the Museum. They were one of the main ways the Museum increased attendance and ensured continued accessions.

Beyond their official purposes, special exhibitions were important in the Museum's program for increased industrial involvement. Throughout the Museum's history, the level of special exhibitions has remained reasonably constant, with a post-War (1946 to 1983) average of 4.6 special exhibitions per year.³ During the immediate post-War years (1948 to 1951), special exhibitions were particularly important for the Museum. It held 24 exhibitions during those years, fifteen of which were at least partially planned from outside the Museum. Of those exhibits, six were planned with industrial concerns⁴ and five with learned or professional societies. While many societies were not directly connected to an industry, the exhibitions that they installed were interested in advancing the industries in which their members were involved and which they notionally represented. An example of this symbiotic relationship can be found in the 1947 Chemical Society Centenary Exhibition, where half of it was designed to explain the "chemistry of everyday life" - a topic that was covered extensively in the later chemistry galleries, as discussed above. Overall, nearly half of the exhibitions during this period related to industry's interest.⁵ This pattern remained consistent until significant changes in the purpose and function of special exhibitions occurred in the late 1970s.⁶ Like the permanent galleries, the involvement of commercial and external concerns became a key part of the Museum's standard procedures.

The increased involvement of industry at the Museum was not without its effects. Before the War, several special exhibitions were displayed that stretched the Museum's supposed

¹ AC 1952, p39.

² The purpose of providing for the needs of the blind was a short-lived project that featured short special exhibitions in 1949 and 1950. They were made of a selection of objects that could be safely handled by the blind and understood easily because of their simple construction.

³ The overall historic average from 1912 to 1983 is slightly lower at three per year but it included the pre-East Block years, during which little space was available for special exhibitions. In addition, the figure of 4.6 per year is also roughly equal to the per year average of every Director from Lyons to Weston, with the exception of Morrison-Scott (with 1.7 per year) and Weston (with 8 per year). Details of these figures are from the unpublished manuscript of the centenary volume of the Museum, *Science for the Nation*.

⁴ This figure is evenly split between government-owned and private industry.

⁵ AC 1940-51.

⁶ For details on these changes, see: *Science for the Nation*, 2010.

commercial neutrality and these problems continued during the post-War period. From the time of Lyons, the Director faced the difficult balancing act of making the Museum attractive to industry while maintaining the commercial neutrality theoretically required by the Government. Partly because of his background and partly because of the circumstances at the Museum, Taylor dealt with this issue regularly during his directorship. Two particular discussions of these topics in relation to displays - the special exhibition, *The Story of Oil*, and the Electric Power Gallery - show how the level of commercial presence in the Museum contrasted with the Museum's stated policy of anonymity.

Special exhibitions had always been where commercial interests were able to assert themselves and establish a larger presence. Many of the special exhibitions that occurred under Lyons were more trade show than thematic display, and they showed the competing influences of the commercial interests involved instead of the museum's editorial judgements. This tension continued throughout the late 1930s and resurfaced after the Second World War in exhibitions such as *100 Years of Submarine Cables* in 1950 and *The Story of Oil* in 1954. This special exhibition on the petroleum industry was a particularly special case, but it also highlights the concerns that surrounded every display provided from outside the Museum. This display was atypical because it was a pre-designed display not specifically designed for the Museum, and it was sponsored by a single company, Shell. It was also unique because it was a pre-existing touring exhibit that had been previously displayed in several smaller museums around the country. In short, it was the first time an entire exhibition was hosted at the Museum that was not specifically designed or organized for them. This fact did not bother any of the curators involved, including Barclay and Chilton. The main problem was that Shell sponsored the exhibit, and thus it did not represent the entire industry. This was an especially sensitive topic during the early 1950s because of the embargo on Iran, the overthrow of Dr Mohammed Mossadek, and the involvement of the Anglo-Iranian oil company.¹ The concerns about it being a exhibition about Shell were quickly relieved through confidential correspondence between Taylor and A.E. Gunther.² Gunther

¹ *14 Sep 1951: Refinery opens as oil row continues*, BBC, 2008, retrieved 9 February 2009 <http://news.bbc.co.uk/onthisday/hi/dates/stories/september/14/newsid_3051000/3051902.stm>.

² A.E. Gunther was the son of R.T. Gunther, the man who hired Taylor as his replacement in Oxford. In 1940, after the death of R.T. Gunther, the two men worked together on sorting the elder Gunther's affairs that concerned the Museum of the History of Science, Oxford. During this period, the two men developed a close relationship. For information about this, see Simcock, *A.E. Gunther*, 1998, retrieved 9 February 2009 <<http://www.mhs.ox.ac.uk/sphaera/index.htm?issue8/articl2>>.

assured Taylor that it was “essentially an industry exhibition” which was “educational in aim” and that gentlemen’s agreements were in place with Shell’s major competitors. In addition, Gunther offered to remove the references to Shell’s sponsorship from the cover of the exhibition handout.¹ Instead of the previous statement of sponsorship by Shell, the exhibition subtitle was changed to “An Exhibition of the Petroleum Industry” and a Shell logo was added on the back cover. The inclusion of the logo was enough to upset Assistant Keeper Winter, who felt that Shell’s advertising department was trying to get away with anything that the Museum would allow. On the version of the pamphlet given out to visitors, the Shell logo was replaced with a statement of acknowledgement from the Director to Shell for providing the exhibition. As a result of these negotiations, acknowledging Shell’s sponsorship was limited to two instances: a logo on the funnel of a tanker and the acknowledgement on the pamphlet. Throughout the actual display, names of various oil companies were used² and any pieces that were seen as pure advertisement were removed. Despite all the negotiations, the exhibition was an easy option for the Museum, and nearly 23,000 people visited during the four weeks it was open, according to the figures given to Shell.³ While it was clearly a popular exhibit, organizing it raised serious questions about industrial participation within the Museum, especially concerning items deemed advertisement. The negotiations surrounding *The Story of Oil* make it clear that the Museum did not allow anything that resembled advertising, and that the only exceptions were when acknowledgements were made or when items were a reflection of reality, like the logo on the tanker.

This policy of anonymity within displays and with detached acknowledgements came under scrutiny during the development of the Electric Power gallery because of the questions surrounding the proper way to attribute donations. These were raised in 1954 because industrial concerns were pressing for an increased presence in the gallery. In these discussions, Taylor repeated the Museum’s preference for anonymity but also repeated the Museum’s flexibility in finding an acceptable solution. Unfortunately, none of Taylor’s recommendations were accepted by the gallery’s curators. Their main concern was practicality and how to maintain consistency

¹ Letter from Gunther to Taylor dated 19 Nov 53 in ScMEd 79/179.

² In actuality, these were all the same company: Anglo-Iranian (which in 1954 started trading under the name British Petroleum) was the parent company of Shell-Mex Ltd, but that fact seemed to be ignored by those organizing the exhibition at the Science Museum.

³ ScM Ed79/179.

throughout the gallery. Taylor's suggestion of a poster to acknowledge donations was dismissed because it would have to be updated with every change in the exhibition. In addition, they raised the issue of the Museum's old custom of acknowledging loans on the labels and the difficulties of removing names from old labels, including getting permission and the likelihood of fostering ill-will by doing it. This, combined with the simple fact that many of the makers are indicated on the objects, meant that anonymity was unrealistic.¹ In short, anonymity was abandoned for practicality, and the customary acknowledgements on labels were eventually adopted throughout the Museum.

By the middle of the 1950s, the Museum still did not have an official policy concerning the presence of industrial concerns within exhibitions. Instead, it relied on unwritten guidelines that had to be renegotiated while organizing practically every exhibition. These guidelines included the Museum's preference for anonymity and complete dislike for advertising, while they recognized the need for acknowledgment but tried to minimize its impact on the gallery's editorial stance. Since no official policy existed, standards varied between staff and exhibitions - a situation that allowed industrial concerns an expanding presence at the Museum because they could, as with the Electric Power gallery, identify displays that were more lenient interpretations of the guidelines. Eventually, an official policy was introduced but it was nothing like the ideal that was espoused by Directors from Lyons to Taylor.

Beyond the Gallery: Issues of Display

After the Second World War, the Museum not only had to deal with redisplaying an entire Museum, but it also had to redefine itself and its place within the national cultural landscape. Many of these issues came to the fore while planning the galleries, but were issues that went far beyond the contents of any single exhibition, whether it was permanent or temporary. Ranging from the types of support received by the Museum to practical questions of display preparation, these questions involved the Museum's entire staff, from those working in the workshop to the Advisory Council, and the solutions to them shaped the modern Science Museum.

From its inception, the Museum struggled over its focus and purpose. The main tension was between the Museum's dual responsibilities of instruction and preservation. In most

¹ ScM Ed79/124

museums, instruction required the preservation of important examples from the past. For example, at a natural history or design museum, early pieces are kept as reference pieces or exemplars of best practice, which can be used by visitors (and researchers) without a great amount of further explanation. Whereas, at museums of science and technology, objects can rarely be appreciated for their aesthetics, and their form generally offers little insight into their function.¹ This long-standing problem meant that the Museum took a new direction during the immediate post-War period. The changes that started during the early 1950s continued throughout the last half of the twentieth century.

This debate ran throughout the entire Museum, but one of the places where it can clearly be seen was the discussion concerning the future of the George III Collection. In 1949, Shaw wanted to dispose of the Collection. His idea was to transfer it to the V&A for display at Osterley House, where the instruments could “take their place beside furniture illustrating the contemporary artistic achievements.” Shaw’s scheme was not liked by the National Trust or the V&A.² Despite the efforts to dispose of the Collection, it was shown as a special exhibition from April 1949 until the end of the year, and pieces were used in the *Science Museum, Past & Present* special exhibition.³ By that time, Taylor had taken office and brought a new opinion to the situation - “I am not convinced that this Museum is not the right place for the Collection.”⁴ For him, the clearly historical importance of the Collection was more important than its inability to enlighten modern scientific practices. Additionally, it fit into his wider view of the Museum’s purpose.

Before Taylor became the Director in 1950, the Science Museum followed the basic purpose defined by the Bell Report in 1912. When Taylor took office, he started to change the type of exhibitions held and sought to change the purpose of the Museum. Besides changing the Director’s stance on the George III Collection, he also started a series of book and printed material exhibitions, the first - *One Hundred Alchemical Books* - ran from 25 June until 21 September 1952. While these “attracted a gratifying amount of interest”, many questioned whether their purpose fit the Museum.⁵ Taylor was more interested in broadening the Museum’s

¹ Cossons, et al., *Making of the modern world: milestones of science and technology*, John Murray, London, 1992, p. 7.

² ScM Ed79/125.

³ AC 1940-51, p16.

⁴ Note from FST dated 30 Sep 53 in ScM Ed79/125.

⁵ AC 1952, p5.

appeal, increasing its educational value, and increasing visitor's understanding of the effects of science. He was much less interested with increasing visitors' technical understanding, and in this way, he foreshadowed the changes that would occur at the Museum after Follett became Director in 1960.

As discussed, one of the major issues that the Science Museum faced after the Second World War concerned its sources of support. It remained a governmental department until 1983 and relied on the Treasury to approve all of its regular expenses in the Government's Annual Budget. While this was a useful source for the funding of regular budget items, it was not useful for items such as gallery development. Gallery development, because of its irregular nature, was provided for through special budget grants from the Treasury. These grants created two problems. First, they were for specific developments, like redecoration or new dioramas. Second, they had to be spent during the budget year in which they were granted. This meant that the Museum 'lost' money when it was unable to spend it fast enough. For instance, the Museum was given a grant to continue the series of Mining Dioramas in the Children's Gallery, and because of the delay in delivery by R.T. Roussel, the Museum lost several hundred pounds.¹ In situations where the task involved the MoW, which the Museum relied on for maintenance, redecoration, and improvements, the delay between planning and completion was prolonged because the request process involved three parties: MoW, Treasury, and the Museum. The delays caused by the MoW could be quite long, a fact recognized by the Museum, and something that they tried to compensate for, when possible. For example, when the Hill Pterodactyl's owner complained during the early 1950s that the plane was not on display, the Museum had to act fast. Because the Museum relied on the MoW to install the bolts to suspend it and to install it, a three-phase plan was developed that took months to complete: 1) MoW engineers installed the bolts, 2) the Museum assembled the plane underneath the bolts, and after a significant delay, 3) the MoW suspended the plane.² This plan allowed the Pterodactyl to be displayed while the Museum waited for the MoW to return and suspend it. Unfortunately, many situations were unable to be solved creatively, and the Museum was forced to wait on the MoW to complete jobs. So, if governmental support was unable to provide the level and flexibility of financing that the Museum required, it was forced to appeal for other public, private, and corporate support.

¹ ScM Nominal 8880.

² ScM Ed79/126.

As discussed, industrial support was important for the Museum, but what did ‘industry’ mean? In general, it referred to the great mass of techno-scientific enterprises that *should have* been interested in the Science Museum. This included commercial, governmental, and fraternal institutions that were coalescing into the nascent military-industrial-scientific complex. From the time of Lyons, it was unclear why industry was interested in the Museum and how the Museum could benefit industry. For some groups, such as professional societies, the Museum simply offered a source of publicity for special events, like anniversaries and large conferences. Despite the Museum’s preferred state of anonymity within exhibitions, commercial entities saw it as a venue for public relations. In many instances, they used the Museum as a voice in their political, social, and commercial competitions. At the very least, they hoped that by sponsoring an exhibition at the Museum, they would generate positive associations for their industry and would be able to garner public support. This, by default, had an effect on the type of galleries they funded. To help form positive associations, exhibitions moved towards being entertaining and promotional. Thus, in many of the industry-sponsored galleries, one sees the move away from the Museum’s traditional styles of display the clearest.

To ensure the continued support of the various industrial concerns, it was important for the Museum to fulfill the proposed plans. Unfortunately, the Museum faced several major obstacles in redeveloping the Collections. The largest one was the lack of space created by the delay constructing the Centre Block. The Museum’s Workshops were also a major source of delay throughout the 1950s. In 1953, the Advisory Council noted that development was being hampered by the Workshops and that more staff were needed. Additionally, to highlight the level of work facing the Workshops, the Deputy Foreman of the Woodworking Shop reported that despite 18 months of repairing and restoring ship models, he had “enough work of this nature to last him another 25 years.”¹ From the anecdotal evidence, it was clear that the Workshops had been overworked and understaffed since the War. A clear measure of the extent can be seen in the number of outstanding work orders that remained each year and the age of the oldest outstanding order. At the end of 1955, the Workshops had 154 outstanding work orders (eight from 1948-1952, 16 from 1953, 21 from 1954, and 109 from 1955) - a figure that was artificially low because requisitions were not made because Museum staff knew about the delay.²

¹ AC 1953, p7.

² AC 1955, p6.

In 1956, the number of outstanding orders was basically the same, but it grew to 185 in 1957 - with three still outstanding from 1953.³ By 1960, the number had been reduced to 104, with a single outstanding order from 1957 being the oldest.⁴ The demands on the Workshops were compounded by a significant lack of skilled men. In 1955, the Metalworking Shop worked for several months with only seven of fourteen places filled, and despite hiring four new staff, only one was still employed at the end of the year.⁵ From that low point until the end of the decade, the Workshops expanded their staff, hitting a high of 35 in 1960.⁶ With the volume of outstanding orders and a lack of staff, the focus of the Workshops changed. Instead of creating new models and displays, a large portion of their time was devoted to repairing and reconditioning models and working exhibits, with the rest focused on completing outstanding orders.⁷ In short, the Workshops became a bottleneck in the Museum's development and it was forced to contract out work it previously did. While it was a short-term solution, many of the outside contractors produced exhibits that had to be rebuilt by the Workshops after being on exhibit for a short period, and only created more work in the long-term.

Another issue that caused delays was the production of exhibition text. Labeling was addressed in the 1955 Report when the system was highlighted as ineffective because the public failed to understand the vocabulary, structure, and presentation of information. The solution recommended was the possibility of hiring professional writers, as was done for the Festival of Britain. They could write labels under the supervision of the Museum staff, allowing the expertise of the curator to be combined with the skill of the professional.⁶ Morrison-Scott took up the issue of labeling shortly after he was appointed to the Directorship. In June 1956, he issued a memo of guidance. In it he stated that "label writing is one of the most difficult arts of a museum officer, but also one of the most important." The general policy he endorsed was for brevity, not prolixity. In addition, he stated that most of the labels were "inherited from a bygone age" and that all old labels should be rewritten. He wanted curators to replace the old Victorian-style monographic labels - "a forest of pages torn out of a text book" - with "pithy,

¹ AC 1956 and AC 1957.

² AC 1960, p6.

³ AC 1955, p6.

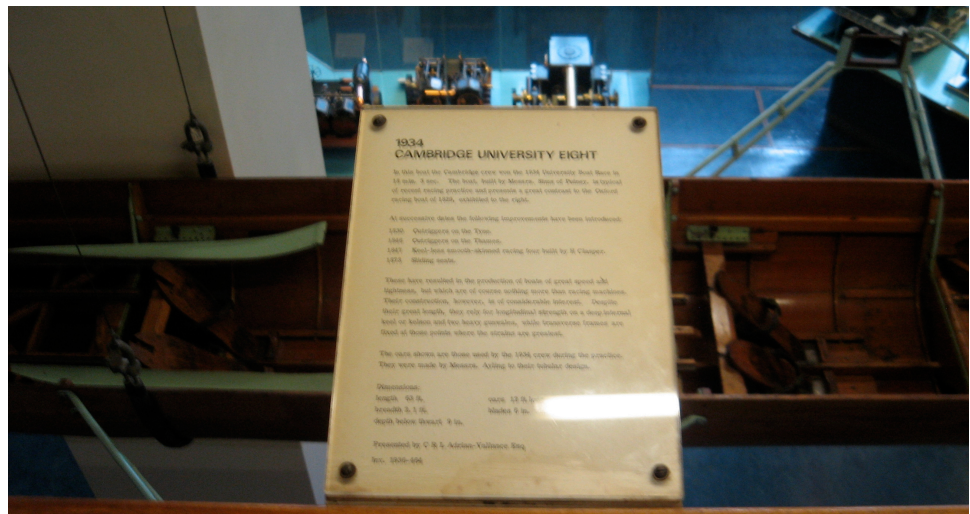
⁴ AC 1960, p6.

⁵ AC 1957, p8.

⁶ AC 1955, p7.

tabloid exposition” that would prevent the “label-reading fatigue” that was common in modern visitors. In short, specialist visitors were not to be the intended audience because they could use other sources, like their own knowledge or the catalogues sold by the Museum. He also recommended that when lengthy text was needed, it should be broken into short labels and provided progressively throughout the exhibition.⁷ One would imagine that, as part of the redisplay after World War Two and in preparation for the Centre Block, refreshing the labels used in the galleries would have been a priority. Quite simply, it was not. Even today, a visitor encounters labels with content that has not been updated since before the Second World War.

In the Shipping Gallery, one can, in 2009, find long labels with statements such as “the model is still (1933) representative of modern practice” and are, based on the amount of discoloration and damage, quite old.⁸



Eliminating such labels was Morrison-Scott’s

Here is another example of the old labels that were reused in the redisplay of the Shipping and Sailing Collections. This label for the 1934 Cambridge University Eight (Inv. 1936-464) (seen hanging behind it in the photo) and states that it “is typical of recent racing practice and presents a great contrast to the Oxford racing boat of 1829, exhibited to the right.” Not only is this label out of date technically, but it describes a display that does not exist because the Oxford boat is no longer on show. (Image taken by Thad Parsons, III on 24 June 2009)

goal because he realized that museum visitors had changed dramatically since before World War Two. To maintain their attention, they had to be treated as consumers, not students.

Unfortunately, for some reason, when the Shipping and Sailing Collections were displayed in their new Centre Block accommodation, the labels were recycled without concern for the contemporary relevance. While the design and decoration of the new Gallery received praise in the press, its labeling was severely lacking.⁹ Overall, while the Museum was excelling at some aspects, such as gallery design, it failed to follow those grand gestures and fix many of the smaller issues that plagued the Museum, such as the labels.

¹ Memo #10/56 dated 25 June 56 in ScM Z148.

² On 21 August 2008, I visited the Museum and documented the old labels and exhibits. This quote comes from the label that accompanied the model of the Balanced Quadruple Expansion Engine from 1914 (Inv. 1930-628).

³ Museum Correspondent, 'New Techniques in Ship Display: Science Museum Models', *The Times*, 1 Mar 63, p. 12.

At times, it seemed that the Museum had multiple personalities. Simultaneously, it was telling one group that it was a source of technical education and telling another that it was a historical museum. It would open a modern, artificially-lit gallery full of dioramas and then create a naturally-lit gallery full of objects in cases. One curator would carefully write new labels for new exhibitions, while another curator would just recycle old labels from pre-World War Two displays. This inconsistency troubled the Museum because it was frequently judged on its weakest sections.¹ This meant that it was commonly seen as nothing more than a children's playground² - a place to push buttons and run between exhibits - or an expert's closet - organized but amateurish, while requiring significant background information to understand.

The Next Step: The Western Block?

Moving away from the Bell Report as the point of reference also meant that the Museum moved away from the Bell Report as a plan for development. Within the plan laid out in 1912, the Centre and Western Blocks were to be planned together and possibly built together, or at the least, the Western Block would quickly follow the completion of the Centre Block.³ Yet, from the time of Lyons, the report was not read in this way. It was seen as a plan of three separate sections. This division of the three blocks became the traditional reading of the Bell Report and was never challenged by the various post-War Directors.⁴ Once the sections became separated, the Western Block was forgotten throughout most of the Centre Block discussions. When it was mentioned, especially in relation to the planetarium, it was referred to as an unlikely development.⁵ In the midst of the four-decade wait for the Centre Block, this was understandable, but it meant abandoning the plans for future expansion.

This position was amplified because without the Bell Report, there was no replacement 'Master Plan' for the physical development of the Museum. Without a plan for reference, the

¹ For an example of this criticism, at the very instance of the opening of the Aeronautics Gallery, see: Leach, 'The Museum Piece', *The Guardian*, 9 July 1963, p. 8.

² This criticism of the Science Museum as nothing more than a children's playground has a long history. The earliest description of the Science Collections as a place for children to have "a good run" was written in 1881 by W. Stanley Jevons. The article which contains several derogatory descriptions of visitors to the SKM, entitled "The Use and Abuse of Museums", was published in *Methods of Social Reform and Other Papers* in 1883.

³ *Bell Report (Part 2)*, pp. 5-6.

⁴ In fact, this was the reading that I made on the first reading of the Bell Report, partly because of the influence of many of the secondary resources. It was only when a close reading was undertaken that the relationship of the Centre and Western Blocks become apparent. While the Bell Report is not completely clear on the timings for construction, it deals with the two blocks as one unit throughout the majority of Part 2.

⁵ "Plans for Centre Block" by Calvert dated 22 Nov 54 marked ScM Nominal 1356A/2/1.

Museum's expansion was haphazard and uneven. Its only impetus was from the ideas, schemes, and ambitions of the various staff members, few of which could significantly push for the Museum's expansion. Lacking even a preliminary proposal, the Western Block was not even a glimmer in an architect's eye. Bereft of support, the Western Block was delayed indefinitely. This lack of impetus for expansion was not unnoticed during the period, and calls for the Western Block appeared in the Press at virtually the same instant as the first galleries of the Centre Block opened.⁶ Unfortunately, the rest of the Museum would have to wait until the next century before it could have a royal opening.

¹ Leach, *The Museum Piece*.

CHAPTER 7:

CONCLUSION

Throughout the 1950s, the Science Museum faced a series of obstacles to its development after the upheaval of the Second World War. The difficulties that the Museum faced were a combination of the lack of financial independence, its position under civil service control, the lack of a strong and long-term Director, a failure to (re)plan for the future, problems with the consistent implementation of ideas, and, more generally, a sense of inertia and traditionalism from within portions of the institution. These obstacles make any of the advances made at the Museum seem impressive. The Science Museum, however, was not the only institution to face such an array of problems. The other National Collections, the Festival of Britain Office, and non-governmental bodies such as Madame Tussauds faced similar sets of problems, but many of the others found ways to overcome their difficulties.

The most basic problems faced by the Science Museum were those that had become embedded into the Museum's fabric. These originated deep within the foundation of the museums in South Kensington. The same dichotomy that divided Cole's educational goals and contemporary focus from Woodcroft's inspirational and historical presentation were present within the galleries of the post-War Science Museum. Additionally, despite the inherent conflict between these two positions, they were codified into the guiding documents of the Museum, specifically the Bell Report. In addition to the struggle between historical and contemporary focuses, which was also being faced by the V&A, the Science Museum faced the difficulty of balancing its presentation of pure and applied science (or, as it was commonly referred to, science versus technology). The applied science collections had a natural advantage within the Museum because they made up the majority of the collections and could garner greater industrial support. To extract itself from the box created by these four parameters - contemporary, historical, science, and technology - the Museum needed to find a narrative that was presentable by the collections and useful for the visitor. The first attempt at such a narrative appeared in the Children's Gallery under Lyons, but was only expanded to the general displays in Taylor's 1952 policy statement. Only when the Museum turned towards the social history of science and technology did it moved beyond its traditional role as part of the Ministry of Education's network of technical education - a role into which it would never easily or

successfully fit. While it appeared that Taylor's influence was going to bring about changes similar to those brought about by Leigh Ashton at the V&A,¹ the impediment of the Centre Block and Taylor's unexpected death delayed any similar changes until after Follett's appointment. Yet, by the time Follett had the opportunity to implement changes to the Museum's direction and focus, the second opportunity to drastically change the Museum's appearance after the Second World War had been squandered and its displays appeared inconsistent and amateurish.

Within the Centre Block, the first gallery to open is a good example of the inconsistency of display efforts. The Shipping and Sailing gallery was publicized as using "33 modern techniques" to convey information and create an appropriate atmosphere for the collection of models.² In reality, the resulting gallery was a compromise - between the central section of models against backgrounds or within scenes, and the sides, where models were set in glazed cases only lit by natural light from the large windows. Being two-thirds old-fashioned, the display is fickle and has the feeling of being put together by a well-informed and talented amateur. More importantly, owing to the Museum's general mistrust of external designers, the gallery appeared amateurish in design because it lacked new ideas that a professional designer could have provided.³ While some of the Centre Block and renewed East Block galleries, such as the Aeronautics Gallery, included impressive new display features, the overall impression was uneven and old-fashioned.

While the internal problems were difficult for successive Directors, they were peripheral to the cardinal reasons why development at the Museum was sluggish. Whether it was by limiting Taylor's exposure as the Director of the Science Museum or by blocking the approval of the planetarium, the Ministry of Education was a stumbling block and its oversight did little to enhance the Museum's influence or authority. In fact, many of the internal problems can be traced to the Ministry's interference in the Museum's routine decisions and activities, such as the habit of some curators to undermine the Director by communicating their ideas directly to his superiors. At other National Collections, the Director and other senior staff reported to a Board of Trustees, or similar group, who acted as a buffer between the Collection and Government.

¹ For a description of the changes Ashton brought to the V&A, see *A Grand Design*, p. 70.

² Museum Correspondent, *New Techniques in Ship Display*.

³ Leach, *The Museum Piece*.

These institutions were protected from the whims of Government or the overreach of enthusiastic curators.⁴ The Science Museum did not have such a buffer because the Advisory Council wielded no concrete authority. This left the Museum under direct civil service control, and with little ability to self-govern. To proceed with its plans for development, the Museum Director had to negotiate directly with the Ministry - talks that could be easily upset by changes at the Ministry or an impetuous curator. While negotiations with the Ministry could be complicated enough, the Museum was also forced to consult with the Treasury for the vast majority of its plans. Throughout its history, the Museum's major source of funding has been the Treasury. During the period covered by this research, the largest sum that the Museum was able to raise externally for a single purpose was approximately £50,000 for the Electrical Power Gallery. In comparison, Lord Duveen provided three times that amount for the gallery that houses the Elgin Marbles at the BM in 1931.⁵ Thus, because of the Museum's inability to attract large donations, it relied on the Treasury to meet both its operational budget and its expansion or development needs. Finally, like all Governmental departments, the Museum was forced to rely on the MoW to finalize plans, provide the Treasury with estimates, and to put buildings on their construction schedule. The Museum's reliance on these three institutions placed the Director in a complicated triangle of negotiations.

The Museum's intertwined experiences of building the Centre Block and attempting to acquire a planetarium highlight the barrier created by this triangle of departments. Guiding a large project, like either the Centre Block or the planetarium, through the necessary approval process took both time and determination. Freedom from at least one of these constraints could have made a huge difference to the Museum. An example of speed, made possible by a degree of freedom, can be found at the BM, when they utilized their network of donors to replace over 20,000 of the volumes damaged and destroyed during the War by 1948.³ The Science Museum, given nearly ten times as long, was unable, partially because of their lack of independence, to acquire a planetarium. Yet, independence was not necessary for a successful presentation of science and technology, as is clearly shown by the Festival of Britain.

¹ Perhaps the most egregious example of this behavior occurred in 1948 when Davy told representatives from the Ministry of Education and the Ministry of Works that a planetarium "either had been or could be procured", which then exposed Shaw to direct criticism from his superior at the Ministry of Education about the chances to acquire and the provision for the housing of a planetarium in the Centre Block. This exchange is in ScM Ed78/181.

² Caygill, *The Story of the British Museum*, British Museum Publications, London, 1981, p. 51.

³ *War Years and After*, p. 9.

The Festival was, like the Science Museum, dependent on the Treasury for funding and on a Government Minister for final approval. Fortunately for the Festival, the Minister in charge, Morrison, fully supported the project and he actively worked to promote it, which provides a dramatic contrast to the actions of the successive Education Ministers towards the Museum. Additionally, the Festival had a strong Director and a comprehensive plan. Despite set backs with financial cuts, it was able to maintain its cohesive narrative structure through the efforts of its leadership to present their view of science and technology. Maintaining the consistency of the message and its presentation was important for the Festival because inconsistencies could weaken the overall narrative structure and, more significantly, the message about Britain's place in the post-War world. To maintain the integrity of the narrative structure when faced with budgetary constraints, the organizers shed unnecessary items, such as their plans for a planetarium and a Newton House, and maintained essential exhibits, such as those on the South Bank. The ability to draw distinctions between integral and peripheral exhibits was enabled by the strong leadership and well-developed master narrative. In many ways, the Festival is a perfect example of how to organize and implement a successful, large-scale presentation of science and technology. Unfortunately, within the Museum and the Ministry of Education, the Festival was greeted with indifference (and, even, hostility) and the lessons that could have been learned from it were not recognized until nearly a decade later.

The two most important lessons that can be learned from comparing the Festival and the Museum's development are the importance of strong leadership and of the existence of a 'Master Plan'. As has been noted numerous times, the constant turnover of directors during the mid-twentieth century had a significant impact on the Museum's development. Frank Sherwood Taylor's abbreviated tenure is an example of this turnover. Without decisions taken independently by Taylor, the planetarium would not have been divorced from the Centre Block to make way for the Aeronautics Collection in its permanent gallery, and its final approval could have been hindered much longer than it was actually delayed. Many of his initiatives, such as those for the Museum's educational provisions, stalled after his death in 1956. At this point, Morrison-Scott, who was a capable administrator, relied heavily on curatorial input for decisions Taylor would have made independently. Yet, Taylor's effects on the Museum did not stop there. It was his guidance that created the plans enacted by Morrison-Scott and Follett for the Centre Block and his 1952 policy report provided the basis for the change from a goal of technical

training to the presentation of general ideas about the history and function of science.

Additionally, under his watch many of the Museum's galleries shifted from being aimed at the specialist student, in their many forms, to a wider general audience of educated laypeople. There is little doubt that, if Taylor had lived longer, he would have continued to make significant changes at the Museum. Despite all of the advances that he made during his tenure, Taylor never conceived of the need for a comprehensive 'Master Plan' for the Museum.

While strong leadership is important, a comprehensive plan built around a strong narrative is equally important. Across Exhibition Road, the V&A's post-War re-display scheme was a completely new plan enacted by Ashton based on decades of discussion about the best way to present its collections. This plan was based on "a chronological narrative, supplemented by study galleries devoted to collections in various materials" and the opportunity of re-display was seen as a one-time chance to remodel the entire V&A's presentation.¹ At the Science Museum, the lack of a similar plan meant that both the opportunities provided by the post-War re-display and the opening of the Centre Block were squandered. Today, the results of the V&A's post-War re-display can still be seen within its galleries,² while the Science Museum's current galleries can, like the V&A's pre-War galleries, be described as an incoherent system.³ The Museum's lack of an organizing narrative at key points during the 1950s resulted in a post-War Museum, that while some display techniques evolved, was organized in a similar manner to many pre-War museums.

As the Museum moved from its focus on specialist visitors towards provision for the general public (commonly referred to as the educated layperson), the lack of a master plan created a range of new problems. Without a unifying narrative, each exhibit within the Museum had to define its own narrative, without reference to the knowledge expected of specialist visitors or to other portions of the Museum. Each attempt resulted in a short story focused on the topic of the gallery but with little (or, in many cases, no) connections to a greater narrative. Unlike at the Festival's South Bank, where the sections were designed to be read as chapters of the greater narrative, the Museum's resulting structure was disjointed and, as a whole, incomprehensible.

¹ Burton, *Vision e3 Accident*, p. 199.

² The basic plan, as created by Ashton and opened in 1948, has been extended but its chronological, versus the earlier materialistic (commonly referred to as "lines of vases"), narrative is still the basis for the majority of its galleries.

³ For the development of the V&A's display, see: Burton, *Vision e3 Accident*, pp. 195-9.

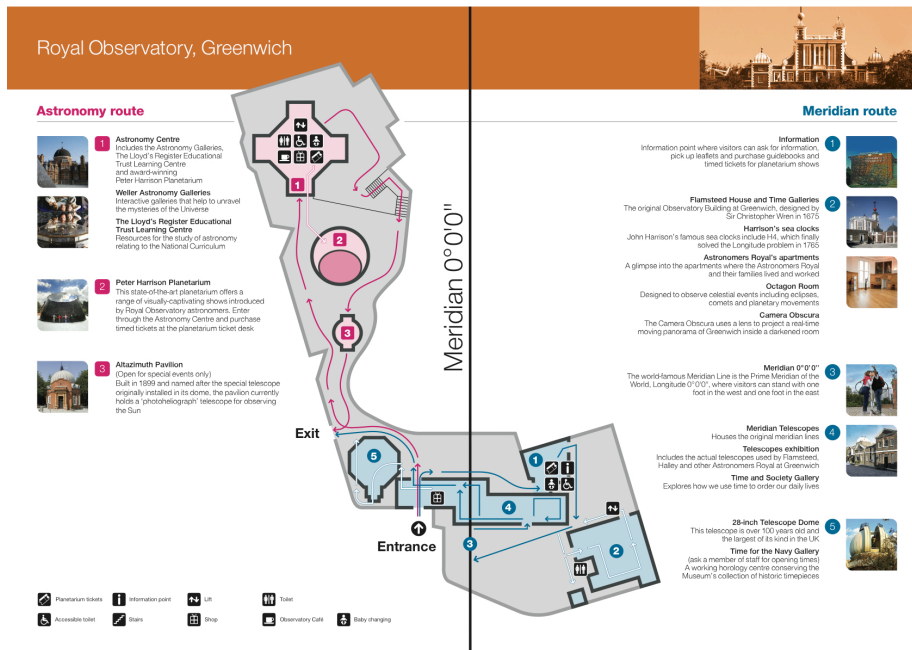
This was especially unfortunate because at the time that the Centre Block was being filled with new exhibits, the Museum could have taken advantage of the interest in the ‘white heat of the technological revolution’⁴ by providing a guiding narrative about the scientific and technological development of the United Kingdom. Since that last chance to provide the Museum with a guiding narrative was squandered, the Museum has sought ways to enforce such a narrative onto its existing exhibits. These attempts have, for the most part, been unsuccessful. Despite all of the other problems faced by the Museum, their failure to develop a Master Plan and comprehensive narrative affected many of the decisions during the period and continues to influence the shape of the institution today.

From the range of comparisons drawn throughout this work, it is clear that science presents a special set of requirements to organize into a narrative. Unlike art and natural history, science does not have a natural narrative. Science’s narrative is therefore more speculative because it lacks a ‘Grand Narrative’. Instead, it has many origins, dead-ends, legends, versions, and current trends. Additionally, developing a narrative of science exposes the problem of its very essence; there is no one ‘science’ but there are many. In art, narratives can be constructed along a stylistic continuum, with one style leading into another, and each style covering a variety of media - painting, sculpture, architecture, and design. Likewise, evolution, taxonomy, and ecology provide easy to follow narratives that can be incorporated into displays of natural history without major difficulties. Conversely, the sciences and many technologies do not follow any such pattern of development. Chemistry did not develop from physics and many technologies mature before science can explain them. The co-existence of different branches of science complicates any attempt at a coherent narrative of science and technology. This creates a plethora of options usable in establishing a narrative of science, and many narratives have been constructed. Taylor did it in Oxford,² the Festival did it on a national scale, and many other scientific and technical museums have developed their own narrative structures. Some of these, like the Festival and the Royal Observatory’s current displays, provide very strict narratives based around key stories or themes, while many other institutions, such as the Museum of the History of Science’s current displays, are based on a narrative that does not require a definitive

¹ This is not Wilson’s actual phrase but is an often-repeated misquote from his 1963 speech to the Labour Party Annual Conference which was published in *Purpose in Politics*, Weidenfield & Nicolson, London, 1964.

² For the organization, see Taylor, *A brief guide to the Museum of the History of Science, Oxford*, 1949.

route but has an underlying narrative structure. Each of these narratives have a common feature, they do not attempt to create a permanent and comprehensive narrative of science - an impossible goal. Instead, they present a coherent narrative bounded by contemporary concerns



or a specialist interest: the Festival was defined by its political views, the Royal Observatory by its focus on astronomy, and the Museum of the History of Science by its interest in social history. Therefore, for the Science Museum to development its own coherent narrative, it needs to look towards its strengths for guidance. It

Just like the Festival of Britain's maps, this map of current displays for the Royal Observatory includes arrows directing visitors towards the correct way to go around the two routes through the site.

could easily design a narrative based on industry - following its early roots in the Great Exhibition - or it could follow the Smithsonian's lead at the National Museum of American History, with a narrative based on the history of science and technology within British society and culture.

Even today, the Science Museum has been unable to devise a single narrative to unite the range of displays on show, despite having a Master Plan (or, as it is often referred to, the Science Museum's Vision) for nearly twenty years. The newest version of this Vision was recently unveiled as the "Museum of the Future" plan for 2015.¹ Unfortunately, this new vision is also flawed. Instead of creating a master narrative for the Museum, the new plans are for the creation of "The Beacon", "SkySpace", and two new "Treasury Galleries." The new plan leaves the vast majority of the Museum's displays untouched, and more importantly, as disconnected from each other as they are currently. As shown by the public information about the changes, parts of this plan were spurred by the pedestrianization of Exhibition Road and the Museum's

¹ Information about the plan can be found in the Energy Gallery at the Museum currently (June 2009) or see, *Museum of the Future*, retrieved 25 June 2009 <http://www.sciencemuseum.org.uk/Centenary/Home/Museum_of_the_future.aspx>.

perceived need to present a new face to the remodeled streetscape. The architectural changes to the Museum, while they may enhance the space visually, are a perfect example of the Museum's recent tendency to prefer form over function. For example, "The Beacon" is designed to show people that the Museum is "the best place in the world for people to enjoy science"² but few of the changes being made within the Museum will improve the visitor's overall experience. They will still enter a Museum that appears as a series of fiefdoms, some prettier and more advanced than others, but still a series of areas operating under their own rules and mythologies. Until the Museum is able to unify the curatorial fiefdoms and present a single coherent narrative, the dramatic structural changes will only distract visitors from the Museum's real problems for a few visits.



The Beacon

By 2011 Exhibition Road will be transformed into a new cultural destination where people, not cars, are in charge. We're planning a new façade to greet the crowds – a beacon for the future. Day and night, animated messages and rich media displays will make sure everyone knows we're the Science Museum... the best place in the world for people to enjoy science.



Presentation of "The Beacon" as part of the "Museum of the Future" exhibition within the Museum's Energy Gallery.
(Image taken by Thad Parsons, III on 24 June 2009)

¹ MOTF_basic.pdf from *Museum of the Future*.

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Z210/9 - X-ray, 1950
Z213/1 - Press Notices
Z226 - Science Museum Information Leaflets
Z240/3 - Letters received by Science Museum
Z253 - Children's Gallery, c.1930-59 (Box 1 & 2)
Z258 - Central Block
Z261 - Short History of the Science Museum
Z282 - [Untitled]

Tate Gallery Archives, London

TG/2/7/1/44/2 - Letter from Robin Ironside to M.W. Bennitt of the Ministry of Works
TG/PH/War/1 - Works Returning from Storage in Piccadilly Underground Station
TG/PH/War/2 - Photograph of the Tate Gardens in use as an Allotment during World War II
TG/PR/279/6/2 - Correspondence Concerning Humidity in the Underground Station
TG/PR/279/14/1 - Letter from Rothenstein to the Ministry of Works regarding use of Tate Grounds for Allotments
TGA/2000/1/55/1 - Prefabricated Houses to the rear of the Tate

Victoria & Albert Museum Archives, London

AO 158 - ARP: Letters & Papers
Ed 84/264 - ARP: Protection and Disposal of Objects
Ed 84/266 - ARP: General
Ed 84/267 - ARP: Montacute House, Somerset
Ed 84/269 - ARP: Westwood Quarry
Ed 84/292 - Reorganization & Development of Museum Collections, 1937-44
Nominal 2/IV - War & Air Raid Precautions: Return of objects from the Repositories

Museum Displays

- Agriculture Gallery, Science Museum (last visited 24 June 2009)
- Balanced Quadruple Expansion Engine of 1914 Display (Inv. 1930-628) in Shipping and Sailing Gallery, Science Museum (last visited 21 August 2008)
- Cambridge University Eight Display (Inv. 1936-464) in Shipping and Sailing Gallery, Science Museum (last visited 24 June 2009)
- Cyclorama designed for Gas Gallery in five wrought metal sections (Inv # 1993-1602) by Lavers, RS, & JSG Ltd., Science Museum, 1951 (currently stored in Blythe House)
- Launchpad, Science Museum (last visited 4 Feb 2009)
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