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*The
National Physical Laboratory
A History*

Edward Pyatt



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Foreword by Dr Paul Dean



Adam Hilger Ltd, Bristol

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Foreword

The history of the National Physical Laboratory is very much a history of the growth of scientific activity in the United Kingdom in the twentieth century. The modest beginnings of the NPL, with Royal Society control and private donations to supplement a meagre government grant, through the long period of growth, the changes of the War years and the influence of DSIR, to its modern role as a Research Establishment of the Department of Industry—these all reflect the changing attitudes and patterns of organisation of science in this country. In this sense the story of the development of the NPL is more than just the story of a single major laboratory.

As Mr Pyatt shows, the historical threads that relate to the NPL go back a very long way, some three hundred years, to the establishment of the Royal Society and the (unrelated) building of Bushy House. In the late nineteenth century the need became clear for a public institution for measurement standards, calibration and related physical research, and from the endeavours of a number of far-sighted individuals the National Physical Laboratory was born. One of those individuals, Richard T Glazebrook, was to be its first Director. His tireless efforts strengthened the Laboratory in its early years and set the pattern for the growth and diversification that was to continue for over half a century. Many of our modern technologies and industries have developed from the resulting NPL programmes.

A crucial aspect of NPL activity has always been its work on standards and metrology. A modern state needs standards and measurement methods for its industries, for health and safety purposes, and for numerous functions of central and local government. The role of the NPL in this sphere is vital for the well-being of the country, and yet it is a largely unseen role that is not widely understood. The developing thread of standards and measurement activity is clearly identified in Mr Pyatt's history as one of the central aspects of the Laboratory's work, of no less importance than the research that has led to major new industries.

We are grateful that Mr Pyatt has risen to the challenge of Hadow's remarks (cf page ix) and written this history. I know that the task has not been easy. There are always problems in unravelling the complexities of historical records and in understanding attitudes and motivations. Whilst we accept that in any historical work there will be room for disagreement on detail or interpretation this, in itself, provides no reason for evading the challenge. The alternative would be no record; and we should all be the poorer.

P DEAN

Preface and Acknowledgments

John Hadow, who during his Secretaryship made many contributions to the history of the Laboratory and its site, wrote in 1969:

‘It does not seem wise to attempt a comprehensive history of the Laboratory. The load would be immense and the opportunity for conflict over the contents would be extensive, while the authority and usefulness of such a publication would be at best limited’.

The irresistible challenge of these words led to the writing of this book. Whether he was right, or not, only the future can tell. But there has been considerable entertainment in the doing. Interpretations and opinions expressed are those of the author.

My service at NPL covered the period 1947 to 1977—certainly the most changeful years of its history. Part of my duties in the later years involved the assembly of the Laboratory archives, researching the history of Bushy House and the setting up of an NPL Museum; these activities facilitated the production of the present work. Among the many contacts who helped to formulate the views of the Laboratory and its organisation set out herein, I single out for special mention the following.

Dr Paul Dean, the present Director, whose interest and encouragement throughout the writing have been specially valued, and who contributes a foreword.

A E Bailey, my last Superintendent at NPL, who played a vital part in the closing stages of the project.

Friends and former colleagues, who have read chapters or parts of chapters, and whose comments and criticisms have been greatly appreciated—G Booth, W E Carrington, J A Champion, D W Davies, J Dawson, G D Dew, S C Ellis, J W C Gates, R W F Gould, S Grant, A Horsfield, R J King, A J D Mackenzie, B Petley, H Pursey, G H Rayner, D W Robinson, B Swindells and D M Yates. (Nevertheless, they cannot be blamed for any errors which may remain; these must result from wilfully ignoring their advice.)

D S Sutcliffe, who took over charge of the Museum and Archives when I retired and who has subsequently made everything in them available to me for study.

Miss J Johnson for considerable help with illustrations.

The Laboratory Library staff for unfailing courtesy and help.

My wife has given continuous encouragement throughout the course of the work. She has typed some manuscripts from my execrable handwriting and finally rounded off the book by the preparation of a substantial index.

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Edward Pyatt

Hampton

1981

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Part I

The Founding of NPL

The Threads of History: 1651–1896

In October 1651, following the Battle of Worcester, King Charles II escaped to the Continent, a beaten fugitive harried from the land by his Parliamentary enemies. In May 1660 he returned once again to his country and began a triumphal progress from Dover towards London. After the bitter fratricidal battles of the Civil War and the austerity of the Commonwealth, after all the troubles and anxieties of the last two decades, he was welcomed as a bringer of peace and prosperity. The King was well fitted for the role; shrewd and cynical in political manoeuvring, brave, sport and pleasure loving, there was something in him for everyone to respect or admire. Though possibly a secret Catholic (and certainly one on his death-bed), he ruled sensibly over an extremely Protestant country, which he held together in a period when the monarchy might well have failed again.

In the early years of the Restoration two entirely unrelated actions set in train chains of events which were to combine many years later to produce the National Physical Laboratory. In 1662 King Charles granted a charter of incorporation to a group of scientists and philosophers, who thereupon assumed the title of the Royal Society, destined to play a leading role in the founding of NPL more than two centuries later. In December 1663 he signed a memorandum:

We have commanded Our Servt Edward Proger, One of ye Grooms of our Bedchamber to build a lodge for our service in one of our Parks att Hampton Court called North Parke¹, And to make a faire walke or laine there in such maner as We have directed.

This was the building which would later house the infant NPL and which continues even today to embellish the heart of the site.

The Civil War and Commonwealth years had seen the emergence of the new, so-called experimental philosophy; the belief that systematic observation and experiment were the proper means for investigating and understanding natural happenings. Until then classical philosophy, which held that the Greeks (and particularly Aristotle) had said all there was to say about science, had dominated all facets of learning. Gatherings of these new philosophers had been held in London and Oxford. In 1659 they were meeting in London at Gresham College in Bishopsgate (where Christopher Wren was at that time Professor of Astronomy). After the Restoration the meetings became more regular and it was soon decided to form a 'Society for promoting Physico-Mathematical Experimental Learning'. The interest of

the King was aroused and he gave the first charter in 1662. The following year a second charter granted a coat-of-arms with the motto '*Nullius in Verba*'.

The broad purpose of this new body was 'to enlarge knowledge by observation and experiment'. However the earliest members were by no means all scientists—the poets Dryden and Waller belonged, as did Samuel Pepys. Prominent among the scientists were Christopher Wren and Robert Hooke; the latter was appointed curator with the task of performing demonstration experiments at the meetings. In 1671 Isaac Newton was elected and four years later the Society played an active part in the foundation of Greenwich Observatory, where Flamsteed was appointed Astronomical Observer.

Edward Proger was born in 1621, the son of a Welsh courtier. He became a Page-of-Honour to King Charles I and, after a distinguished career in the Civil War, was made Groom-of-the-Bedchamber to the Prince of Wales. After the execution of Charles I in 1649 he followed the new King into exile



1 Edward Proger. Drawn by S Harding from a painting by Sir Peter Lely. Reproduced by permission of the Trustees of the British Museum.

and, continuing in his service until the Restoration, was awarded a lodge in the Park by Hampton Court as a reward for lifelong services. Within easy ride, or even walk, from the King's riverside palace it was within comfortable commuting distance for a valued servant or for a King wishing to escape temporarily from the affairs of State. It is probable that Proger's office entailed a certain involvement in the monarch's amorous adventures; it was even said that Proger's eldest daughter bore a close resemblance to the King, but all this is now mere speculation.

The design of the lodge in the Park can be attributed with a fair degree of certainty to William Samwell (1628-76) who, along with Hugh May and Roger Pratt, formed a coterie of gentleman architects at the Court². The building cost £4000, a tremendous sum in those times, which was paid by Proger himself. In the ensuing years he devoted considerable effort, only partially successful, to recovering this money from the Treasury. It is probable that the building consisted simply of the present main block, with only two full floors above the basement, surmounted by a true attic floor with dormer windows. It was approached on the east side along an avenue of trees from the present-day Chestnut Avenue in Bushy Park across what is now the NPL sports field. There still exists in the grounds a Spanish chestnut tree said to have been planted by the King himself.

Occupation of the new lodge carried with it the office of Keeper of the Middle Park, which Proger held for the best part of half a century. On the death of Charles II in 1688 he relinquished his post at Court and retired to his house in the Park. Above Proger, holding the office of Keeper of all the Hampton Court parks, was General George Monck, Duke of Albemarle, the chief engineer of the Restoration. He was succeeded by the Duchess of Cleveland, one of the King's mistresses. In 1708, the Keepership (or Rangership) was purchased from her by Charles Montagu, Lord Halifax (later Earl of Halifax). He was granted the post conditional upon repairing a second lodge in the Hampton Court parks—that in Bushy Park (which name in those days was applied only to that part of the parks lying close to Hampton Hill). This, so-called Old Lodge (or Upper Lodge), became his home, while Proger continued to reside at the New Lodge (or Lower Lodge) a kilometre away in the Middle Park, until his death on 13 December 1713 at the age of 92.

Charles Montagu was born in 1661 and became MP for Maldon in 1689. He rose rapidly; as a Treasury Lord in 1692 he first raised the loan now called the National Debt; he established the Bank of England in 1694 and the following year appointed his friend Isaac Newton Master of the Royal Mint with the task of reorganising it.

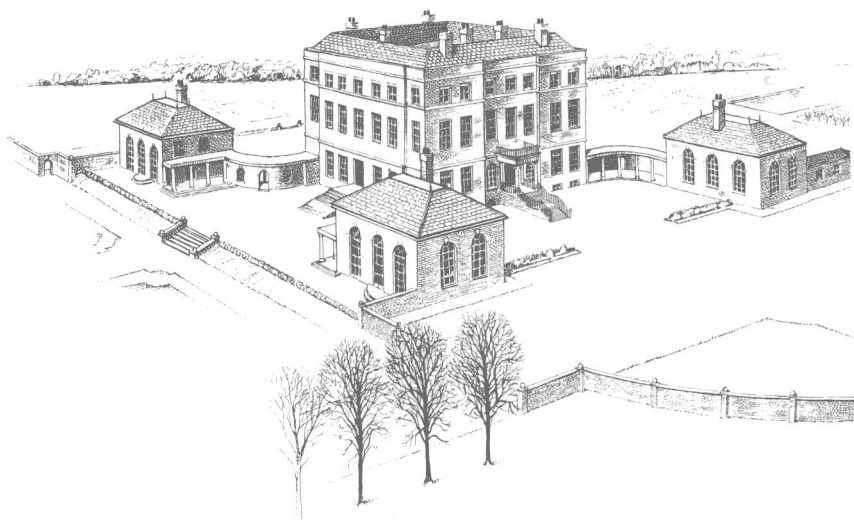
Here the threads of our story come together again, for from 1695 to 1698 Charles Montagu was President of the Royal Society. In 1713 this office passed to Isaac Newton who held it until his death in 1727. These two men were very close as Catherine Barton, Newton's niece, is believed to have

been married to Montagu in his later years. After Proger's death Charles Montagu attempted to bequeath the Rangership to the lady in his will, but as he only held it by Royal Patent it was not his to give. (In 1953 the authorities at Kew presented the Laboratory with a graft from Newton's apple tree. This was planted between Buildings 2 and 3 close to the wall of Bushy House garden and has since fruited).

Renovation work now began on Lower Lodge, but Charles Montagu himself died in 1715. The Rangership was granted to his nephew, George Montagu, who became Earl of Halifax of the 'second creation'. He continued and completed the repairs and extensions to Lower Lodge which his uncle had put in train, casing the existing structure in contemporary brickwork, converting the attic floor to a main third floor and later adding wing buildings to enhance the grandeur. It is probable that Catherine Barton continued to occupy Upper Lodge until her marriage in 1717 to John Conduitt, who succeeded Newton at the Mint.

By this time the distinction between Bushy Park and Middle Park was disappearing, since the fence between them was gone by 1700. The whole became known as Bushy Park, as it is today.

Lower Lodge remained in the Halifax family for three generations before passing in 1771 to Lord and Lady North. Lord North is unjustifiably saddled with responsibility for the loss of our American colonies (his solution to their problems arrived too late to save a situation already irretrievably lost by the generals in the field); Lady North was cunningly appointed to the Rangership by King George III when it was realised that



2 Bushy House in 1797. A reconstruction drawn by R D Treble.

her husband was constitutionally forbidden from holding an office of profit under the Crown while serving as Prime Minister. Extensive works were carried out on their behalf by the Office of Works in 1773-74. Lord North died in 1792 and Lady North in 1797.

On the death of Lady North the Rangership passed to the Duke of Clarence, third son of George III. Born in 1765, he seemed at this time sufficiently far down the line of succession to have no prospect of ever becoming king. After a brief naval career, he was created Duke of Clarence and then, at the age of 24, faced the usual aimless yet confined existence of lesser royalty. Within a short time he became infatuated with the famous comedy actress, Dorothy Jordan; the attraction was mutual and soon they were to all intents and purposes man and wife.

The Duke and Mrs Jordan set up house together in the Lower Lodge in Bushy Park, the Duke for many years playing the part of a country squire and farming the land around the House. Their liaison was accepted by the King and Queen and by the Duke's royal brothers, all of whom visited at some time or other. Ten children were born to the couple—all taking the name FitzClarence.

Their association finally broke up in 1811, for reasons which are unknown to this day. It is impossible to find a human explanation of the Duke's



3 'La Promenade en Famille'. The Duke of Clarence and Mrs Jordan setting out for Bushy House. Cartoon by James Gillray. Reproduced by permission of the Trustees of the British Museum.

conduct, for it would seem that he just cast off an old mistress because of her failing earning power and began to look around for a rich wife.

This was the period of the Regency. The Prince of Wales was ruling the country while George III, confined to Windsor, became increasingly mad as he grew older. In 1817 the Prince Regent's only child, Princess Charlotte, died in childbirth, leaving her uncles next in the line of succession. It became necessary for the Duke of Clarence to marry into royalty and the choice fell on Princess Adelaide of Saxe-Meiningen. They were married in July 1818 and settled down to a life of domesticity at Bushy House; two daughters died in early childhood, but Princess Adelaide mothered the FitzClarence children, and at the same time competently managed the Duke's financial affairs. Additions to the building during this period included the two large rooms on the east face and a servants' wing on the north side, all destined to have a future laboratory function.

King George III died in 1820 and the Prince Regent became King George IV. Then in 1827 the death of the Duke of York left the Duke of Clarence as direct heir to the throne. At 6.00 am on 6 June 1830, the Duke was called from his bed to meet messengers from London in the Main Hall of



4 The Duke of Clarence (later William IV), by Sir Thomas Lawrence.