

The Board of Visitors of the Royal Observatory—I: 1710–1830

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Although the Royal Observatory was established by King Charles II in 1675, and John Flamsteed (1646–1719) then appointed ‘Astronomical Observator’ or first Astronomer Royal, no regulations for superintending the Observatory or for publishing the astronomical observations were formulated.

Over the years Flamsteed industriously accumulated thousands of observations of a much higher accuracy than any made earlier but was reluctant to publish his results in any form other than a great single work which would enhance his and England’s reputation in the scientific world.

By the turn of the century Isaac Newton (1642–1727) had been engaged for some years on his theory of the motion of the Moon and urgently required good current observations for the completion of this work. Although Flamsteed had parted with such observations in 1694 and subsequently, much bitterness existed between the two men over what the Astronomer Royal considered a gross breach of confidence on Newton’s part in disclosing the observations to others.

In 1703, however, Flamsteed made it known that he intended to publish the Greenwich observations provided that funds were made available to cover the cost of printing and pay for the additional labour involved. During the following year, Newton, by then President of the Royal Society, was able to persuade Prince George of Denmark, Consort to Queen Anne, to finance the publication of the long-awaited observations. A committee of the Royal Society, known as ‘The Referees’, was accordingly set up. This comprised Newton, Wren, Wren’s son, Arbuthnot, Gregory and Roberts, who accordingly inspected the observations, expressed approval and recommended that everything should be printed, including Flamsteed’s catalogue of fixed stars. The whole business, however, proceeded very slowly, hampered as it was by disagreement and much personal animosity, until the death on 1708 October 28 of Prince George in whom, Flamsteed wrote, ‘the Observatory lost one that would have been a great and noble patron, had he not been prevented by one of his physicians who was influenced and governed by Sir Isaac Newton’. This was a reference to John Arbuthnot, one of the Referees.

Eventually, as a result of what Flamsteed called ‘another piece of

Sir I.N.'s ingenuity' in taking advantage of a change in Ministry when his friends Arbuthnot and St. John (1678–1751) later Viscount Bolingbroke, became Physician Minister and Secretary of State, respectively, the Queen agreed to appoint Visitors to superintend the work of the Royal Observatory and ensure that the observations were published. The first that Flamsteed knew about this was the delivery of a letter from St. John, dated Whitehall 1710 December 12, enclosing a copy of the Queen's warrant, which ran as follows:

To our trusty and well-beloved the President of the Royal Society for the time being.

Anne R.

Trusty and well-beloved, we greet you well. Whereas we have been given to understand that it would contribute very much to the improvement of Astronomy and Navigation, if we should appoint constant Visitors to our Royal Observatory at Greenwich, with sufficient powers for the due execution of that trust, we have therefore thought fit, in consideration of the great learning, experience, and other necessary qualifications of our Royal Society, to constitute and appoint you, the President, and in your absence the Vice-President of our Royal Society for the time being, together with such others as the Council of our said Royal Society shall think fit to join with you, to be constant Visitors of our said Royal Observatory at Greenwich: authorising and requiring you to demand of our Astronomer and Keeper of our said Observatory, for the time being, to deliver to you within six months after every year shall be elapsed, a true and fair copy of the annual observations he shall have made. And our further Will and Pleasure is that you do likewise, from time to time, order and direct our said Astronomer and Keeper of our said Royal Observatory to make such astronomical observations as you in your judgement shall think proper. And that you do survey and inspect our instruments in our said Observatory; and as often as you shall find any of them defective that you do inform the principal Officers of our Ordnance thereof; that so the said instrument may be either exchanged or repaired.

And so we bid you farewell.

Given at our Court at St. James's, the 12th day of December, 1710, in the ninth year of our reign

By Her Majesty's Command

H. St. John

Events moved briskly during the next few days. Flamsteed, smarting under this treatment and the reference to the instruments (on which he had spent nearly £2 000 out of his own pocket), waited upon St. John

on the next morning to lodge a complaint but 'Mr Secretary St. John seemed not to regard what I said, but answered me haughtily "The Queen would be obeyed".' A hurried visit to Lord Rochester, the Queen's uncle, who lived nearby, gave the exasperated Astronomer Royal no immediate satisfaction.

Newton acted equally quickly and the Council of the Royal Society met on December 14 when Arbuthnot delivered the Queen's letter and a copy of a letter from St. John to the Board of Ordnance. It is recorded in the Minute Book of the Royal Society that 'The President, Dr Sloane, Dr Halley and Dr Arbuthnot were desired to acquaint the Secretary "with how much Thankfulness the Society received this Letter from Her Majesty and to know his pleasure when the President shall return him Thanks, and when it may be proper for the Members of the Society to wait upon him with their Thanks and assurances of their performing their Trust." The President, Mr Roberts, Dr Arbuthnot, Dr Halley, Dr Mead, Mr Hill, Sir Christopher Wren, Mr Wren and Dr Sloane were Ordered a Committee to go to Greenwich, any three of them (of which the President or Vice-President be one) to be a Quorum and to report their opinions of the Conditions of the Observatory and the Instruments therein and to take an Inventory of the Instruments. The Treasurer was ordered to pay the Fees of the Queen's Letter.'

On December 29 Flamsteed drafted a petition to the Queen listing his complaints, but evidently thought better of it, for it does not appear to have been sent. A month later his attitude towards the establishment of the Visitors had undergone something of a change, for in a letter dated 1711 January 23 to Abraham Sharp (his one-time amanuensis and friend of long-standing) he wrote hopefully 'But to obviate the inconveniency that might emerge from this letter (the Queen's), God has raised me some friends that I hope will give the Queen a true state both of the Royal Observatory and the Royal Society; and doubt not but in a little time the latter and its President and Vice-President will be ashamed in their attempt.' The nature of his hidden resources was not revealed, but on March 14 he was surprised to learn that the printing of his observations was well advanced; he was shortly further dejected on receiving a demand for the undelivered part of his catalogue of fixed stars.

On 1711 May 30 he was left in no doubt at all as to the President's intention to exercise full supervision over his activities, when the following letter arrived, signed by Newton, Sloane and Mead:

'Sir, By Virtue of Her Majesty's Letter to us Directed, dated the 12th day of December, 1710, we do hereby order and direct you to observe the Eclipses of the Sun and Moon this year, and particularly of the Sun on July the fourth ensuing; and we desire you to send such

your Observations to us at our Meetings at the house of the Royal Society in Crane Court in Fleet Street.'

Later that year, on October 16, he was instructed to present himself at Crane Court 'at 11 o'clock friday come sennight' to report on the condition of the instruments.

The machinery for the relatively smooth running of the Royal Observatory under the Royal Society supervision was thus established and the Astronomer Royal's activities regulated.

On 1713 July 27 Queen Anne granted Newton an audience, at which she was pleased 'voluntarily, with her own mouth, to give fresh Commands that he and the Rest of the Gentlemen of the Society should take care of Mr Flamsteed's Observatory'.

As a token of respect, Newton presented the Queen with his new edition of *Principia*, about which Flamsteed was to remark acidly 'I think his new *Principia* worse than the old, except in the Moon; and here he is fuller, but not so positive, and seems to refer much to be determined by observations. The book is really worth 7s. or 8s.; it costs 4s. 4d. a-piece, printing and paper. Dr Bentley puts the price at 18s.; and so much mine cost me.'

The first Visitation of the Royal Observatory took place on Saturday, 1713 August 1, when Newton, accompanied by Thorp, Machin, Rowley and Hodgson proceeded to Greenwich. Rowley was a mathematical-instrument maker and Hodgson Flamsteed's nephew by marriage.

Not leaving anything to chance, the Astronomer Royal provided two witnesses, one of whom was his assistant Abraham Ryley, 'to attend our conversation and accompany them to view the house and my instruments, being a little lame myself with the gout. They had a view of what they pleased, except my library. I gave them a glass of wine.' Three weeks later a letter was sent to the Officers of the Board of Ordnance informing them of the deficiencies in the instruments and pointing out that 'the Observatory, being supported and repaired by your Office, we, the President and Council of the Royal Society... being ready on our part what in us lies for the putting of Her Majesty's Commands into execution in the best manner... pray the favour of your Answer'.

The Board of Ordnance, hitherto responsible for building maintenance only, had evidently paid little attention to the Queen's and Secretary of State's letters and were unaware that the instruments of the Observatory were now in their province. They adopted a course then common for dealing with unwelcome requests and ignored the Visitors, although they did communicate with the Secretary of State. Thus began a protracted struggle by the Visitors to obtain adequate funds for the Royal Observatory.

Meanwhile, the publication of the observations had proceeded under the supervision of Edmond Halley (1656–1742) and the ‘pirated’ edition of *Historia Coelestis* was published in 1712. On Queen Anne’s death in 1714, finding himself with friends at Court following ministerial changes, Flamsteed was able to obtain 300 copies out of the 400 printed and, after separating and preserving the observations arranged by himself, burned the rest as a protest.

The remaining years of Flamsteed’s term of office passed without any undue friction between himself and the Visitors. The constitution of the committee remained unchanged apart from the addition of James Pound on 1714 February 18. The latter was Bradley’s uncle and on good terms with the Astronomer Royal.

Newton had succeeded in his plan to exercise considerable control over the Royal Observatory and to ensure that the observations should be published. Flamsteed, chafing under what he felt was unjust treatment, continued to work on arranging his observations and catalogue of fixed stars for a definitive publication. In this he did not succeed, but after his death on 1719 December 31 his widow, assisted by Joseph Crosthwaite (an assistant at Greenwich for many years) and Sharp, laboured for five years to complete the *Historia Coelestis Britannica* which was published in three volumes in 1725.

Although Flamsteed never ceased to criticize Newton and his methods, he nevertheless had a hearty respect for the great man’s ability. Much more intense was his dislike of Halley (probably due to their totally opposed temperaments), his successor in office.

Appointed Astronomer Royal on 1720 February 17, Halley established himself at Greenwich only to find that all the instruments had been removed by Mrs Flamsteed; this action was legally correct for all the Observatory’s equipment had been either given to or paid for by her late husband.

How much help the newly-appointed Astronomer Royal obtained from the Visitors is uncertain, but it was not until 1726 May 12 that he informed Newton and the Council that he had obtained a Treasury grant of £500 (probably largely through the good offices of his patron and friend the Earl of Macclesfield, then Chancellor) with which to re-equip the Observatory. As most of this had been spent on instruments already in operation, he requested the support of the Visitors for obtaining the additional funds necessary to bring the establishment into an efficient state.

After the lapse of more than a decade Visitors were appointed, the committee consisting of the Vice-President, Folkes, Taylor and Stukeley, together with Hadley and Graham, the celebrated instrument-makers. On Monday, 1726 May 16, they visited the Royal Observatory, reporting

on the instruments and additional buildings provided by Halley. These included new quadrant and transit houses, telescopes fitted with micrometers, clocks, a transit instrument and the large 8 ft quadrant by Graham. Having examined vouchers and bills, the Visitors found that a balance of £24 9s. 8d. remained out of the £500 and recommended that a further £200 was needed to meet existing commitments and an equatorial telescope. (Halley's sole equatorial was borrowed from the Royal Society.)

At a subsequent meeting of the Society a memorial was drawn up and signed by Newton and nine council members on 1726 June 2. Conduit, Newton's nephew, was instructed to wait upon and present it to the Duke of Argyle, Master General of Ordnance. The outcome of this action is not clear but certainly no substantial sum was granted beyond what was necessary for immediate requirements.

Halley was made to feel the difference between being a Council member and a 70-year-old Astronomer Royal when, at a meeting held on 1727 March 12, the 84-year-old Newton 'took occasion to observe that by the late Queen's letter concerning the Visitation of the Royal Observatory at Greenwich . . . they were among other things directed to demand of the Royal Astronomer (*sic*) within six months after every year was elapsed, a true and fair Copy of the annual observations he shall have made and that whereas this precept had not of late been observed, it might be of ill consequence to continue in the neglect of it and therefore he thought it proper to take this opportunity now the Royal Astronomer was present, to put them in mind of the said precept.'

With perhaps the shade of Flamsteed in his mind, Halley 'hereupon acquainted the Council he had a Multitude of unpublished Observations by him, especially on the Moon's place and Motions; But there being many uses to be made of the said Observations for forming a method for better ascertaining the Longitude of places, and a great reward being appointed by Act of Parliament for discovering such methods, he had hitherto kept the Observations in his own Custody, that he might have time to finish the Theory he designs to build upon them, before others might take advantage of reaping the benefit of his Labour. However, as there were many Observations for settling the places of the fixt stars which have not yet been settled, he would deliver to the Society the Observations on that head by Mich^s. next.'

The reward mentioned was that of £20,000 offered by the Government on the formation of the Board of Longitude (of which Halley was a member by virtue of his office of Astronomer Royal) in 1714.

Halley's observations made at Greenwich were, in fact, never published and by the time the minutes of this particular meeting were agreed, a

further note had been added: 'Sir Isaac Newton departed this life on Monday the 20th of March 1726/7.'

No further pressure was brought to bear on Halley by the Visitors; he died on 1742 January 14 and was succeeded by James Bradley (1693–1762). Although the late Astronomer Royal's observations were carried off by his executors, following the precedent established by Mrs Flamsteed, the instruments were Crown property and the Royal Observatory was not stripped of means for observing. One advance, at least, had been made.

In 1748 August Bradley asked for and received the assistance of the Visitors in petitioning the Lords of the Admiralty 'concerning the instruments now wanting' at the Observatory. This petition was drawn up in the name of the Astronomer Royal and the President and Council, being signed on 1748 October 17 by Bradley, the President Martin Folkes (1690–1754) and nine other Council members, including Lord Charles Cavendish. In a lengthy document, with a nautical bias in the tail, they 'humbly prayed that your Lordships will be pleased, in such manner as to yourselves in your great prudence shall appear most expedient, to order the several New Instruments mentioned in the said Schedule to be provided for the use of the Royal Observatory, and the old ones to be repaired and amended, as that His Majesty's present Astronomer and his successors in the said Office, may be therewith enabled to carry on constantly, and in the exactest manner, such a series of Observations as maybe of the greatest use for the improvement of the Science of Astronomy whereupon that of Navigation so particularly depends, and which may consequently prove of the greatest service to His Majesty's Royal Navy, and most effectually contribute to the safety of the same. And your Petitioners shall ever pray &c.'

The schedule of instruments needed included an 8 ft brass quadrant at £300, a movable quadrant at £200, a transit telescope at £100, a Newtonian reflector at £115 and a parallactic sector at £45. These, with a few smaller items, and the cost of repairs to existing instruments, brought the estimate to £1,000. It is interesting to note that the 'parallactic sector' was Bradley's famous 12½ ft zenith sector which he, in this way, sold to the Crown.

On November 9 Folkes reported that he and Bradley had presented the petition and that the Admiralty had promised assistance. They were as good as their word and George II's Warrant of 1749 January 12 ordered the full £1,000 to be raised from the sale of old Navy Stores, although it was not until 1754 October 10 that the President, Lord Macclesfield (1697–1764) was in a position to arrange a Visitation. At a Council meeting of that date it was resolved that all present should be appointed Visitors. Short, the instrument-maker, and West, Treasurer of the Royal

Society, were included in the committee appointed to meet at Greenwich on October 16 at 11 o'clock 'to examine by the Schedule the Instruments lately made by order of His Majesty' and make a report on the state of the Royal Observatory. This was done, and the Visitors reported that everything was in order, except that the reflector had not been delivered by Short. Including an advance of £100 to the latter £985 had been spent. As the estimate for the reflector was £115, it appeared that all the money had been allocated very exactly.

The Visitors suggested that, when Short had fulfilled his contract, Bradley 'should draw up and give into the Council of the Society an exact Inventory of all the Instruments in the said Observatory which belong to the Publick'. The Astronomer Royal whereupon drew up a meticulous inventory of the Observatory's equipment which, for the rest of his term of office, he kept in excellent condition.

Bradley died on 1762 July 13 and Visitors were appointed to inspect the Observatory and check the instruments. Macclesfield, accompanied by Short, Parsons, Birch, Morton and Watson, met the newly-appointed Astronomer Royal, Nathaniel Bliss (1700–1764), at Greenwich on August 18. The instruments were formally handed over to him and the necessary repairs to the house and buildings were eventually carried out by the Board of Ordnance.

What was to prove a momentous general meeting of the Royal Society was called for 1763 June 9 when Nevil Maskelyne (1732–1811) asked to address the Society on 'some affairs of consequence'.

Outlining the Observatory's history and the fate of the Greenwich observations (Bradley's executors had followed what was becoming a disastrous custom and removed his observing books), Maskelyne demanded strong action to recover them. The only 'official' publication was the 1712 edition of the *Historia Coelestis* and 'the learned have been obliged to depend upon the places of the stars contained in the British Catalogue, tho' many of them are known to be erroneous; till about 5 years ago, when the Abbé de la Caille published his *Fundamenta Astronomiae*, since which time, to the great discredit and dishonour of this nation, this Society and to the general state of learning in this Kingdom, the English Astronomers are necessitated to make use of these French Observations because they cannot obtain those made at our own Royal Observatory, with at least equal care and with far superior instruments'. He added that 'Mr Mayer's Theory of the Moon, tho' more exact than any that appeared before, is not indeed perfect, but might perhaps be rendered so by the help of Dr Bradley's observations, and this affords us a fresh reason for securing and preserving them.'

Maskelyne ended by moving, firstly, that the Royal Society demanded

of the executors of Flamsteed, Halley and Bradley the immediate surrender of their original observations and to begin a law suit if necessary at the expense of the Society and, secondly, that the Council should put into strict execution the standing order of Council directing the Astronomer Royal to present all observations annually, commencing with the next St Andrew's day.

After some debate these motions were withdrawn but three amended motions were put to the ballot and carried: (1) that the Society should enquire into the extent of their right to the observations and use the best means for securing them, past, present and future: (2) that when obtained the earlier observations should be immediately printed (carried by 20 to 17) and (3) that the observations should be handed over on each St Andrew's day and published in the *Philosophical Transactions*.

Following this, legal advice was taken and a case drawn up by Kirkby, the Society's solicitor. Queen Anne's letter of 1710 and George II's of 1749 were produced, copies of the Warrants of previous Astronomers Royal obtained from the Secretary of State's Office and other evidence relating to the powers of the Visitors collected before being sent to the Attorney General and Solicitor General for their opinions.

Lord Macclesfield died on 1764 March 17 and on May 10 a Council meeting was held under the chairmanship of his successor as President, the Earl of Morton (1702–1768), to make known the findings.

The blow then fell. There had been no legally constituted Visitors since the death of Anne in 1714. The Council therefore resolved 'That tho' the Attorney and Solicitor General are of opinion that the power given by Queen Anne's Letter . . . dated December 12th 1710, to the President or Vice-President, together with such others as the Council of the Royal Society shall think proper to join with them, to be constant Visitors of the Royal Observatory at Greenwich, does not at this time subsist in them and that they cannot take any legal method to recover the Observations made there, for the use of the Publick, yet as they have hitherto been reputed Visitors . . . and have acted as such by the desire of the Royal Astronomers, that it becomes the President and Council to lay the state of this affair before the Crown; to the end that this institution which does honour to the nation, may not be rendered useless to the Publick, or at least the utility thereof become precarious, by leaving it in the Option of the Royal Astronomers whether they will communicate their observations to the Publick, or suppress them.' The President was further desired to take all steps for renewing and perpetuating the powers of the Visitors. The Secretary of State, Lord Halifax, was approached and he recommended that a case should be drawn up, quoting all relevant Royal Warrants, and laid before the King. This advice was acted upon and a

comprehensive petition, including regulations for the execution of the office of Astronomer Royal, submitted to George III. This was sealed in Council and signed by the President and fifteen others on November 8.

Meanwhile, almost unnoticed, the Astronomer Royal had died on 1764 September 2 and Maskelyne, so busily formulating regulations for the firmer control of the Observatory, succeeded him in office.

The Royal Warrant renewing the powers of the Visitors was signed on 1765 February 22, the wording identical to that of Queen Anne's fifty years before. For this document the Society thankfully paid £8 1s.

A Visitation was held on March 16, the President and Council being accompanied by Captain Campbell and Short, and on April 12 the new regulations, signed by the King on March 12, were made known to the Visitors, as were instructions to the Board of Ordnance regarding repairs and instruments.

The regulations laid down (1) that the Royal Observatory should be the Astronomer Royal's actual place of residence, (2) that he could not absent himself for more than ten days without notifying the Visitors and the Secretary of State, (3) that he should ensure the diligence of his servant or assistant (paid for by the Board of Ordnance), (4) that he should not accept any other office or employment necessitating absence from the Royal Observatory, (5) that no visitors were to be admitted to the rooms containing instruments without the Astronomer Royal or his servant being present; no visitor was to touch an instrument and no money taken for permitting such visits, (6) that the Astronomer Royal was to comply with the instructions of the Visitors, (7) that he was to keep records of all observations and that the actual observer was to be indicated by a distinguishing mark (as an honour, distinguished foreigners and others could be permitted to make observations, provided that their names were written in full), (8) that all observation books were to be authenticated on each page by the Astronomer Royal's signature, (9) that such books were not to be removed from the Royal Observatory without express Royal Command and (10) that authentic copies of all observations were to be delivered to the Royal Society within six months of the end of each year.

Maskelyne soon drew up lists of repairs to instruments and buildings, which were duly passed on to the Board of Ordnance. Even now they put up a struggle against maintaining the efficiency of instruments but, after pressure had been brought to bear, capitulated in 1765 October and thereafter accepted the responsibility without demur provided that the bills were signed by the President and Council of the Royal Society. In the same year Halley's observations were presented to the Society by his daughter, Mrs Catherine Price, and deposited at Greenwich. Flamsteed's

observations and correspondence were later (1771) purchased by the Board of Longitude for £100 and eventually reached the Royal Observatory in 1796; Bliss's observations were obtained by the Royal Society from his widow, to whom fifty guineas were paid on account of her straitened circumstances. The most important of all, Bradley's, were the subject of a protracted law suit undertaken by the Board of Longitude, but were not published until 1798 and 1805, and then by the University of Oxford to whom they had been presented. (For a full account of these transactions see the account by E. Forbes in *Q. Jl R. astr. Soc.* (1965) **6**, Nos. 3/4, 321–328.)

Maskelyne and the Visitors next assured the publication of future observations made at the Royal Observatory by obtaining a Royal Warrant, signed 1767 June 18, authorizing the printing and instructing the Board of Ordnance to meet the cost provided that it did not exceed £60 a year.

The Nautical Almanac, Maskelyne's greatest achievement, was published by the Board of Longitude and did not as yet come within the province of the Visitors, although it was still superintended by the Astronomer Royal.

The regular publication of the Greenwich observations began in 1774 when those for the years 1765–1769 were printed in a single volume; at last the observations made at Greenwich were available to the public, a century after the foundation of the establishment. The King's Assent for the printing of 500 copies, dated 1774 April 21, contained the surprising clause that, after a certain number of the volumes had been distributed, the remainder were to be handed over to the Astronomer Royal for his trouble in preparing the observations for press. Initially only thirty-eight copies were presented, twenty-five to recipients in Great Britain and Ireland (including six to the Office of Ordnance), eleven to universities and institutions in Europe and two to the American colonies (Harvard College and the Philosophical Society of Philadelphia). In 1781 the American Academy of Arts and Sciences, Boston, was added to the list.

The Astronomer Royal continued to enlist the support of the Visitors in improving the instruments and buildings of the Observatory, including considerable alterations and improvements proposed in 1770, when a Visitation was held on October 24.

Since 1710 there had only been six actual Visitations at Greenwich, one for each of Maskelyne's predecessors and two during his own term of office, but from 1774 onwards it became an annual event (with the possible omission of 1782) held between mid-July and early August.

By 1789 Visitation had become a formal occasion, no new inventories being made (although the appropriate changes were noted on the existing schedule) but the Visitors always included some actively concerned with

astronomy or instrument-making. Essential business was dealt with, instruments checked, plans for improvements examined, observations handed over by the Astronomer Royal and bills countersigned for payment. Maskelyne was thus able to expand the Observatory in a modest way and keep the instruments in good working order and abreast with the times as to improvements. Occasionally the Visitors tried to alleviate a grievance, such as in 1785 when they asked the Board of Ordnance 'whether it may not be reasonable that Dr Maskelyne should be eased in the payment of window lights, no less than 59 for the use of His Majesty's Observatory, and of the house tax, amounting altogether to the annual expense of £14'.

An unusual request was received in 1797, when Dr Fitzgerald, Senior Fellow of Trinity College, Dublin, asked whether 'the Council would permit a 40 in. Quadrant, in the Royal Observatory to be lent to their Observatory till such time as a similar instrument they expect from Mr Ramsden shall be completed, or else to be returned on the demand of the Council'. Maskelyne must have been approached previously as he raised no objection to this proposal. The Visitors, however, did not feel themselves authorized to consent to such a loan in view of the regulations of 1765 and consequently 'sought His Majesty's approbation'. No difficulties were raised and by next Visitation it was noted that the quadrant had been transferred to Dublin, where it remains to this day.

Before the end of Maskelyne's reign, Visitations were becoming social as well as business occasions, the President and Council being accompanied by up to a dozen Fellows or friends.

In 1807 the Astronomer Royal proposed the provision of an advanced meridional instrument, a mural circle (approved by the Board of Ordnance within three months) although he did not live to see it in operation. An astronomical clock was also ordered from Hardy; this proved a much superior time-keeper to any hitherto provided for the Royal Observatory, although the bill of £325 later caused much agitation to the Visitors. One of Maskelyne's last acts was to petition for an increase in salary for his sole assistant.

Maskelyne died on 1811 February 9 after a long period of office during which he had been on the best of terms with the Visitors. During these forty-six years the Presidents of the Royal Society were the Earl of Morton, Sir James Burrow, James West, Sir John Pringle, and, since 1778, Sir Joseph Banks (1744–1820). Practically always the moving spirit, this Astronomer Royal succeeded in modestly expanding the Royal Observatory, providing sensible regulations and, above all, of fulfilling the original intention of publishing accurate observations and ephemerides for general use.

The sixth Astronomer Royal, John Pond (1767–1836) was appointed by the Prince Regent in 1811 February, and at an early Visitation (May 7) his Warrant was read, as were the new Warrants confirming the President and Council as Visitors and for regulating the conduct of the Astronomer Royal. The usual procedure for handing over the instruments was carried out and the President announced that steps had been taken to ‘move the Prince Regent to order the Warrant for repairing and supplying instruments to the Royal Observatory should be extended likewise to a supply of books for the formation and increase of an astronomical library’. This enabled Maskelyne’s private library to be bought for the use of the Observatory. Pond asked for, and obtained, a new transit instrument which, with the astronomical clock and mural circle recently installed, added greatly to the accuracy of observations. With these instruments in operation, he felt himself in a position to petition for an increase in staff.

On 1814 January 27 the Council approved a memorial for presentation to the Treasury, stating that ‘in the present highly improved state of the Royal Observatory much greater exertions are required than in the time of the late Astronomer Royal for conducting the observations in such a manner as to correspond to the progressive advancement of the sciences and to support the high character which has been allowed by all foreigners to the English nation for their diligence and success in the cultivation of practical as well as theoretical Astronomy’. It went on to ask for a second assistant and a generous allowance of coal and candles, pointing out that although the Astronomer Royal’s salary had recently been raised from £300 to £600 a year, he could not be expected to pay for the heating and lighting of the Royal Observatory.

Bills amounting to £215 13s. 2d. for these commodities were promptly rejected by the Board of Ordnance; it eventually appeared that Maskelyne had regarded these as personal expenses.

Partial agreement on these matters was reached with some difficulty and the assistant was granted an increase to £200 a year in 1815.

In 1816 the Visitors received a request from the Prince Regent to carry out pendulum experiments on behalf of the Ordnance Survey but a request for additional staff at the Royal Observatory was turned down by the Board of Ordnance. Why the request to undertake this geodetic work had not come directly to the Visitors was not explained. Such extraneous burdens and administrative complications led Pond and the Visitors to state on July 19 ‘that much loss of time and great inconvenience were experienced by the Astronomer Royal on account of the general management and detail of business being divided between three of the public Offices of Government, the Treasury, the Admiralty and the Board of Ordnance and that in their opinion it would save much trouble

to the public Offices . . . and at the same time be of essential advantage to the Observatory and to the Interests of Astronomical Science if the whole management of its affairs was transferred to one department of Government, remarking that as the Royal Observatory was originally instituted with a view chiefly to the promotion of the knowledge of ascertaining the Longitude at Sea . . . the Visitors beg leave to suggest that the Lords Commissioners of the Admiralty appear to them the most proper in every respect to take under their direction the whole charge and management of the Royal Observatory at Greenwich.' This petition was passed on, without any noticeable result, but when the usual bills were forwarded to the Board of Ordnance on 1818 April 23, the President was informed that they had been sent to the Admiralty for payment. It was not until 1819 February 16 that the latter informed the Visitors of the transfer and thus assumed responsibility for the Royal Observatory.

The Nautical Almanac was meanwhile in trouble. Pond had not taken his predecessor's interest in it with the result that owing to deficiencies its usefulness had dropped alarmingly, critics comparing it unfavourably with several foreign almanacs and rating it little superior to Old Moore's. In 1818, on the reorganization of the Board of Longitude (its usefulness largely past once the marine chronometer had been developed commercially), responsibility for the Nautical Almanac was taken from the Astronomer Royal and Thomas Young appointed to the newly-created post of Superintendent. Young improved the accuracy, but opposed any change in structure and on his death in 1829, Pond was once more charged with the publication of the ephemeris. Some improvements were effected but the long-awaited revision did not take place until 1831, and then at the hands of the Royal Astronomical Society, whose Secretary, Lieutenant Stratford, undertook its superintendence. The Nautical Almanac remained separated from the Royal Observatory until 1937, when it once more came under the control of the Astronomer Royal.

No change in the constitution of the Visitors took place on the death of George III, although the new Royal Warrant, dated 1820 May 19, was accompanied by a letter confirming the Admiralty's liability for all charges.

The appointment of a second assistant to the Astronomer Royal was granted in the same year and marked the beginning of Pond's reasonably successful efforts to build up the Observatory staff.

Pond succeeded in establishing a substantial library by purchasing books for £199, the Admiralty footing the bill after some resistance (although Pond received a reprimand for not first consulting the Visitors).

The Admiralty proved to be much more critical of bills than the Board of Ordnance and much correspondence accumulated in subsequent years

on this subject. On the other hand, they reacted favourably to the request for two further assistants needed to deal with the increased work arising from the addition of a second mural circle and went so far as to advocate the employment of more highly qualified assistants than the Observatory then possessed, even proposing salaries rising (in the case of the First Assistant) to £500 a year. They pointed out, however, that if their proposals were accepted, they had no intention of applying these new salary scales to the existing assistants 'who are not of the class their Lordships propose by this arrangement to encourage, but that it should be applied to the case of the new assistants who may succeed future vacancies'.

With a view to complying with these suggestions, Pond tried to obtain a pension for his First Assistant but failing to do so, then let the matter drop, probably because of a sense of misplaced loyalty to his staff.

In 1821 The Royal Observatory was obliged to undertake the charge and rating of chronometers offered for Government purchase and this greatly added to the work of the small staff. Even so, Pond resisted efforts of the Visitors to take advantage of the Admiralty offer of superior assistants but, when pressed, expressed his views to Wollaston in a letter dated 1826 April 26. In this he wrote: 'I am and always have been unwilling to offer or appear to offer resistance to what seemed to me the marked inclination of some of the Members of the Board of Admiralty and of the Council, and actuated by this feeling I may have been less explicit at the Council in expressing my real sentiments on this subject than I ought to have been. What that opinion is, however, and always has been I will now state.

You know the new methods of observing with the two mural circles; . . . evidence of the vast labour which has been bestowed will be found in the journals of 4 quarters of Greenwich Observations . . . containing nearly 10 000 observations. But to carry on such investigations I want indefatigable hard working and above all obedient drudges (for so I must call them, tho' they are drudges of a superior order)—men who will be contented to pass half their day in using their hands and eyes in the mechanical act of observing and the remainder of it in the dull process of calculation.'

These and similar sentiments practically damned Pond in the eyes of most of the Visitors; the Admiralty subsequently proved adamant, on several occasions, in refusing to consider any rise in salary for the existing assistants, although they did increase the number to six before the end of Pond's time as Astronomer Royal.

A year before this, in 1825 March, S. Lee, Assistant Secretary of the Royal Society, addressed to the President a letter containing charges of gross inaccuracies in the Greenwich Observations of 1821 and incompetence

on the Astronomer Royal's part in failing to observe the comet seen in the same year. A committee comprising Colby, Francis Baily, Davies Gilbert, Kater, Wollaston and Young was promptly set up to investigate the matter. After a lengthy examination of Pond and of Lee's charges, the Astronomer Royal was exonerated of negligence although surprise was expressed at the failure to observe the comet and also that 'very few observations were made after 10 or 11 at night'.

Lee, rebuffed, sent a letter of complaint to the Admiralty who referred it back to the President. At a Council meeting on November 17 it was ordered that 'Mr Lee be called in and informed by the President that the Council feel extremely indignant at the expressions therein, which they consider highly improper and indecorous'. Lee's reply to this was ordered to be struck from the minutes 'in consequence of the offensive expressions which it contains'. Lee did not survive long as Assistant Secretary.

This excitement temporarily diverted attention from Pond, but he was soon in trouble again when it was found that 'a great number of copies of the Greenwich Observations be for sale, as waste paper, at a shop in Thames Street'. Nothing could be done about this, however, as spare copies were regarded as the Astronomer Royal's perquisites.

Although Pond was complying with regulations and the Greenwich Observations were published annually, they remained too basic and on 1828 January 21 G. B. Airy, then Lucasian Professor at Cambridge, pointed out the benefits of reducing the observations of the Sun, Moon and planets. The Visitors accordingly recommended to the Board of Longitude (now almost moribund) that they should arrange for the reduction and printing of these from 1816 to 1828. The annual cost of running the Royal Observatory (excluding salaries) had now risen to about £1 000, borne by the Admiralty, and it was probably felt appropriate that the Board of Longitude should contribute some financial support to important publications.

The number of Visitors who now annually inspected the Royal Observatory had grown considerably and included as guests prominent statesmen and politicians, such as Melville, Brougham and Peel, in addition to those better qualified. Those taking part in Visitations often numbered between forty and fifty.

The President and Council of the Royal Society had, since their appointment as Visitors a hundred and twenty years previously, exercised an exclusive and important supervision over the Royal Observatory, although the degree of control was governed by the initiative and personality of the Astronomer Royal. Certainly for the major part of the first century friends at Court, patronage and personal influence all

played their part in deciding the outcome of differences of opinion between the Visitors and the Astronomer Royal.

Up to 1830 there had been six Astronomers Royal, while the Visitors had met under the chairmanship of twelve Presidents of the Royal Society, from Newton to Davies Gilbert (1767–1839), who had in 1820, in his capacity as Commissioner of the Board of Longitude, successfully proposed the establishment of the Royal Observatory at the Cape of Good Hope.

The foundation of the Astronomical Society of London in 1820 (despite the strong disapproval of Sir Joseph Banks, then President of the Royal Society) and the excellent reputation it gained in its first decade led in 1830 to the first significant change in the constitution of the Visitors of the Royal Observatory.