

## The Genesis of the Northern Hemisphere Observatory\*

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### 1 INTRODUCTION

In 1974 November the Science Research Council (SRC) approved the plans for the construction of a 1 m and 4.5 m telescope and for the reconstruction of the 2.5 m Isaac Newton telescope on a suitable overseas site. The subsequent development of the Northern Hemisphere Observatory (NHO) on La Palma has been well documented (1, 2) and is summarized briefly in Section 9. The main part of this paper is concerned with the complex discussions before 1974 and particularly with the proposal that the building and management of the NHO should not be vested in the Royal Greenwich Observatory (RGO), but in a new National Centre.

Six months after the end of World War II H.H.Plaskett, in his Presidential address to the Royal Astronomical Society (1946 February 8), opposed many influential British astronomers who argued that we should leave observational astronomy to the Americans and concentrate the UK efforts on theoretical work. He called upon the RAS to move forward with plans for the erection of a large telescope in the British Isles.

The Society was inspired by Plaskett's address and on March 8 a Committee was formed to pursue the issue. At the meeting of this Committee on April 30 Sydney Chapman had the further inspiration of suggesting an association of the telescope with the Isaac Newton Tercentenary celebrations which had been postponed because of the war. At the meeting of the Society on May 10 Plaskett was able to announce that Chapman and the Astronomer Royal had placed the project before the Royal Society Newton Tercentenary Committee and, indeed, six days later the Council of the Royal Society decided to make a direct approach to H.M. Treasury. The Astronomer Royal, Sir Harold Spencer Jones, then discussed the details with Sir Alan Barlow of the Treasury to such good effect that Sir Alan agreed to advise the Chancellor of the Exchequer to provide the money for a 100-inch telescope.

Although financial authority was obtained with such remarkable alacrity, 13 years of dispute and argument occurred before contracts were placed in 1959. During that interregnum the Royal Greenwich Observatory moved to Herstmonceux in 1957 and so the site for the telescope was determined. Also, when Her Majesty the Queen inaugurated the Isaac Newton telescope on 1967, December 1, the responsibility for the instrument had already passed from the Admiralty to the Science Research Council.

\* The title Northern Hemisphere Observatory (NHO) was dropped after the signature of the international agreement in 1979 (see Section 9). The telescopes discussed in this paper are now designated the Isaac Newton Group of Telescopes (ING) and are part of the Roque de los Muchachos Observatory, La Palma.

In his Presidential address Plaskett had expressed anxiety that controversy might arise between the RGO and the Universities about the use of the new telescope and suggested that the telescope should be built on a site remote from any observatory or University. In the event Plaskett's anxieties had been further complicated by the change in responsibility for the telescope. The Science Research Council's solution to the problem was to vest the responsibility for the maintenance of the telescope in the Royal Greenwich Observatory and, for the programmes, in a newly created Large Telescope Users' Panel to which all applications for observing time on the telescope had to be made. The observatory had no special claim, at least in principle, on telescope time.

By this means the Science Research Council established the principle that the programme of a telescope is controlled neither by those who maintain the telescope nor by the observatory at which it is situated, but by the central agency which provided the money. This vital issue of principle became a critical factor in 1969 when the discussions leading to the NHO were initiated.

In the 13 years that elapsed between the decision to build the INT and its inauguration, many technical advances in instrumentation had begun to change astronomers' expectations of the investigations and results to be expected in observational astronomy. By the standards of 1946 Herstmonceux was a reasonable site for the INT; in 1969 when the discussions about the NHO were initiated this was manifestly not the case and the move of the INT to the new site of the NHO became an integral part of that plan. The last observations with the INT at Herstmonceux were made in 1979 May. Although the telescope operated on the Herstmonceux site for only 12 years it provided the stimulus for the creation of a powerful observational body of astronomers in the UK and hence for the present NHO.

## 2 THE 1965-67 PROPOSALS FOR A NORTHERN HEMISPHERE OVERSEAS SITE

When R. van der Riet Woolley arrived in England as Astronomer Royal in 1956 January he brought with him the idea of a large telescope in the southern hemisphere which he had recently promulgated whilst director of the Mt. Stromlo Observatory. For more than 10 years after his arrival this concept dominated the UK discussions about optical astronomy which eventually culminated in the formal agreement between the UK and Australian Governments in 1967 April to construct the 150-inch telescope at Siding Spring. Complex negotiations (3) had delayed this agreement to such an extent that in 1966 December the SRC "considered it prudent that further thought should be given to possible alternative schemes...in the event that the Anglo-Australian discussions did not proceed".

Within the SRC, astronomy was part of the Astronomy Space and Radio Board (ASRB); grants were recommended by the Astronomy Policy and Grants Committee (APGC). Lovell was Chairman of ASRB, and Hoyle was Chairman of APGC. Amongst the alternative schemes considered by the APGC on 1967 March 6 (only weeks before the favourable Australian response of 1967 April 14) there were three proposals involving the construction of major UK optical telescopes in a Mediterranean latitude.

(i) Hoyle, Redman and Ryle submitted a detailed memorandum urging

that the UK should proceed immediately with the building of an 80- to 100-inch telescope in a Mediterranean latitude.

(ii) At the first meeting of the ASRB on 1965 May 6, Brück (Astronomer Royal for Scotland) had made a proposal to SRC for a 150-inch telescope in the northern hemisphere and he now renewed the case for this telescope to be built in Italy or Sicily.

(iii) Similarly Redman renewed the case he had made at that 1965 meeting of the ASRB for the construction of a 36–40-inch telescope to be built in the Mediterranean region – one of his arguments being that this could be used to test the feasibility of an alt-azimuth mounting.

After discussion of these and other proposals the APGC agreed on 1967 March 6 that Bondi, Brück, Redman, Ryle and Woolley would form a sub-committee to design an 84-inch telescope and find a suitable site in the Mediterranean area. In the event the favourable response from the Australian Government on April 14 led to the cancellation of this and other possible alternatives to the Anglo–Australian Telescope (AAT). Although these were the first proposals for a major UK observing facility on an overseas site in the northern hemisphere, they were not the immediate precursors of the present Northern Hemisphere Observatory.

### 3 THE GENESIS OF THE IDEA OF THE NHO

The Anglo–Australian agreement of 1967 April caused these schemes for a major UK telescope on a Mediterranean site to be abandoned. At the same time this agreement made it essential to consider the future of the South African observatories in relation to the proposed AAT. The responsibility lay with the Science Research Council and in 1967 December the APGC was asked to undertake a review of optical astronomy in the Southern Hemisphere. Hoyle was the Chairman of the APGC, and the Southern Hemisphere Review Committee (SHRC) was formed with him as Chairman and with R.O.Redman (Cambridge), R.Wilson (Culham) and J.F.Hosie (director of the ASR division of SRC) as members. The report of this Committee was presented to the APGC in 1968 November. The recommendations of the SHRC were (i) discussions should be held with CSIR South Africa in respect of the astronomical facilities in South Africa (ii) a British enclave should be established alongside the AAT at Siding Spring and it should be equipped with a 48-inch Palomar-type Schmidt instrument (4). The SRC gave formal approval to these recommendations in 1970 January. In respect of (i) a draft agreement with CSIR South Africa, considered by SRC on 1970 July 15, proposed the move of the 74-inch telescope of the Radcliffe Observatory from Pretoria to Sutherland after expiry of the SRC lease in 1974. With regard to (ii) the 48-inch Schmidt, manufactured by Grubb Parsons, arrived at Siding Spring on 1973 May 10. First light was obtained on 1973 June 27 and the subsequent success of this telescope is well known.

Encouraged by the expeditious and successful outcome of this Southern Hemisphere Review the SRC decided to undertake a similar review for the Northern Hemisphere. This intention to establish a Northern Hemisphere Review Committee (NHRC) was on the agenda of the ASRB on 1968 December 17. The initial terms of reference from Council were that the

Committee should “seek to inform itself of the views of British astronomers including the staff of the Royal Observatories and such expatriates as the Board would decide” (5).

#### 4 THE NORTHERN HEMISPHERE REVIEW COMMITTEE (NHRC)

The membership of the NHRC was left for discussion and agreement between the Chairmen of the ASRB and APGC. At the meeting of the Board on 1969 March 18 the Secretary reported that Council had approved the membership of the NHRC as Hoyle (Chairman), Lovell (Chairman of the ASR Board), the Astronomer Royal (Woolley), the Astronomer Royal for Scotland (H.A.Brück), J.M.Cassels, R.L.F.Boyd, J.F.Hosie (director of the ASR division) (6). It was reported that in connection with the obligation to consult expatriate astronomers arrangements had already been made with Burbidge and Sargent. In fact, before this report to the Board, the Committee had already met on January 28 with the specific terms of reference:

- I. The Committee to review policy for optical astronomy in the Northern Hemisphere will:
  - (a) have regard to:
    - (i) the relevance of decisions on and plans for radio, infrared, ultraviolet, gamma- and X-ray astronomy and theoretical studies;
    - (ii) the outcome of present studies on research in the millimetre band and on cosmic rays;
    - (iii) foreseeable restrictions on manpower and finance;
  - (b) seek to inform itself of the views of British astronomers, including such expatriates as the Board shall decide and the staffs of the Observatories;
  - (c) make recommendations on:
    - (i) the future needs of and the desired resources for British optical astronomy in the Northern Hemisphere, whether national or in collaborative projects;
    - (ii) the structure or organization necessary to implement both policy for optical astronomy recommended for the Northern Hemisphere and that adopted for the Southern Hemisphere.

Difficulties soon arose about item (b). At the first meeting it had been agreed that G.R.Burbidge and W.L.W.Sargent should be invited to attend the second meeting on April 17. They did so and Woolley immediately wrote to the Chairman of the Board.

“Consultation does not necessarily mean that these two gentlemen, or others invited to the Committee meetings for consultation, have full voting rights. Ordinarily this point would hardly matter since it is most unusual for a matter to be put to a vote at one of our Committees, but it actually occurred at the NHR Committee, and the Chairman of that Committee invited the “expatriates” to vote, which they did. I think I can foresee other issues coming before this Committee which will be controversial and I think the ASR Board, which made the arrangement about consultation, may have to give a ruling about what it meant”.

The Chairman of ASRB evaded the issue by replying that the Chairman

(of the NHRC) was merely seeking an opinion and that he did not think the NHRC had any voting rights since any action on their recommendations was the business of the APGC and the ASRB. Nevertheless, the incident was symptomatic of the immediate division of opinion that developed on many issues between the Astronomers Royal and the non-establishment members of the Committee (7).

## 5 THE PROCEEDINGS OF THE NORTHERN HEMISPHERE REVIEW COMMITTEE

This Committee held nine meetings, the first on 1969 January 28 and the ninth on 1970 April 23. Three of the meetings were held outside London, at the Rutherford Appleton Laboratory, the RGO at Herstmonceux and at the Royal Observatory, Edinburgh (ROE).

The concept of a major new telescope on a favourable overseas site was, at least, one thread of agreement running through these meetings – and indeed, a sum of £4m up to 1974/75 was entered on the forward look of the APGC for this NHO. On the other hand the organization for building and operating this telescope soon became a major source of dispute to the extent that on the occasion of the 5th meeting on 1969 July 31 there was only one item on the agenda – the proposal for a National Centre. Two papers were before this meeting. The first signed by Hoyle, Burbidge and Sargent proposed a detailed organization for a national centre to be created either in a University, in a University town or on an isolated site (citing the Rutherford Appleton Laboratory (RAL) as an example). The second paper signed by the expatriate astronomers E.M. and G.R. Burbidge and Sargent, attacked the INT and the RGO. Of the INT the authors considered that “[the telescope] in its present location is not merely ineffective but useless” and on the role of the RGO they considered that “it would be folly on the part of SRC to go ahead with a Northern Hemisphere large telescope if any part of its development or operation is to be put in the hands of the present RGO”.

The heads of all the UK astronomy departments had been asked for their views. The views of the Edinburgh, St. Andrews and Glasgow groups had been presented at the Edinburgh meeting and at meetings on 1969 December 4, 5 (the seventh), the NHRC heard presentations of the other reports. Advice was also sought from the SRC RGO Committee, the RAS Council and the UK theoretical groups (8). The result of these consultations was summarized in Section VI of the draft report of the NHRC (34):

### *Section VI Reorganization: the Need and the Solution*

6.1 The organization, control and exploitation of large overseas facilities are new issues for British astronomers regardless of whether they work in one of the Observatories or in a University.

6.2 A similar problem has already been faced both in the US and in Germany. Essentially each has adopted the same solution namely, to form a single viable group to serve, and to act as focus for, all the astronomers concerned. In the US there is the Kitt Peak National Observatory comprising a group of Universities and, despite some criticisms, it is accepted that optical astronomy in the US Universities concerned has improved greatly – the big KPNO 150-inch telescopes have not yet been built, only the smaller ancillary telescopes. In Germany membership of the European Southern Observatory (ESO) has not prevented plans to create large national observatories, now and already approved, for the Northern Hemisphere and, later but planned, for the

Southern Hemisphere. Again the responsibility has been entrusted not to an existing organization but to a newly created Max Planck Institute for Astronomy.

6.3 The Committee discussed reorganization frankly and fully as their major preoccupation with the staffs of the two Observatories, the representative University astronomers and the Chairmen of the Observatory Committees. No unanimous view emerged. Senior members of the RGO staff felt that the present situation required little change. They were not conscious of any imbalance between the support for University astronomy and that for the Observatories. At the ROE a majority of senior staff members again felt that little change was needed but some favoured a major reorganization of British optical astronomy even if this should have to be at the expense of the Observatories.

Among University astronomers consulted only one, nearing retirement, saw no need for change. All others favoured reorganization, mostly of a radical nature, but there was no unanimity of view as to what should be done. A consensus of views favoured the creation of a new centre with a few of those in favour prepared to see this located alongside, or even in, the RGO.

The NHRC had appointed a sub-committee at an early stage in its meetings to investigate the feasibility of an alt-azimuth mounting for the proposed telescope. Redman, acting as Chairman, had a series of meetings with V.C.Reddish (ROE), J.G.Davies (Jodrell) and T.A.Wyatt (Imperial College). At that time the 6m Soviet telescope was the only large instrument using an alt-azimuth mounting and members of the sub-committee visited this instrument. The comprehensive report of this sub-committee was available by the autumn of 1969. In summary, the members were "convinced that the alt-azimuth mounting is a viable proposition, promising significant savings both in effort and in costs when apertures of 150-inch or over are involved" (9).

Redman and Brück had also been asked to investigate possible sites for the telescope and the data they assembled in which the conditions on the 'Mediterranean' sites were compared with those in Hawaii, Chile and elsewhere proved to be another valuable outcome of the proceedings of the NHRC (10).

In the light of the successful transfer of the INT to La Palma some years later it is interesting to note that at the meeting of the NHRC on 1969 November 3, 4, Boyd asked about the possibility of moving the INT to a Mediterranean site. "The Astronomer Royal stated that there had been few cases of such moves. The evidence suggested that the movement of telescopes cost roughly as much as the provision of new instruments. He did not think a case existed for moving the INT" (11)\*.

## 6 THE REPORT OF THE NHRC

The task of assimilating the complex and controversial meetings of the NHRC into a report was the responsibility of the Secretariat of the SRC. By 1970 February the first draft of this report (34) was circulated to members of the Committee and it soon became evident that agreement would be very difficult to obtain. There was no dissent about the recommendation that a

\* In the light of subsequent experience Sir Francis Graham Smith commented on this (1990) that the AR was right about the cost of moving, although the complications of housing the INT in a major building make comparisons difficult. In retrospect the cheapest thing to do would have been to build a "new technology" standalone telescope; (see further comment in Section 9 in respect of the eventual move of the INT to La Palma).

Northern Hemisphere Observatory should be “provided urgently on a good site in the Northern Hemisphere – which, for climatic reasons, means outside the UK”, neither was there any problem about the recommendation that followed “the facilities so provided should comprise, initially, a large telescope and one of medium aperture”.

The dissent arose over the recommendations concerning the future organization of astronomy in the UK, namely that control and administration of the new national facilities, planned and to be planned, should be the responsibility of a new National Centre for Astronomy (also to be responsible for ground-based infrared astronomy). The Royal Observatories would be involved only in so far as they would be represented on the Management Committee – otherwise composed of major users in the Universities – which would report to the APGC of the SRC.

Immediately Woolley made it clear to Lovell that he would dissent and that he was afraid that “the production of a report which carries dissent will not do any good to the image of astronomers in other quarters”. He objected to the influence exerted on the Committee by the continued presence of the expatriate astronomers and he did not believe that the proposed constitution and management of the National Centre could exercise the necessary control which already existed in the Royal Observatories. In reply Lovell informed Woolley that he had already decided not to sign the report in its present form on the grounds of concern about the increasing control which SRC would exercise, that he could not agree to the proposal to decrease the RGO budget, and that (as President of the RAS) he could not sign unless (as recommended by the RAS Council) the RAS was represented on the Management Committee (I2). Although Lovell was not disagreeing in principle with the creation of a new National Centre he informed Hosie of SRC that he had “never been a party to the desire to destroy the RGO in order to create a new centre”, and that the security of the Observatory’s budget must be guaranteed. Further he would not sign unless it was agreed that the RAS would have representatives on the Management Committee. He recommended to Hosie that the report should be re-drafted to deal only with the important points of agreement – that is, the urgent need for the new telescope (I3).

A stalemate soon developed. Woolley and Brück were willing to sign the report “if it omits the proposal to found a new Centre, and avoids pejorative reference to the Royal Observatories” (I4). Further correspondence ensued between the Chairmen of the Committee and of the ASRB. At the ninth meeting of the Committee Lovell had suggested that the report should be limited to the areas of agreement (I5) but Hosie responded that it would be useless to go forward to SRC without a recommendation for the detailed structure to use the telescope. On May 12 the Chairman of the ASRB asked Hoyle on whose authority this statement was made, since the issue had not been referred to the APGC or ASRB and again emphasized that “we ought to get ahead with the major and urgent job of building the telescope and observatory and not confuse the issue and introduce still further disarray amongst UK astronomers by forcing it into a disputed administrative system”. However, Hoyle’s response was that there were at least four members of the Committee who would not agree to proceeding un-

conditionally with a Northern Hemisphere Observatory: “they would take the view that unless the organizational issues are first resolved, funds available to astronomy would be better spent on other parts of astronomy, not on further facilities for optical astronomers” (16).

On June 15 Lovell circulated to the Committee his comments on the draft report with the conclusion that: (i) we should proceed with the construction of the telescope; (ii) an analysis (as distinct from opinion) of the capabilities of the Royal Observatory should be made and on this basis another attempt to find an organizational solution acceptable to the Royal Observatories should be made; and (iii) the entire problem should be referred back to the ASRB so that the constitution and terms of reference of the Committee could be reconsidered (on the grounds that large amounts of money were being used for astronomical research outside the terms of reference of the NHRC). Neither this, nor a final attempt at specifying an organization in which the Vice-Chancellors of certain Universities should appoint representatives to a Management Committee who, together with the two Astronomers Royal, should appoint a director and recommend a site for the National Centre met with the approval of Woolley and Brück.

By the early autumn of 1970 the final 40 page report of the NHRC with the recommendations (see Annex) had met with the approval of the majority of the Committee with the Astronomers Royal submitting a minority report opposing the recommendation to create a National Centre outside the Royal Observatories. Although in its final form the NHRC report met with the approval of the Committee members, with Woolley and Brück dissenting only on the organizational recommendation, Council of the SRC decided to refer the report to the APGC and the ASRB. The report was never published.

## 7 THE AFTERMATH OF THE NHRC REPORT

With the increasing economic pressure on SRC the lack of unanimity in the report of the Northern Hemisphere Review Committee was one reason for caution. Another was the impending change at the R.G.O. Woolley was to retire at the end of 1971 and at the time of the finalization of the NHRC report the appointment of his successor as director of the Observatory and the question of separating the office of Astronomer Royal from that of the director of RGO was also under consideration by SRC.

The discussion of the NHRC report was initiated by Hoyle at the meeting of the APGC on 1970 November 17 (17) and a full discussion took place at a special meeting on 1970 December 1. The results of these two discussions were summarized early in 1971 in a discussion paper by Hosie (18). In view of the deteriorating financial provisions the Committee had recognized that divided advice should be avoided and that it should be considered “whether it would be feasible to regard the divided NHR Report as an historical basis from which the Committee might seek to formulate unanimous advice”. Hosie’s paper concentrated entirely on the organizational problem, proposing a scheme whereby a Management Committee would control policy in respect of all national optical, infrared and mm wave facilities with restructuring at the RGO and ROE. The Astronomer Royal would be the director of RGO, and would have deputy directors in charge of the proposed

NHO, the 48-inch Schmidt at Siding Spring and to be responsible for liaison with the directors of the AAT and Mt. Stromlo.

On 1971 January 19 the APGC had an extensive discussion on the original NHRC report, and on Hosie's proposals (19). "There was unanimous agreement that a National Centre of the kind envisaged by the NHRC was needed" and that "the majority of the members of the Committee would prefer the National Centre to be independent of any existing establishment or unit". A further long discussion took place at the next meeting of the APGC on 1971 February 2 (20). Blackwell and Hewish made a further proposal that the RGO should be split into two separate SRC establishments one dealing with routine items such as the Nautical Almanac Office and the Time Service and the other becoming part of the National Centre dealing with the INT and the proposed NHO. In summary Hosie said "there was also the chicken and egg situation over the selection of the next Astronomer Royal". He suggested, and it was agreed, that he should report to the ASRB and Council that the APGC were "considering various solutions and wished to defer a final choice until this could be done in the light of the knowledge of the next Astronomer Royal".

As a result of these lengthy discussions in the APGC on the NHR report Hoyle, as the chairman, was advised to make an interim report to the ASRB to the effect that the APGC had: (i) accepted the main recommendation but that extra resources would have to be found for the National Centre, and (ii) that the Committee had three schemes under consideration whereby a National Centre could be created within a framework acceptable to the RGO and ROE on the basis of policy control by a Management Committee and that "the Committee feels unable to choose one of the three possible courses without knowledge of the identity of the next Astronomer Royal".

The NHO was next considered at the APGC meeting on 1971 May 18 when Hosie reported that if the financial provisions of the Forward Look were to be utilized action was needed so that plans could be ready in two years time. £8 million had been entered in the Council's Forward Look for the NHO based on the provision of a large (150-inch) telescope and "a medium telescope". There was a discussion about the site and site-sharing and about the possibility of an alt-azimuth drive for the telescope. A recommendation was made for the creation of a planning committee for the observatory as a whole (21). Hosie circulated proposals on 1971 May 26 for such a Planning Committee to members of the APGC and it was agreed that this Committee should be constituted with Hoyle as Chairman and membership of Blackwell, Brück, Woolley and Hosie with powers to set up individual panels to consider the type of mounting, choice of site and the details of the optics, control and drive system (22).

Progress on site testing for the NHO was slow. On 1972 February 8 Hosie reported that political difficulties were hindering tests on a site in southern Spain but that some results were available for the Tenerife site (23). On 1972 November 16 it was reported that the difficulties regarding access to the Spanish site remained but that other sites were to be considered including the Portuguese Cape Verde islands and the lower spur of Kitt Peak. Meanwhile the NHO Planning Committee had decided to commission cost studies for a 120–240-inch alt-azimuth telescope (24).

## 8 THE APPOINTMENT OF THE RGO DIRECTOR

Critical discussions had been taking place about the appointment of a successor to Woolley as Astronomer Royal and director of the RGO. A main argument for delay throughout the APGC discussions was that it was important to await news of Woolley's successor before making final recommendations on the NHRC report. The possibility that Woolley's successor as director RGO would not also be Astronomer Royal does not appear to have been considered seriously throughout these discussions. In 1971 September Professor Margaret Burbidge, then working at La Jolla, California, accepted the invitation from the SRC to succeed Woolley as director of the RGO from 1972 January 1. At that time it remained unclear when the office of Astronomer Royal would be filled and whether the appointment might still be combined with that of the Director of the RGO. In the event Margaret Burbidge arrived at Herstmonceux in the summer of 1972 as director of the observatory but not as Astronomer Royal. In 1972 June it was announced that Ryle was to succeed Woolley as twelfth Astronomer Royal – the first occasion since the post was created in 1675 that the appointment had been separated from that of the director of the observatory.

Shortly after Margaret Burbidge arrived at RGO the Chairman of SRC (Sir Brian Flowers – later Lord Flowers) sought her views on the publication of the NHRC report. At a meeting of the NHO Planning Committee on August 2 Margaret Burbidge had informed them that her recommendation would be that the report be published and in a letter to Flowers (1972 August 22) she confirmed her opinion that SRC should “publish it in its entirety, with the accompanying minority report and the more technical appendices. It is timely and very relevant to the current discussions concerning a Northern Hemisphere Observatory”. Margaret Burbidge completely disagreed “with opinions from the SRC that the Review is no longer relevant” and added “There has been much speculation about the NH Review, and nobody understands why the results of so much careful work should be suppressed. It would be best to get this out into the domain of open discussion”.

Although so recently appointed, Margaret Burbidge was already “feeling somewhat depressed about the way in which the planning toward a Northern Hemisphere Observatory has been going – or rather, not going” (25). The publication in *Nature* (26) in 1972 September of a letter from Geoffrey Burbidge in which he used the resignation of Hoyle from the Plumian Professorship in Cambridge as the basis of a swingeing attack on the SRC and the organization of British astronomy did nothing to help the implementation of the recommendations of the NHRC. The resignation of Margaret Burbidge from the directorship of the RGO on 1973 November 30 symbolized the disarray amongst astronomers in the UK and with the increasing financial pressures on SRC the outlook for a Northern Hemisphere Observatory became even less hopeful.

Martin Ryle, who, in 1972 June, had been appointed Astronomer Royal in succession to Woolley, started a new initiative in 1973 November by asking the senior UK astronomers to sign a paper which he proposed to submit to the new Chairman of the SRC (27). This document *The case for the*

*northern hemisphere observatory* now proposed that the UK observatory should be created on Mauna Kea and equipped with a  $2\frac{1}{2}$  m telescope (time scale 4 years) followed by a 5 m telescope (time scale 9 years). Nineteen astronomers indicated their willingness to sign this document but others who had been involved in the NHRC would not do so. Lovell objected that whereas Ryle claimed that his proposals were in line with the recommendation of the NHRC they differed in the essential advice regarding telescopes and the site. He responded that the proposal “as outlined in your memorandum is contrary to the advice tendered by the NHO Committee...we interviewed nearly every astronomer of any substance in the UK...and SRC cannot simply sweep it under the carpet and then expect some of the signatories to sign a contrary document.” He objected also to the proposal that Mauna Kea be the site without further investigation of the possible Atlantic sites (28). In the event Ryle decided that he would not proceed with this submission to SRC.

## 9 THE REALIZATION OF THE NHO

The confused situation over the proposed NHO was resolved by Sir Sam Edwards shortly after he succeeded to the Chairmanship of the SRC in the autumn of 1973. At that time, although the NHO Planning Committee (§ 7 and refs. (21, 22)) had been at work for two years on the technical and site problems, the organization for running the NHO (National Centre, Royal Observatories or some hybrid solution, see § 7) remained in dispute. When Edwards reviewed the problem facing SRC he discovered that (35)

“There were two very expensive accelerators which were taking money which should have been used for CERN and for other areas of the Council; there was a free standing computing lab which had been overtaken by government decisions setting up the Computer Board; there was a Radio Physics lab not integrated into the advanced physics of other establishments and the Universities; there was a telescope in a poor visibility position and there were several astronomical problems in the management of new telescopes which were seriously planned but which were not sited. I weighed up how much administrative change the Council could stand and in particular weighed up the time scales of the practical problems facing astronomy compared to the time scale of the administrative proposals put forward to resolve them. It was clear that there was a hopeless mismatch. To start a National Centre would take time and money; to close RGO and ROE would also take time and money. The other problems listed above would take time and money, and they were much more urgent, virtually haemorrhages. The resiting of the first telescope was urgent and right outside the timescale of changing the existing set up.”

At that time Alan Hunter had succeeded as director of the RGO (on 1973 December 1) after the resignation of Margaret Burbidge, and Edwards summoned Hunter and Brück (director of the ROE)

“and said that I proposed to divide the astronomical problems into two and at that meeting the division would be made. It was the division we now see, and there was no argument from them. They were pleased to get clear remit and I told them to get on with it, which they did. Frankly I paid little credence to the plans offered by the Board and Committee. Their suggestions were devoid of management sense. The Council was broke and to perform the miracle of continuing new developments in the U.K. science required absolutely no changes costing money other than in new science, and no redundancies because HMG would not give money for that.”

This firm direction by Edwards, although disregarding the proposals of the APGC and ASRB then existing, was based on the only procedure which he considered to be viable financially and by this action he successfully terminated the tortuous discussions about the NHRC report and the management of the NHO. When Graham Smith arrived at RGO as director designate in the autumn of 1974 (he succeeded Hunter as director in 1976 January), Edwards instructed him to give the NHO his top priority and a new degree of stability occurred in the affairs of the RGO and in UK optical astronomy. The NHO Planning Committee had been constituted by the APGC in 1971 (29) with Hoyle as Chairman. He had been succeeded by D.W.N.Stibbs in 1972 and J.Ring became Chairman in 1974. Under these successive Chairmen the NHO Planning Committee had made extensive investigations and on 1974 November 20 outline specifications were submitted to Council for three telescopes. However, Graham Smith had decided that there was little hope of Council agreeing to finance three new telescopes and in presenting the report to Council he introduced as a critical part of the submission the proposal to move the 2.5 m Isaac Newton Telescope from Herstmonceux to the proposed overseas site as one of the three telescopes. In addition the plans envisaged the construction of a 1 m telescope for astrometry and photometry and a 4.5 m telescope on an alt-azimuth mounting. Council approved the plans subject to the choice of a suitable first class site, and early in 1975 the D.E.S. approved an expenditure of £350000 for preparatory work and a further £100000 for figuring a new 2.6 m (33) primary mirror for the INT.

In accordance with the directive from Edwards the idea of the national centre was abandoned and in 1975 April the responsibility for the provision of the NHO by the Royal Greenwich Observatory was formalized by SRC. Meanwhile site testing had continued and in 1974 October full scale tests in the Canary Islands were arranged on an international basis at a meeting with the Consejo Superior de Investigaciones Cientificas (CSIC) of Spain. The circumstances leading to this agreement, involving the UK, Denmark, the Netherlands, Spain and Sweden have been described by Graham Smith (1, 2) and the details of the site testing on Hawaii, Madeira and the Canary Islands which eventually led to the selection of a site on the island of La Palma in the Canary Islands have been given by B.McInnes (30).

The meeting with CSIC in 1974 October proved to be the first of a series of international discussions leading to agreements about the sharing of the facilities on La Palma. The details to the end of 1980 have been given by Graham Smith (1). The formal agreement signed on 1979 May 26 between the UK, Spain, Denmark and Sweden concerned the establishment and use of the facilities of the Roque de los Muchachos Observatory named by the Instituto de Astrofísica de Canarias after the highest point on La Palma.

As the design of the 4.2 m (32) telescope and the buildings evolved, escalating costs cast doubts on the feasibility of constructing a telescope of this size on UK resources alone. Fortunately an informal contact between Graham Smith and H. van der Laan during the 1979 IAU General Assembly in Montreal eventually led to an agreement (concluded in Amsterdam on 1981 June 18) with the Netherlands Organisatie voor Zuiver-Wetenschappelijk Onderzoek (ZWO) to bear 20 per cent of the costs with

appropriate manpower help (2). An additional arrangement with the Dublin Institute of Advanced Studies led to an agreement for cost sharing with the 1 m telescope.

The history of the 2.5 m Isaac Newton Telescope and its eventual move to La Palma as a 2.6 m instrument has been described by Graham Smith and Janet Dudley (31). The last observations with this telescope at Herstmonceux were made in 1979 May and first light with the re-built instrument on La Palma was obtained in 1984. The 1.0 m Kapteyn telescope and the Carlsberg transit telescope also became operational in 1984. The plans for the construction of the 4.2 m telescope were approved by the Department of Education and Science in 1980 August and at the suggestion of Graham Smith it was agreed that the instrument be designated the William Herschel Telescope. The formal opening of the Roque de los Muchachos Observatory by the King of Spain took place in 1985 and first light with the 4.2 m telescope was obtained at the end of 1987 May.

## ANNEX

### *Section XI of the final report of the NHRC (1970 autumn)*

#### *Recommendations:*

- 11.1 More detailed reasoning underlying specific recommendations will be found in the paragraphs referred to in each recommendation.
- 11.2 The Committee unanimously recommend that:
  - (a) optical astronomy should become one of the main branches of physics. The SRC should encourage Universities to develop close links between their Astronomy and Physics Departments; (3.7, 8.1).
  - (b) modern facilities for British astronomers should be provided urgently on a good site in the Northern Hemisphere – which, for climatic reasons, means outside the UK; (3.1, 4.3).
  - (c) the facilities so provided should comprise, initially, a large telescope and one of medium aperture; (4.6).
  - (d) because of the urgency, systematic site testing at possible locations in the Mediterranean area should begin forthwith, the results should be compared with, and be assessed in relation to, those available for known sites in the Americas; (4.4).
  - (e) for the large telescope at least consideration should be given to the adoption of an alt-azimuth mounting; (4.7).
  - (f) differences of timescale rule out collaboration with any of the other European countries also providing large national facilities in the Northern Hemisphere but the possibility of sharing a site and base facilities should be pursued; (4.5).
  - (g) the present imbalance in favour of the Royal Observatories in the allocation of total funds, i.e. University and SRC, for support of astronomy should be removed by increasing the amount available to Universities by some £250K p.a.; (Section V).
  - (h) the SRC should apply selectivity in its support of University astronomy, selection for special treatment depending on evidence

that a University is prepared to make and continue an allocation from its own resources and to develop very close links between its Astronomy and Physics Departments; (5·8, 5·9).

- (i) SRC support, by grants or by budget allocations, for development of instruments for use with large facilities should provide some additional academic posts in both optical and theoretical astronomy and should adopt measures to facilitate other than fleeting absences of University staff with teaching duties; (Section IX).
  - (k) reorganization of the present structure in astronomy in the UK is essential in order to provide for control of the new national facilities by and for British astronomers as a whole, and as of right. (3·6, 6·4).
- 11.3 The majority of the Committee recommends:
- (a) control and administration of the new national facilities, planned and to be planned, should be the responsibility of a new National Institute for Astronomy; (7·1).
  - (b) the new Institute should be controlled by a Management Committee nominated by the Vice-Chancellors of selected Universities, as set out in detail in 7·2.
  - (c) the Institute should have a small staff of which at least half should be on term appointments; (7·6).
  - (d) the staff of the Institute should have an allocation of time on the central instruments, not exceeding a maximum percentage determined from time to time by the Management Committee in consultation with the Astronomers Royal, the balance to be allocated on merit to applicants from Universities and from the Royal Observatories; (7·6).
  - (e) the Institute should be concerned with astronomy and should not become the centre for development of instrumentation. But the Institute must have some capacity in instrumentation. (7·6).
  - (f) the Management Committee should have powers to make grants in support of work required by it in respect of development and use of the facilities for which it is responsible.
  - (g) the Management Committee, operating through the Director and staff, would be responsible for expenditure, and control, of the resources allocated to it by the SRC; (7·2).
  - (h) the Institute should be responsible for optical and for ground based infrared astronomy; (7·6).
  - (i) the Management Committee should be set up as rapidly as possible and have as its first task the selection of a Director, as recommended in 7·2.

### *Abbreviations*

AAT	Anglo–Australian Telescope (Siding Spring)
APGC	Astronomy Policy and Grants Committee of the SRC
ASRB	Astronomy Space and Radio Board of the SRC
CERN	Centre for European Nuclear Research (Geneva)
CSIC	Consejo Superior de Investigaciones Cientificas

DES	Department of Education and Science
ING	The Isaac Newton Group of Telescopes, part of the Roque de los Muchachos Observatory, La Palma
INT	Isaac Newton Telescope
NHO	Northern Hemisphere Observatory
NHOPC	Northern Hemisphere Observatory Planning Committee (1971–76)
NHOSC	Northern Hemisphere Observatory Steering Committee (1976–1981)
NHRC	Northern Hemisphere Review Committee (1969–1971)
NWO	(since 1988 February 1) Nederlandse Organisatie voor Wetenschappelijk Onderzoek (formerly ZWO)
RAL	Rutherford Appleton Laboratory
RGO	Royal Greenwich Observatory
ROE	Royal Observatory Edinburgh
SHRC	Southern Hemisphere Review Committee (1967–68)
SRC	Science Research Council (name changed to Science & Engineering Research Council (SERC) in 1981 April)
ZWO	(before 1988 February 1) Organisatie voor Zuiver-Wetenschappelijk Onderzoek (now NWO)

## NOTES AND REFERENCES

- (1) Smith, F.G., 1981. *Q. Jl R. astr. Soc.*, **22**, 254.
- (2) Smith, F.G., 1985. *Vistas in Astronomy*, **28**, 431.
- (3) This early history of the Anglo–Australian Telescope and a description of the alternative plans has been given by B.Lovell. 1985. *Q. Jl R. astr. Soc.*, **26**, 393.
- (4) Lovell, B. 1985. *Q. Jl R. astr. Soc.*, **26**, 456.
- (5) Minute 61 para. b. of the ASR Board meeting of 1968 December 17.
- (6) Minute 2. IV of the ASR Board meeting on 1969 March 18.
- (7) Woolley/Lovell correspondence of 1969 April 21/25 deposited in the John Rylands University Library of Manchester.
- (8) Minutes 52 and 53 of the 7th meeting 1969 December 4–5, and Minutes 57 and 58 of the 8th meeting 1970 February 12.
- (9) Report of the Alt-azimuth Mounting Committee – paper NHR40 presented at the 6th meeting of the NHRC 1969 November 3/4.
- (10) Minute 51 of 7th meeting 1969 December 4/5 referring to papers NHR 47, 50, 56.
- (11) Minute 42.6 of 6th meeting of the NHRC 1969 November 3/4.
- (12) Woolley/Lovell correspondence 1970 February 16–20 deposited in the John Rylands University Library of Manchester.
- (13) Lovell to Hosie 1970 February 20, deposited in the John Rylands University Library of Manchester.
- (14) Woolley to Lovell 1970 May 15, deposited in the John Rylands University Library of Manchester.
- (15) Minute 68.2 of 9th meeting of the NHRC 1970 April 23.
- (16) Correspondence Lovell/Hoyle 1970 May 12–26 deposited in the John Rylands University Library of Manchester.
- (17) Minute 238 of the APGC meeting 1970 November 17.
- (18) APG 132. SP/189/03. 1971 January 19.
- (19) Minute 255 of the APGC meeting 1971 January 19.
- (20) Minute 258 of the APGC meeting 1971 February 2.
- (21) Minute 276 of the APGC meeting 1971 May 18.
- (22) SRC references SP/260/01, SP/260/03, SP/260/10 dated 1971 May 26 and APG 180, SP/260/03 undated.
- (23) Minute 318.1 of the APGC meeting 1972 February 8.

- (24) Minute 353 of the APGC meeting 1972 November 16.
- (25) Ms letter to Lovell 1972 August 27 enclosing copy of letter to Flowers about the NHRC report (deposited in the John Rylands University Library of Manchester).
- (26) *British Optical Astronomy* by Geoffrey Burbidge, 1972, *Nature* **239**, 117.
- (27) Sir Sam Edwards succeeded Sir Brian Flowers as Chairman of the SRC in the autumn of 1973.
- (28) Ryle/Lovell correspondence 1973 November, deposited in the John Rylands University Library of Manchester.
- (29) The original 1971 NHO planning committee was constituted with Hoyle as Chairman and with Blackwell, Brück, Woolley and Hosie as members. Subsequently there had been several changes, Stibbs had succeeded Hoyle as Chairman in 1972 and had been succeeded by J.Ring in 1974. At the time of this submission the members were H.H. Atkinson, D.E. Blackwell, I.G. van Breda, H.A. Brück, J. Meaburn, B.E.J. Pagel, M.V. Penston, K.A. Pounds and F.G. Smith. There were three specialist working groups concerned with photometry and detectors, spectrometry and interferometry, and with computing and control.
- (30) McInnes, B., 1981. *Q. Jl R. astr. Soc.*, **22**, 266.
- (31) Smith, F.G. and Dudley, J., 1982. *J. Hist. Astr.* **23**, 1.
- (32) Until 1976 the intention had been that the aperture of the large telescope should be 4.5 m. However, in 1975 September J.D. Pope had visited Corning and Owens Illinois and had found that a 4.2 m blank was available from Owens Illinois and that the provision of a special 4.5 m blank would not only be costly but would cause considerable delay. At the meeting of the Planning Committee\* on 1976 May 26 Graham Smith reported that the "alternative to purchase of existing Owens-Illinois 4.22 m blank appeared to involve at least an extra £0.5M cost and 3 year delay." (Minute 257.2) and in a paper NHO SC 77/22 prepared for the Steering Committee\* on 1977 May 12 Graham Smith reported that this Owens-Illinois blank was the last of a production run in Cervit and was the same material as that used for the 3.9 m AAT, the 4 m Kitt Peak and Cerro Tololo mirrors. He reported that no further production runs were planned and unless this 4.2 m blank was secured before the end of 1977 an extra £1.5M would be required and there would be a delay of at least a year. [\* At this meeting of the Northern Hemisphere Planning Committee it was announced (Minute 250) that the Planning Committee would be superseded by a Northern Hemisphere Observatory Steering Committee. This Steering Committee, which held its first meeting on 1977 February 18, was reformed in 1979 January as the Northern Hemisphere Observatory Steering Committee (NHOSC) under the Chairmanship of H.H. Atkinson (director A Central Office of SRC). After the conclusion of the agreement with the Netherlands in 1981 this became the SERC-ZWO Joint Steering Committee (now SERC-NWO Joint Steering Committee).]
- (33) See Ref. (31) for details of the change from 2.5 m to the 2.6 m mirror.
- (34) Draft report of the NHRC dated 1970 February 12. Annex to SRC paper NHR 68. Copies of the individual responses are deposited with the Lovell papers in the John Rylands University Library of Manchester.
- (35) Edwards/Lovell correspondence 1989 February/March, 1990 July deposited in the John Rylands University Library of Manchester.