

BOOK REVIEWS

BRITAIN'S NATIONAL DISH

The Story of Jodrell Bank

By Sir Bernard Lovell. Pp. xvi + 265. (London: Oxford University Press, 1968.) 45s. net.

THIS is the story of the construction of the great radio telescope at Jodrell Bank which was also virtually the beginning of the Radio Astronomical Observatory. It is in fact part of Sir Bernard Lovell's autobiography. It is not a treatise on radio astronomy, for that clearly was not the author's intention. It is, however, a scientific saga describing almost daily the struggles of a pioneer to create the facilities that were necessary to found a new science and thereby bring into being a corpus of new knowledge complementary to the immense works of the optical astronomers.

The necessity of having the biggest radio telescope in the world is not just a matter of scientific pride, for the bigger the aperture of the telescope the greater its range into remote space. Lovell went about the business in the bold way and the question was just how far the structural engineer could go to meet the scientific criteria both as regards the precision of the reflecting surface and the control of the movement of the telescope in elevation and in azimuth. There were no guide lines and most engineers, with one exception, would have turned down the idea straight away as impracticable. The cautious engineer would have demanded a pilot model in order to examine the problems that were bound to arise in the construction of the full scale instrument. Pioneers in science, however, know that their thoughts may not be unique and it is essential to move rapidly into the new field and exploit it with energy. So it was that the decision was to go straight to the full scale instrument and this led to the tremendous troubles, both technical and financial, that had to be overcome to bring the project to its conclusion.

In spite of the extensive war-time experience by many academics in creating big electronic-engineering projects, such experience had not penetrated to the universities even by 1950. Equally in agencies such as the DSIR the concept of the support of ventures in big science had not really been seriously considered. There was, therefore, no previous knowledge to build on, so in a way the stage was set for some new thinking and even awkward and bitter experience. With hindsight it is now easy to see how this could happen. The Department of Scientific and Industrial Research (DSIR) accepted the necessity to give Lovell the backing he asked. A project of such magnitude had to be set out in terms that would not then terrify a grant-giving body and thus it was natural to pare down the grant to such a level as to be particularly dangerous when so many unknown factors entered the construction of the telescope. If, however, all these unknown factors had been incorporated as a large contingency element in the grant, this might well have scared off DSIR altogether.

Once the construction was started, the inevitable rise in costs began, because each design feature had to be tried while the telescope was actually being constructed. Change upon change had thus to be made and nothing is more calculated to escalate costs. Thus time went by and

Lovell naturally became extremely impatient at seeing the prospect of his getting into radio astronomy receding further and further into the future. In such a state of affairs, friction was bound to arise between the DSIR and the University. Between two parties difficulties can often be resolved. The debate went further, however, when it involved ministers, the Treasury and the Public Accounts Committee. This really put the fat in the fire and brought the whole matter into the limelight of public debate. This naturally led to further delays and a highly charged atmosphere that could easily have wrecked the project and thus, to a large extent, radio astronomy in this country.

There was no escape from this position, because the DSIR was subject to public accountability and the complex of Parliament, Government, DSIR, University and a multitude of contractors was a fertile ground for there to be created a mountain of misunderstanding. It was difficult for those concerned to see how to resolve these problems. But for the great enthusiasm of Lovell, the project would certainly have failed.

The telescope was designed for the reception of radio emissions from outer space, yet the sudden emergence of man-made satellites and space probes offered to Jodrell Bank the unique opportunity to take part in this new science too—much to the disgust of the true radio astronomers. It was this development, however, that continuously brought the name of Jodrell Bank to world-wide recognition. Neither the Russians in their use of earth satellites and moon satellites, nor the Americans with their deep space probes, could do without it. It is not often that world-wide collaboration in science and technology is almost forced together. In spite of the unexpected value of these experiences and the universal approbation they received, the financial problems were not easily resolved. Though clearly serious mistakes were made in estimating the true cost of the telescope and in the procedures for the rapid change of design, it is extraordinary that a unique British scientific and technological achievement was in fact brought to completion. Very much larger sums of public money have been utterly wasted without causing more than a minor ripple in the public press when facts have been made available through the operations of the Public Accounts Committee.

Enthralling and important as this story is, the telling of it provides a significant commentary on the way in which large scientific projects should be handled. Enterprising and novel projects have got to be preceded by design studies and even expensive models before proceeding to the final stage. What is more, money has to be provided by Government in the knowledge that this kind of money may in fact be wasted. This lesson was well learnt, for the construction of later marks of telescopes at Jodrell Bank was completed within the time allotted and within the initial financial estimates.

The new phenomenon that was created by universities entering into big science was that the academic staff had to acquire a new skill in managing these affairs in association with grant-giving bodies on the one hand and contractors on the other. The fact that in later years large projects supported by the DSIR, and by the Science Research Council, in very many fields have been carried to satisfactory conclusions shows that this can be done to the satisfaction of all parties concerned. It is, however, again the pioneers that have had to bear the intolerable burden of showing the way. That Lovell even survived the ordeal is extraordinary—a lesser man might well have given it up. He, Lovell, could personally have given up his idea to become a radio astronomer and that would have been a tragedy. Equally this country's very high standing in this science would have been to a large extent eroded. It is of interest to note that the sum of money that caused so much dispute now represents merely half a week's spending from the present budget of the Science Research Council.

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