

the most unhappy feature of the Hoyle affair is that, rightly or wrongly, the university has allowed itself to seem inflexible. The hope now is that none of this will affect the quality of the work, quite exceptional by any standards, carried out at Cambridge.

Where Next with Apollo ?

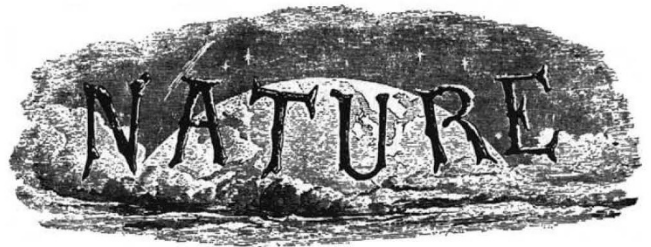
THE expedition of Apollo 16 to the Moon this week, technical hitches notwithstanding, has been yet another demonstration of the usefulness of these journeys. From the start of the Apollo programme, more than a decade ago, there has been good reason to think that the landing of men and equipment would bring a valuable harvest of information about the Moon, and now the expectations of the optimists have been for practical purposes confirmed. Each new expedition suggests new experiments that might be carried out, which is at once a sign that useful jobs remain to be done on the surface of the Moon and that there will be great frustration later in the year, as the time approaches for the next and last expedition, Apollo 17. To acknowledge this is not to say that the great cost of the Apollo programme has been justified, for a more balanced programme of research, some of it dependent on largely conventional techniques, would probably have made a still more remarkable contribution to the understanding of the Solar System. From the start, however, the Apollo programme has been openly regarded by its sponsors as an objective in its own right and only adventitiously a means of scientific research. The United States would have had an Apollo programme even if this had not by chance been a time when it is possible to ask pertinent questions about the origin of the Solar System and to make use of the Moon as a means of testing some striking hypotheses. If, for example, plate tectonics had not by now provided a framework for the understanding of geological events on the surface of the Earth, it would have been much more difficult to make sense of what the Apollo expeditions have found on the surface of the Moon. But is it a sensible use of resources that the next Apollo expedition to the Moon, at Christmas, should be the last?

The zeal with which the National Aeronautics and Space Administration pursued the planning for the Apollo programme a decade ago has now given way to enthusiasm for the space shuttle, a system of reusable rocket vehicles that will be used, in the late 1970s and the 1980s, for ferrying people and equipment to and from living spaces in orbit about the Earth, and which in due course may provide a cheaper method of exploring the Solar System than could ever have been provided by the Saturn rocket system. In due course, the space shuttle will also be a flexible tool, able to provide staging posts for all kinds of exploits, not necessarily including people. The trouble, of course, is that the shuttle—like the Concorde and its Russian rival—is way ahead of its time. In due course, it may turn out to be an economic blessing, but as things are, there is not enough business to make full use of it. And even by the late 1970s, it is unlikely that the United States Congress will be prepared to sanction such a large increase of the NASA budget that the shuttle system can be put usefully to work. Even if NASA's attempts to recruit European participants for the project

are more successful than has seemed likely for the past year, it is hard to think that the space shuttle will turn out to be more than a white elephant unless Congress is prepared to increase its support for NASA above the level of \$3,200 million a year which Dr James C. Fletcher has said he and his men will be able to rub along with.

The ending of the Apollo programme at this stage in the game is especially unfortunate. It may be that Apollo should never have been begun, but now that the milk has been spilt, is there not a good case for continuing with a modest programme of journeys to the Moon? Dr Fletcher was telling Congress only a few weeks ago that he and his colleagues would no doubt be embarrassed by their planned inactivity later in the decade, when it is most probable that the Soviet programme of planetary exploration will gather momentum. As it happens, NASA has the solution in its own hands, for there are spare Saturn V rockets in storage and enough is now known about the machinery involved in landing on the Moon to ensure that space capsules could be built in time. To be sure, there would be the extra cost of maintaining launch facilities, which would imply that extra Apollo journeys would be more expensive than in the past. Yet if NASA is serious in saying that it wishes to contribute to the understanding of the Solar System, it is feckless of it to embark on the shuttle instead.

100 Years Ago



THE CIVIL ENGINEERS' BANQUET

WE do not grudge our friends the Civil Engineers their annual felicitations, nor Mr. Gladstone his congenial moral reflections. It were hardly worth while to dissect after-dinner rhetoric, however full of fallacies. But those ever-watchful teachers of mankind, the daily press, have pounced upon the speeches delivered on Wednesday week, and have made them an occasion for propounding solemnly what was spoken hilariously; and this deserves looking to.

The *Times*, of course, armed at every point, does battle valiantly for decentralisation of science, because that notion seemed to find favour with the notabilities of the evening. Mr. Hawksley, president of the Civil Engineers' Institute, in toasting Her Majesty's Ministers, complimented them on the "performance of the negative duty of letting his profession alone," adding, with unconscious satire, that what the engineers had done "they had achieved, not through, but in spite of, all Governments." These two sentiments are quite intelligible and quite true; but the conclusion of the speech, which informs us that "the Civil Engineers of this country approached the Government with perfect reliance on its purity," conveyed a needless truism; to the pure all things are pure—to pure engineers even a British Government is pure, of course. But why dwell on so obvious a fact?

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