

## More Room on the Moon

THE visit to the Moon last weekend seems to have demonstrated how quickly Moon landings have become familiar and even dull affairs. Even with the help of colour television, and in spite of the skill with which the television networks now switch their shots from one place to another, only the more dramatic phases of a Moon journey seem to be able to compete successfully with the well-established peak hour shows. To be sure, it would be different if there were some kind of accident; then the public attention for the Apollo programme would be as avid as ever—the flight of Apollo 13 showed that for all to see. But left to itself the international audience for these journeys will tail away as the months go by, just as the Apollo programme itself has been attenuated. All this is sensible enough and, indeed, it may well be that inattention from the public is what space exploration in the United States and the Soviet Union is most in need of. It does not unfortunately follow that everything is right.

In the United States, the most serious defect of the programme now being written into the budget is that too many efforts are being concentrated on the still pointless task of developing large habitable satellites together with the re-usable rockets which can carry people in both directions. It is true that final decisions on the so-called shuttle have not yet been taken—so far, substantial sums are being spent only on the development of the engines for the shuttle spacecraft, and engines are inevitably the slowest items to develop. But the more money that is spent, the harder it will be for NASA to abandon what has been done already. As time goes on, however, the arguments in favour of the plan to build a shuttle and to launch space stations for it to service remain embarrassingly short of justification. The argument that the shuttle and its space stations are necessary steps in the development of hypersonic flight is of course entirely an illusion. That is a project which should and could be pursued in its own right. The argument that there may be opportunities for using orbiting space stations as places in which to carry out the kinds of experiments in such techniques as welding which the Apollo 14 crew attempted last weekend is a pitifully thin excuse for spending such a lot of money. Does anybody seriously believe that there will be a commercial industry based on such delicate capering? And the belief that the space stations and their transport vehicles will somehow be justified by the presence of sufficiently large telescopes is tenable only in circumstances in which astronomers are not in the majority. Since it appears that the first task of the first orbiting space station will be to carry out some no doubt valuable astronomy, particularly in the X-ray region of the spectrum, it might be interesting—it would certainly be equitable—if NASA were to ask a representative body of astronomers how they would like to spend the sum of money involved—\$15,000 million is probably at this stage a modest estimate.

The starting point for the shuttle concept seems to have been the recognition that only a very large project could take the place of the Apollo programme, due originally to have been completed by the mid-seventies. Even with the experience of three successful landings on the Moon, it now seems clear that human beings are not particularly successful at lunar locomotion. Understandably, they find it hard to walk uphill. Understandably, their still

primitive suits leave much to be desired. Understandably, in circumstances in which it is necessary to carry all kinds of physiological equipment for the maintenance of life along with the people, it is hard to provide sufficiently complicated and comprehensive instruments to return a rich harvest of information. This is why many Americans must be regretting the abandonment of the Surveyor programme, with its promise of being able at least to fill in the gaps left by the necessary sporadic visits of human beings and possibly able to extend enormously the work (not to be sniffed at) already carried out on the Moon. But if all this is apparent where the Moon is concerned, at its comparatively modest distance, how much more so is it necessary that the long-term exploration of the solar system should be based on automatic rockets of one kind or another? As it happens, this is what the Russians have always said and it is surprising that the planners in Washington have so consistently been able to turn a deaf ear to such declarations. It will be a great misfortune if in the coming months, when the Senate is picking over the NASA budget, some effort is not made to correct a modest but potentially crucial deficiency in the present pattern of expenditure. For the rest, and because the notion that there should be large numbers of astronauts in service has become almost a historical fact, it will be necessary to decide how best to use the manpower that exists or which threatens to exist, and from this point of view there is in practice a strong case for arguing that they should be used for as diverse a set of roles as possible, if only to make sure that their employment will at least provide a clear picture of the circumstances in which men may and may not be useful.

## 100 Years Ago



PHILADELPHIA

Academy of Natural Sciences, Nov. 8.—Mr. Thomas Meehan referred to a potato presented to the Academy some months ago by Mr. Henszey, a member, which had the appearance of one potato growing out of the centre of another. The opinion of all who saw it was that it was really a case of this kind. It had been handed to him by the curators, and on dissection, though no exact place of origin could be traced, there seemed nothing to indicate any other theory of origin than that one potato had really grown out of the centre of the other. But there were serious physiological reasons in the way of such a theory. A potato tuber is really but a thickened axis, in which the greater part of the interior structure would be incapable of developing a bud which would produce a tuber such as this one had done. The origin of a new tuber from an old one would be nearer the old one's surface. He had been looking for some further explanatory facts, and believed he had them here this evening, in the potato tubers he now handed to the members. They were about the size of hen's eggs, and were pierced in every direction by stolons of the common couch grass, *Panicum repens*. They had gone completely through, as if they were so much wire, and in one instance two tubers had become strung together by the same stolon, as if they were two beads on a string.

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