

In Australia, the site of the new telescope at the Siding Spring Observatory of the Australian National University has been levelled. The project is run by a Joint Policy Committee consisting of Sir Richard Woolley, Professor Fred Hoyle and Mr J. F. Hosie on the British side and Professor O. J. Eggen, Mr K. N. Jones and Dr E. G. Bowen from Australia. During the coming months the committee will take several decisions which could prove crucial. First, tenders for the telescope building are to be invited shortly and the contract is expected to be let early next year. Second, the committee is mulling over the choice of an all-British telescope to be set up alongside the Anglo-Australian telescope, and will probably reach a decision in January or February. Third, the design of the Cassegrain and Coudé spectrographs—essential instruments which will have to be available when the telescope goes to work sometime in 1974—will have to be settled soon. Each spectrograph could take several years to build. It seems likely that the designs will be essentially the same as the Herstmonceux spectrographs, but modified in the light of experience.

The Joint Policy Committee is also thinking hard about how the telescope is going to be administered, and in particular how observing time is to be apportioned. It is probable that the British half share will be in the hands of the SRC Large Telescope Users' Panel which was set up chiefly to administer time on the Isaac Newton telescope. A similar panel will be in charge of the Australian share, and the worst problem is likely to be coordination between the two committees. One solution being considered is for the director of the proposed British telescope at Siding Spring to be a go-between.

The incentive for the establishment of an all-British facility alongside the Anglo-Australian and purely Australian telescopes is of course that it provides back-up observing time for British visitors when the joint telescope is not available as well as a base for the British support contingent at the observatory. As far as the distribution of observing time on the smaller telescope is concerned, the situation is not unlike that at Kitt Peak National Observatory where a resident staff is in charge of telescopes run by a consortium of United States universities. The resident staff are allotted forty per cent of the observing time, and it could be a similar arrangement for the resident staff of the proposed British facility at Siding Spring.

## TECHNOLOGY

### Superconductors at Sea

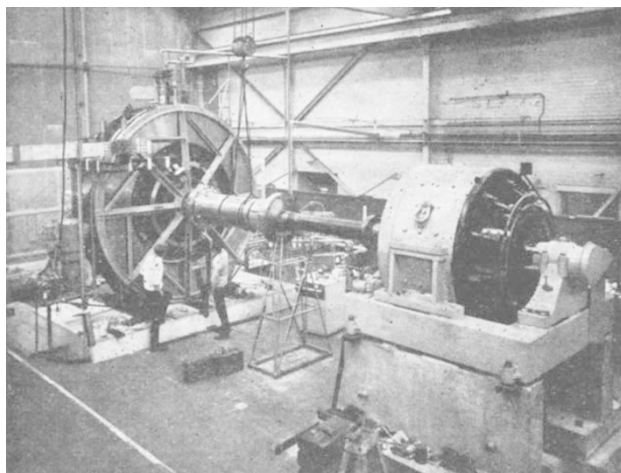
from a Correspondent

*Newcastle upon Tyne, November*

Few technological enterprises in recent years can have met with as much good fortune as the application of the superconducting principle to electric motors and generators. Four years ago, the Ministry of Defence (Navy) placed a small contract with the Newcastle company International Research and Development Ltd to build a small experimental homopolar d.c. motor with a superconducting liquid helium cooled field coil. The design was to develop, initially, a total of two horsepower. Design improvements during the construction of this prototype were such that the finished model was able to produce no less than 50 hp; and this

early promise led the National Research Development Corporation to present IRD in 1966 with a £500,000 order to build a full-scale motor for use in an industrial environment.

Last week this finished motor was put on display for the first time. The machine, which runs at 200 r.p.m., develops a total of 3,250 hp (although the display run was carried out at about 20 per cent load) and is to be moved, as soon as tests are completed, to the CEGB's Fawley power station, where it will drive one of the station's four cooling water pumps. The leader of the team responsible, Mr Anthony Appleton, thinks that the motor will be ready for installation at Fawley in mid-January.



Motor during final stages of assembly, with part-load on the right.

The most encouraging piece of news from the day's proceedings was the fact that the Navy has once more placed a contract for a further close study of the system's applications. The new contract asks IRD to construct a one megawatt superconducting generator, and Mr Appleton confirmed that work on building this machine should start as soon as the Fawley motor is out of the way. As the motor took only 18 months to construct, it seems likely that the generator should be ready by mid-1971 at the latest.

Naturally enough, the Navy's interest in the project has been generated by the seemingly ideal application of the motor to ship propulsion. As well as having the obvious advantages of lightness, compactness and economy, the fact that an electrical connexion between power source and propeller drive can supplant a bulky shaft connexion means that enormous space savings could be achieved in a vessel's engine compartment. The prime mover—a gas turbine has been suggested—and the generator could be mounted on an upper deck, while the motor itself could be accommodated in a relatively minute space right astern. The motor's infinitely variable speed and reversibility will also endear this form of propulsion to naval architects. The Navy is not alone in its enthusiasm for superconducting d.c. generators. The chemical industry—in particular the aluminium smelters—have shown a keen interest, and in a recent speech IRD's managing director, Dr Hyman Rose, suggested that a 200 MW, 1,000 volt generator could cut the costs of an aluminium smelter such as that at present under construction at

Lynemouth, Northumberland (ironically less than ten miles from IRD), by as much as £1 million.

#### MOON FLIGHTS

### Vinogradov and Apollo

from a Correspondent

ALTHOUGH Russian space research seems to have been tied, from the beginning, to the sequence of projects envisaged by Tsiolkovskii, which gives the creation of an orbital station priority over any voyages beyond the Earth's orbit, there is no doubt that the Apollo projects have evoked considerable scientific and popular interest throughout the Soviet Union. In a recent interview (*Pravda*, November 27) Academician A. P. Vinogradov, vice-president of the Academy of Sciences of the USSR, gives what would be called, in military terms, an "appreciation" of the Apollo results to date.

After outlining the surface experiments carried out by the landing parties of Apollo 11 and 12, he emphasizes that neither crew included a geologist, and hence that the rock samples collected would be entirely random, although the longer spell of the Apollo 12 crew outside the rocket would result in samples being "more diverse and richer". The chemical and geological findings of the Apollo 11 specimens are outlined, with especial note of their similarity to achondritic meteorites. Cautiously, Vinogradov states: "I do not therefore consider it to be an absurd idea that the basalt meteorites found on Earth are of lunar origin". He stresses, however, that for a proper appraisal, it would be necessary to have selenological specimens from different parts of the lunar surface, in particular from the highlands.

The problem is raised of the greater dustiness of the Ocean of Storms in comparison with the Sea of Tranquillity; this, says Vinogradov, is a "riddle", and he contents himself with restating the basic problem as "Is the presence of lunar dust connected with the nature of the surface or do any other factors play a part here?"

Finally, when asked to comment on the contribution of manned flights to lunar studies, he chose as a particularly noteworthy example the fact that the Moon is now supposed to have a definite crust and not to be the homogeneous body previously imagined. Rather strangely, no indication is given as to how this result was inferred. From Vinogradov's article it might be assumed that this new model of the lunar structure had been obtained either from the analysis of specimens or from the readings under natural conditions of the seismometer, magnetometer and spectrometer which he enumerates at the beginning of his appreciation. In extending the congratulations of Soviet scientists to the American "cosmonauts, scientists and engineers", he makes no mention whatever of the Intrepid crashdown nor of its world-shaking (or moon-shaking) consequences.

#### AGRICULTURE

### Fast Growth at Nottingham

from our Botany Correspondent

THE University of Nottingham seems to be defying those pessimists who hold that the fruits of university

agricultural research are inferior to those that come out of special institutions. Nottingham has a fast expanding school of agriculture and financial backing to prove that many people think that its activities are very valuable. The latest annual report of the school of agriculture (price 10s.) records that the 1968-69 session, which marked the fiftieth anniversary of the teaching of agriculture on the site at Sutton Bonington, has seen the virtual completion of the new teaching and research block. This will house the departments of agricultural economics, agriculture and horticulture and the animal physiology group. There has also been a new building for avian physiology, and animal accommodation which has been built jointly with the new medical school.

Perhaps it is cooperation and diversification that are the secret of Nottingham's success in agriculture, for there is a generous admixture of pure and applied work in progress with no isolation from the other biological departments of the university. The spirit of diversity represented by the constituent departments of agricultural economics, agriculture and horticulture, applied biochemistry and nutrition and physiology and environmental studies is carried over into the undergraduate courses. The honours BSc degree depends on a "triad" system in which a student takes three honours units, selected to form an effective combination, and writes a dissertation in one of them. The wide scope of this system is partly a consequence of cooperation between faculties, so that topics such as embryology and entomology can be studied in the department of zoology. On the other hand, students of zoology can go to Sutton Bonington to learn about genetics, while lawyers and social scientists are instructed in agricultural economics.

Signs of approval of the research effort are recorded in the form of grants from government, industry and other organizations, which have recently been supplementing the contribution from the university's own funds. The department of applied biochemistry and nutrition, for example, has received £55,300 from diverse sources, most of it to cover one year's activities. The department of agricultural economics has been spending £134,000, which it is receiving in several instalments. This sum includes £30,000 over three years for joint work with the University of Zambia, involving an examination of factors affecting labour productivity. The rest of the school of agriculture has fared equally well, and no doubt feels confident in expanding its activities.

#### WATER RESOURCES

### Icebergs for Sale

from our Geomagnetism Correspondent

THE idea of towing icebergs from Antarctica to irrigate deserts farther north sounds at first as if it might have been invented by Spike Milligan. But with the shortage of fresh water in many areas, a serious evaluation of the idea is being carried out by Dr William Campbell of the US Geological Survey and Dr Wilford Weeks of the US Army's Cold Regions Research and Engineering Laboratory. More than 80 per cent of the world's fresh water, equivalent to about sixty years' precipitation over the entire globe, is tied up in Arctic and Antarctic glaciers. Even in North America the volume of water stored as snow and ice exceeds that