adds that even those who want to go on to get a degree elsewhere are often hampered from entering the kind of high-quality institution they prefer by the "inappropriately tough grading standards" which have been applied to them at Reed.

Reed officials are concerned about the high dropout rate. Mathematician John D. Leadley, who headed a committee on Reed's attrition, has written that he personally believes that half the Reed dropouts could be retained. Reed faculty members have commented that the dropout rate at Swarthmore College is less than a third that of Reed. "We can't feel smug about our attrition rate when a school that's as good or better is keeping many more of its people," Dudman argues. The attrition rate is especially painful to Reed in a period when it needs every tuition dollar that it can legitimately collect.

Reed is not likely to make substantial progress in educational reform or in tapping new sources of money until it finds a president. Reed has been looking for a leader since April 1966 when Sullivan announced his resignation. So far, three presidential prospects have turned down firm offers from Reed. Physics professor William L. Parker comments that before Sullivan's tenure "Reed was once known as the graveyard of presidents." Sullivan, who served longer than any other Reed president, is given high marks for breathing new life into the college, especially during the first years of his tenure. Some at Reed wish that Byron Youtz, who is now the acting president, would be chosen, but Youtz and others at Reed think that "it is important to bring in a person with new ideas to start new controversies." A search committee of trustees and faculty is looking for a man with a "tough hide" from outside the Reed faculty to direct the institution's future.

The new president of Reed will have a lot to cope with: financial deficits, high student attrition, and a faculty and student body that demand consultation on the major decisions affecting their community. Furthermore, some professors feel that Reed is now adrift in the educational "doldrums." On the faculty, "people are looking for a new deal on the educational front, but they don't know what it is," mathematics department chairman Lloyd B. Williams comments.

In their more pessimistic moments, some Reed faculty members wonder if their kind of educational institution will survive. "There is an awareness that the day of the private liberal arts college may be over," B. Hunt notes. Physicist W. Parker thinks that "the liberal arts college is going to have to do something different to justify these costs. I'm not sure it warrants this tremendous expense; most of our experimenting was done several years ago." The new president of Reed will have to do more than raise faculty salaries to convince some members of this community that an expensive undergraduate college is still a viable part of American educational life.

—BRYCE NELSON

Theoretical Astronomy: New Institute in Cambridge

Cambridge. A new institute of theoretical astronomy, tucked away in trees near the university observatories on the fringe of Cambridge, is a visible sign that astronomy's star continues to rise in Britain.

Establishment of the institute under its director, Fred Hoyle, however, came after several years of negotiations which were at times so troubled that the project appeared in real jeopardy. Reports of the difficulties, in fact, filtered into the press, giving the public an unaccustomed glimpse of the workings of British science politics.

In 1959 the government's Advisory Council on Science Policy agreed that it would be desirable for theoretical astronomers to have a place where they could get together and have access to a computer. Hoyle, as a distinguished theoretician in the field, was asked to comment on the situation.

In his response Hoyle pointed out that investment in radio astronomy in Britain had been relatively heavy, but that very little had been spent on theoretical astronomy. He recommended establishment of a research institute in theoretical astronomy whose members would be free of the responsibility of teaching undergraduates.

Hoyle's suggestion seems to have been favorably received in government, and something might have been done about it in the early 1960's if the project hadn't bogged down in arguments among astronomers over where the new center should be located. This was a period when new universities were being established and sentiment was strong for putting new programs at new places.

Hoyle, who had taken his degree and made his career at Cambridge, felt that conditions were right at Cambridge for establishment of the new institute, particularly since it is generally recognized that the brightest mathematicians among British school and university graduates are attracted in large numbers to Cambridge.

Approaches to the university at that time, however, were not warmly received. Hoyle had insisted that a computer was an essential, if expensive, part of the concept, and not enough university funds were available at the time to supplement the government contribution.

By 1964 Hoyle felt that circumstances at Cambridge had changed and that it was time to move on the project, particularly since major help from private sources was in the offing. At Cambridge, however, the situation was complicated by a split in the mathematics faculty over policies and personalities. Hoyle and some other senior men in the Department of Applied Mathematics and Theoretical Physics had in effect pulled out of that department.

Hoyle says he feels that traditionally a university is an uneasy mixture of teaching and research, but that the balance built up between the two functions during the first third of this century has been destroyed by the demand for teaching large numbers of students as well as by administrative chores. Unless something is done to redress the balance, he fears, research will suffer seriously.

In 1964 an election for the chair-

manship of his department had gone against Hoyle and his partisans. A reporter for the *Sunday Times*, one of Britain's "quality" newspapers, wrote at some length on the situation and, in the spring of 1965, reported that Hoyle, who did not comment publicly, might be joining the "brain drain."

Negotiations for establishment of the institute continued, with government officials making strong efforts to find a solution. Last summer arrangements with the university were completed. They provided a great degree of autonomy for the institute and represented a considerable bending of precedents. Work was pushed on the institute's computer center, a separate building which was completed in time for installation of an IBM 360-44 computer in February. The second building, containing work space for researchers and students and a small library, is just about ready for occupancy. It is a long, single-story brick building with big windows looking out on pleasant views. The comfortable offices have good light and plenty of blackboard and pin-board space.

The institute is situated across a field from the Cambridge observatories in the same former-country-house grounds occupied by the department of geophysics; it is across Madingley Road from the site where the new Cavendish Laboratory will rise in the next few years. Since the plans were drawn essentially according to Hoyle, the building should provide all that a theoretical astronomer needs.

The institute now has seven or eight research fellows on hand or on the books. All are under 30 except for Cyril Hazard, visiting professor of astronomy at Cornell, who is joining the institute staff. Since Hazard is British, he may be regarded as a case of brain regain. At full strength the institute will have about 20 research fellows, up to 10 visiting researchers, and about 25 graduate students. Hoyle does not expect the staff to reach full strength for at least another year.

The agreement with the university, which had aspects of a peace treaty, provides that members of the institute will do no regular lecturing. It has been suggested that the institute may have difficulty in attracting good graduate students if it has no direct contacts with undergraduates. Hoyle himself continues to hold his chair as Plumian Professor of Astronomy and Experimental Philosophy in the university and plans to give a series of lectures

NEWS IN BRIEF

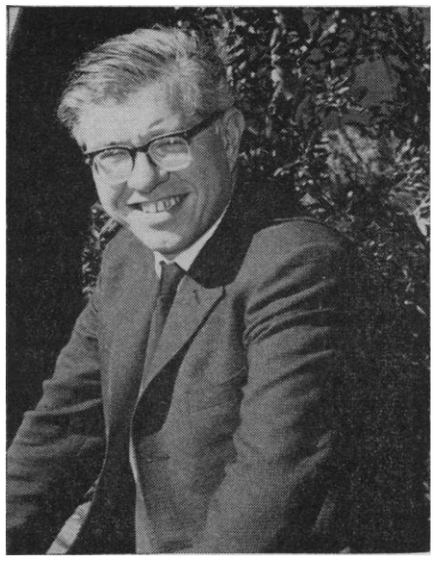
● **SOVIET-AMERICAN EXCHANGE**: The National Academy of Sciences (NAS) is accepting applications from American scientists who wish to study or do research in the U.S.S.R., Czechoslovakia, Poland, Romania, or Yugoslavia during the 1968–69 academic year. Agreements between NAS and the academies of these nations enable American scientists to make visits of not less than 1 month, to familiarize themselves with current scientific research. Visits of 3 to 12 months duration may be arranged for research. Applicants must be U.S. citizens and possess a doctoral degree or equivalent in the physical, biological, behavioral, or engineering sciences or mathematics. Participants will receive transportation to and from the capital of the country to which the visit is arranged and per diem allowance for expenses. Scientists who visit for three or more months will be reimbursed for salary. Those who remain 5 to 12 months may also receive support for their families. Applicants should apply for one country only. Applications should be sent to the Office of the Foreign Secretary, (USSR/EE), NAS, Washington, D.C. 20418, by 20 November.

● **MOHOLE COSTS**: Although settlement with the primary contractor and three major subcontractors of the ill-fated Project Mohole has yet to be made, the National Science Foundation (NSF) now estimates that total expenditures for the project will run between $27 million and $30.3 million. NSF is handling the mop-up operations for the project, which would have penetrated the floor of the ocean if Congress had not decided that $127 million for the 3-year project was more than it was worth. Total expenditures for the project through 29 April were a little more than $21 million. At that time, NSF reported to a Senate Subcommittee on Appropriations that settlement of outstanding contracts would cost an additional $7 million. NSF also stated the entire project would cost NSF about $1.8 million for the handling of contracts and other services. Daniel Hunt, Jr., special assistant to the director at NSF, told *Science* that a final settlement with the project's prime contractor, Brown & Root, will not be made for several months. In addition, three large subcontracts have yet to be settled, including one with National Steel and Shipbuilding, the firm which was slated to construct the $30-million drilling rig for the project.

● **QUATERNARY CENTER**: A Quaternary Research Center has been created at the University of Washington, Seattle, to encourage interdisciplinary study and research in the natural sciences. According to a statement issued by the university, "The purpose of the center is to provide a facility, transcending departmental boundaries, which will serve as a focal point for study and attract students interested in Quaternary research." "Quaternary" is a geologic term referring to the last 3 million years of the earth's development. Albert Lincoln Washburn, professor of geology, has been appointed director of the center, and Stephen C. Porter, associate professor of geology, has been appointed associate director.

● **BRITISH MEDICAL FOUNDATION**: The Royal Society of Medicine Foundation, Inc., has been established to promote closer relations between members of the medical profession in Great Britain and the United States. The foundation was organized under the auspices of the Royal Society of Medicine, a 13,000-member organization that is based in London. According to an announcement made by the new organization, the Royal Society of Medicine Foundation will provide "an opportunity for individuals, corporations, government agencies and charitable foundations in the U.S. to support medical research in Great Britain and to foster closer relationships between members of the medical profession in both countries." The organization has headquarters in New York City.

● **NAS GIFT**: The Alfred P. Sloan Foundation has given the National Academy of Sciences an unrestricted gift of $1 million. Academy President Frederick Seitz states that the money will be used to enlarge the academy's "independent resources in dealing with problems affecting the scientific community and national welfare." In March of this year, the Ford and Rockefeller foundations gave the academy $5 million and $1 million, respectively.



Fred Hoyle

during the coming academic year. And it is thought that word of the institute will get around in other ways.

Financing of the institute for the first 5 years will come through a combination of government, private, and university money. The Wolfson Foundation has contributed about $500,000 to build and equip the two buildings. Of the $1.75 million required for the first 5 years of operation, the government's Science Research Council (SRC) is to contribute 40 percent, the Nuffield Trust 40 percent, and the university 20 percent. The SRC contribution will go essentially to meet the cost of buying and running the computer.

Running costs of the computer will be paid in part by payments from other university users. The Cambridge molecular biology research unit, financed by the Medical Research Council, is the main example, having agreed to pay some $36,000 a year for use of the machine 4 hours a day for the next 2 years.

When the grants run out at the end of 5 years, new financing arrangements will have to be made for the institute. Customarily, projects which are started by the SRC and which flourish are taken over by the University Grants Committee, which distributes government funds to the universities. Hoyle admits that the institute's prospects after 1972 depend to some extent on the state of the British economy and the prevailing attitude toward basic research.

General control of the institute is vested in a committee of management made up of members representing interested departments in the university, the SRC, the Wolfson Foundation and the Nuffield Trust.

The work at the institute can be expected to be influenced by Hoyle's interests and reputation. Continued close contact with American institutions is indicated, particularly with Caltech. Hoyle estimates that in recent years he has been spending as much as a third of his time in the United States.

The new institute will put the Anglo-American interchange on a solid two-way basis, since American astronomers are sure to be drawn by the opportunity to use the computer and by the attractions of the institute and the Cambridge university community.

To Hoyle, the most important thing seems to be that the institute "will prevent you from training graduate students and then immediately losing them." The expectation is that most research fellows will move on to other posts after a few years at the institute, but they will have had the chance to make the most of their productive postdoctoral years, to the profit of themselves and of theoretical astronomy.

As for astronomy in general, Britain would appear to be riding a wave of balanced development. Outside Cambridge, a small group in theoretical astronomy has been formed at the new University of Sussex, around Professors W. H. McCrea and R. G. Taylor. Sharing of computer facilities at Greenwich Observatory is contemplated.

In radio astronomy Britain has been conducting a world class effort, with groups at Jodrell Bank under Bernard Lovell (*Science*, 1 May 1964) and at Cambridge under Martin Ryle. Now optical astronomers, who have felt themselves stepchildren for years, have had their prospects brightened by an agreement between Britain and Australia to share equally the cost of building a 150-inch telescope at Siding Spring Mountain in New South Wales.

All in all, there is a feeling in government and university science circles that in astronomy, at any rate, an antidote to the brain drain has been administered.—JOHN WALSH

Woods Hole: Summer Mecca for Marine Biology

Woods Hole, Mass. This Cape Cod village, situated on a finger of land 75 miles southeast of Boston, protrudes into waters that contain an abundant and varied marine life. For this reason, it has long been a major center for investigations in the marine sciences. Of the three research institutions clustered here, the one which historically has had the greatest influence on the American scientific enterprise is the Marine Biological Laboratory (MBL), established in 1888.

The others are the Bureau of Commercial Fisheries Laboratory, founded in 1885, and the Woods Hole Oceanographic Institution (WHOI), established in 1930 with the help of MBL's leadership. WHOI, whose current budget of about $9 million is several times greater than MBL's, has been developing rapidly and is now a leader of large-scale research programs in oceanography. But it is MBL, with its tradition as a place for summer research by independent investigators from universities and of intensive courses for advanced students, that has exercised a formative influence on several generations of biologists.

Moreover, much significant research has been done at MBL, although often the laboratory must share the credit with the investigators' universities, where the work may have started or been completed. Examples of important investiga-