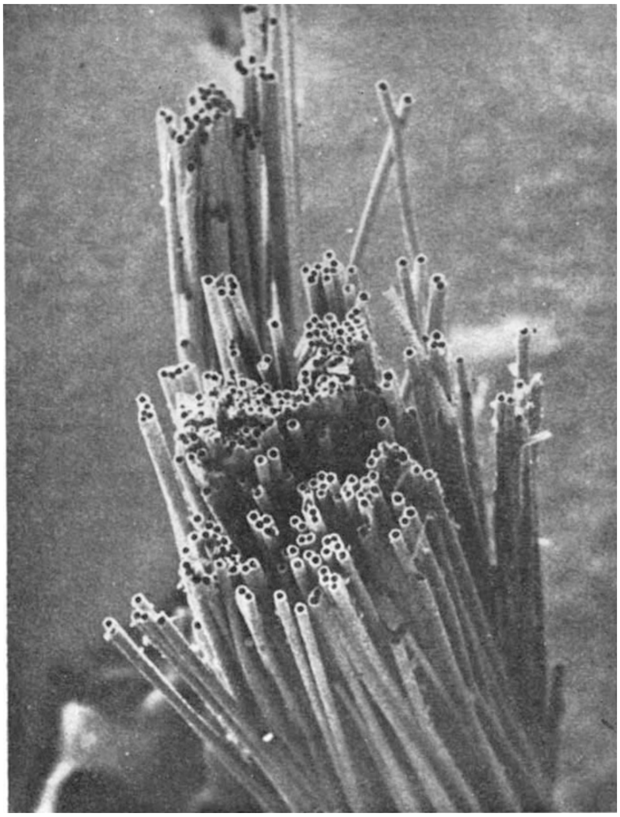
fibres with a thin tungsten film using a vapour deposition technique which it has perfected over the past twenty years. The idea behind coating the fibres with a metal is that they can then be incorporated into a metal matrix to form a tough stiff composite that can be used at higher temperatures than the more conventional fibre reinforced plastics. Coatings of light metals like aluminium are being tested at the Atomic Energy Research Establishment at Harwell and at the University of Nottingham, but the trouble with aluminium is its low melting point which means that the composites can be used only at medium temperatures—up to 400° C at most. Dr J. A. Coiley, the development officer at the institute, hopes that tungsten-coated fibres could be used at much higher temperatures, possibly as high as 1,000° C.



Tungsten-coated carbon fibres.

The FRI is a self-supporting research institute, owned by the Institute of Physics and the Physical Society, which undertakes research on contract for the Government and various industries.

The Ministry of Technology assisted in the development of the vapour deposition technique by sponsoring a project to protect the nose cones of small experimental rockets by coating them with tungsten, but the institute went ahead on its own with adapting the process to carbon fibres. It is hoped that with the current vogue for fibre technology and the potential value of high temperature composites, someone will be found to support a thorough investigation of the properties of these tungsten-coated fibres.

The main doubt expressed about tungsten coating, apart from its density, which is twelve times that of the fibre itself, seems to be its tendency to form a brittle alloy—tungsten carbide—with the carbon. Dr Coiley is confident that no carbide is formed during the vapour deposition process, but it is too soon to be sure that it will not be formed during further heat treating processes or with continued use at high temperatures. Aluminium coatings do not suffer from this disadvantage and they have the further advantage that they are light and can be easily incorporated in an aluminium matrix, but on the other hand their low melting point reduces the range of application. Dr A. A. Baker, on secondment from Rolls-Royce to the University of Nottingham, is working on a chemical vapour deposition technique for aluminium which is probably similar to that used at the FRI.

MEDICAL RESEARCH

Picking Up Pieces

LONG stop is not a coveted position—even on the cricket field—and not unnaturally the Wellcome Trust does not relish the prospect of acting solely as long stop for the British Government when it comes to financing medical research. The seventh report, for 1966–68, of the Wellcome Trust, which is the largest private source of funds for medical research in Britain, says as much and warns that its senior awards scheme designed to fund "men of real promise in medical research who might otherwise decide to emigrate" must be regarded as "a stop-gap measure and not a permanent subsidy".

The scheme was started in April, 1968, when the trust found itself coming under increasing pressure to provide money for important research projects which had become victims of cutbacks in Government support of the universities. This situation has, of course, been exacerbated by reductions in overseas spending by the US National Institutes of Health, which are also feeling the pinch. But in Britain, apart from the Wellcome Trust, there is little organized private philanthropy to cushion the effects of a Government squeeze. In response to this situation Lord Franks, the chairman of the trustees, wrote to the university vice-chancellors in April 1968, offering £2·5 million over the subsequent five years, and seven awards have been made so far.

The scheme is bound to become an increasing part of the trust's work and is in line with the general policy of increasing research assistance and reducing the proportion of funds going to provide new buildings and equipment. Of the £2·7 million given in the two years 1966–68, 57 per cent has gone on research assistance, including the setting up of units (several of which are overseas), fellowships and university awards, compared with 16 per cent for buildings and 12 per cent for equipment.

Among the fields of medical research which the trust believes are inadequately supported are dermatology, diseases of the eye, ear and nose and some sectors of neurology. These and a few other subjects have been singled out for special attention and the trustees have also decided that it is an opportune time to foster greater research cooperation with Europe. But like many another organization with the same intentions, the trust is not at present sure how best to do this. It has an exchange fellowship scheme which can always be extended but it is seriously investigating more novel proposals, including the direct support of research in Europe.

Another of its declared policies—support of interdisciplinary research—has proved "difficult to foster in the context of university departmental specialization". That is no doubt a polite phrase describing hours of sterile committee bickering, but the trust can at least point to one success, the new Department of Experimental Pathology at St Mary's Hospital, London, which is particularly concerned with the pathology of tissue rejection and has received £100,000 from the trust.

One of the advantages of the sponsoring by private philanthropy of research is that it can quickly come to the support of new areas of research which need money to achieve an initial impetus. The Wellcome Trust has provided its fair share of such support in the past two years. Professors R. Fraser and I. MacIntyre at Hammersmith, for example, have received a grant of £100,000 spread over the next five years for work on calcitonin, the newly discovered thyroid hormone. Work on another new family of hormones, the prostaglandins, has also been supported and so has work on the transplantation of organs at several universities as well as at St Mary's Hospital.

MARS

Viking Invasion Planned

WITH two Mariner spacecraft due to fly by Mars in seven weeks, two Martian orbiters planned for 1971 and two soft landings in 1974, the question of life on Mars could be settled in the next decade. Although this year's Mariners are programmed not to detect life but rather to ascertain whether conditions are favourable for life, the 1974 landers are to be set down in the wave of darkening where a colour change which may be biological occurs in the Martian spring. Called the Viking Project, the 1974 plan is for two orbiting spacecraft based on the Mariner configuration, but with an extra soft-landing component which will be detached after ten days in orbit. Last month, a $280 million contract for the landing system and technical integration of the project was awarded, as expected, to the Martin Marietta Corporation of Denver. It was announced in April this year that Jet Propulsion Laboratory was to be responsible for the orbiting part of the spacecraft, and for tracking and data acquisition. The NASA Langley Research Center at Hampton, Virginia, is managing the project, which has a total cost of about $400 million. Viking is to be launched by the Titan 3 Centaur vehicle during the summer of 1973 and will arrive at Mars early in 1974. Out of the weight of 7,000 lb, a retro-rocket system will account for 4,000 lb and only 400–800 lb of equipment is to be landed. It is to be hoped that by 1973 fears about the contamination of Mars will be allayed by the development of a workable sterilization system for spacecraft. According to Dr G. E. Mueller, associate administrator for manned space flight, NASA already considers the Moon to be a contaminated body, and it would be a disaster if the same fate befell Mars.

The two orbiters planned for 1971 are also to be of the Mariner type, and will orbit the planet for three months. Each spacecraft will weigh about 2,000 lb, of which about 900 lb will be propellants so that 1,100 lb containing 125 lb of scientific instruments will be orbited. Launch, by an Atlas-Centaur rocket, will probably be in May 1971 for arrival at Mars in November. The first of the two spacecraft will examine about 70 per cent of the planet's surface from an orbital inclination of 60°, while its successor will be at an inclination of 80° to get a better view of the polar caps, and possibly of the two Martian moons, Phobos and Deimos, difficult to observe from the Earth because of their small size and close proximity to the planet. Last November, management of the project was assigned to the Jet Propulsion Laboratory.

The Jet Propulsion Laboratory is also managing Mariners 6 and 7, at present en route for a Mars fly-by mission and due to arrive on July 30 and August 4 respectively when Mars will be 60 million miles from the Earth. As well as a programme of atmospheric measurements, the two spacecraft are to transmit a total of 141 pictures of the disk of Mars as they approach, followed by a sequence of 24 close-ups each, from distances down to 2,000 miles. With a resolution of 900 feet, the best of the close-ups should show in what form the Martian canals exist.

POWER GENERATION

Memoirs on MHD

THE publication of a book on the research carried out by the Central Electricity Generating Board on magnetohydrodynamic power generation will be a reminder of the CEGB's unhappy association with this project between 1964 and 1968. The book (*Open Cycle MHD Power Generation*, by J. B. Heywood and G. J. Womack, Pergamon, £15) is a monument to a research effort which was from the beginning a race against time, and which finally came up against the telling truth that MHD power generation would not be economic in comparison with nuclear power generation in the late nineteen-seventies.

The study of MHD power generation was started by the CEGB in 1959 at the research laboratory at Leatherhead. The basic mechanism of the system is to extract the energy generated by an electrically conducting fluid flowing through a region of magnetic field and to translate this energy into normal electrical energy. Most of the principal research problems had been identified by 1964, when it was decided to proceed with building an experimental plant at the CEGB site at Marchwood, Hampshire. By 1967, however, it had become clear that MHD would not be economically competitive with nuclear power generation, and by the middle of 1968 all work on the project had been terminated.

The CEGB has spent about £2·5 million on research into MHD power generation. Of this, about £750,000 was for the capital cost of the Marchwood plant. Although the CEGB has stopped work on this form of power generation their experience may prove of value to generating boards in other countries whose economic situations make it worthwhile developing an MHD plant.