

the new development may help to broaden the pattern of grant-giving. The Ford Foundation's enterprise in bridging the usually sharp line between grant-giving and investment will be widely admired, but it will be interesting to see whether the US taxation authorities will allow private individuals to make loans to similar organizations and then to claim freedom or partial freedom from tax. In Britain, the new development will, first of all, be a problem for the Charity Commissioners, who have so far helped to create the view that investment and grant-giving should be kept apart.

#### UNIVERSITY ENTRANCE

### Scottish Requirements Standardized

THE move by the eight Scottish universities in coming together in a new agreement on entrance policy should simplify the process of getting into university in Scotland. Last week the Scottish Inter-University Conference on the General Entrance Requirement announced that subject to Privy Council approval, the Scottish Universities Entrance Board which since 1919 has administered the entrance requirements of the four older universities—St Andrews, Glasgow, Aberdeen and Edinburgh—is to be dissolved. The certificate of Attestation of Academic Fitness (required for entry into these four universities) is also to be abolished.

In place of these will be the new Scottish Universities Council on Entrance, composed of three representatives from each of the eight universities—the original four plus Strathclyde, Heriot-Watt, Stirling and Dundee, which have all come into being since 1964. The function of the council, which still needs approval from the general councils of the four older universities, will be to keep the universities informed on matters of entrance, and to cooperate with educational organizations outside the universities. The council will also administer the Scottish Universities Preliminary Examinations which, together with the newer Certificate of Scottish Education, is the academic hurdle immediately preceding application for university entrance in Scotland.

Instead of applying for a certificate of attestation, a candidate for admission to a Scottish university in October 1969 will immediately apply to the university of his choice, either directly or through the University Central Council on Admissions. He will be able to assess his eligibility to apply according to the statement of general entrance requirements which the eight universities have agreed upon. Later this statement is intended to include details of the specific subject requirements of the various faculties and courses of each Scottish university, which of course must still be satisfied before acceptance. The new council, unlike the board which it replaces, will not have the right to decide whether candidates comply with the general entrance requirements of the universities but will only be able to advise on the validity of academic qualifications for entrance.

As before, the general requirements for entrance are the equivalent of five passes in the Scottish Universities Preliminary Examinations of which three are at the higher grade, or four passes at the higher grade. There is a separate set of requirements for the University of Strathclyde and the Heriot-Watt University which do not insist on passes in such a wide range of subjects as the other six universities. Although the general require-

ments as a whole will provide some increased latitude in choice of subjects, the traditional Scottish breadth of education will still be required. When specific faculty and course requirements are taken into account the situation for the applicant, in terms of the qualifications he must possess, will probably be little changed.

#### MEDICAL ENGINEERING

### Towards Artificial Heart—Lungs

from our Social Medicine Correspondent

A MIXED audience of medical workers, engineers and a sprinkling of officials from the Ministries of Health and Technology attended the conference "The Engineering Challenge of the Artificial Kidney and Lung Machine" held at the University of Leeds on October 3. Organized by the Yorkshire branch of the Institution of Chemical Engineers, the conference was held to mark the publication of the institution's fourth research report *Chemical Engineering in Medicine, The Artificial Kidney and Lung Machines*, by Dr J. R. Flower of the University of Leeds.

During the morning session, devoted to the artificial lung, Mr G. H. Wooler of Leeds Infirmary described various methods of assisting the circulation. He seemed satisfied with the machines available for perfusing adults, but emphasized the need for the development of smaller, equally safe machines for use with infants. This was followed by a description—from the engineer's point of view—of extracorporeal oxygenators by Dr Flower. With reference to the membrane oxygenators in which gas is separated from the blood by thin membranes of various permeable materials, he said that the chief problems to be overcome are the resistance which some membranes may offer to gas diffusion, possible blockage of the membrane by blood clots and the pressure drop across the membrane which may cause leakage either of gas or blood. Silicone rubber seems to be the most suitable material for the construction of membranes, and Dr Flower suggested that the principal challenge now is some means of packaging sufficient area of the membrane into a device which gives a thin uniform film of blood and which can pass about six litres of blood each minute.

Mr D. Longmore of the National Heart Hospital, London, talked about the future problems in heart-lung machines from the surgeon's point of view. He believes that prolonged circulatory maintenance will become possible within the next year or two. For the time being, however, the main disadvantage of oxygenators is the damage they cause to erythrocytes. Mechanical injury causes most damage, but decreases in blood pressure caused by localized high velocities can lead to cavitation and evolution of gas, causing severe haemolysis.

After lunch, Dr R. Baillo of the Royal Free Hospital discussed the technical, medical and economic problems arising with artificial kidneys. Dr Flower then considered the designs of dialysers, pointing out where many of them fail. Among the more novel approaches is the "fibre kidney" developed by the Dow Corning Company in which the membrane consists of very small fibres of regenerated cellulose, a bundle of the fibres being held together by resin "tube-plates" cured *in situ*. Another advance is the successful develop-