analyses. Its original hope was that a Family Index might be instituted, which would collate fertility information for each marriage throughout its course on a central 'family card'. The Registrar General indicates the difficulty of maintaining such an Index with any accuracy, and rejects the proposal mainly on the ground that, although the Index would be additional to periodic fertility censuses, it would not yield much additional information. The Committee further recommends certain internal changes in the General Register Office of England and Wales to strengthen its status as an instrument for the study of population statistics. It considers that demographic statistics should be available for Great Britain as a whole, and not only for its separate parts, and asks that arrangements shall be made for the production of detailed statistics for the whole area. In this connexion, the present volume contains a series of tables of demographic statistics for Great Britain, in some instances covering a period of more than a century, and compiled principally from the reports of the Registrars General. IAN SUTHERLAND

THE INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS

By PROF. F. J. M. STRATTON, O.B.E., F.R.S.

General Secretary

IN 1946 the first General Assembly after the War of the International Council of Scientific Unions was held in London. The desire to renew and invigorate international co-operation in the various sciences after years of enforced isolation was strong on all sides, and a valuable ally to active development was represented in Dr. Joseph Needham, head of the Natural Sciences Division of the United Nations Educational, Scientific and Cultural Organisation. He was the herald of generous financial aid to the Council and its Unions by means of grants-in-aid from Unesco, totalling each year some 200,000 dollars. These have assisted international gatherings and movements of younger scientific workers, by contributions towards travelling expenses, and also publications and the rehabilitation of scientific stations of international standing. It was no doubt due to the fact that international science was already so well organised in many branches that a good case could be made out from the start of Unesco for grants-in-aid that would usefully be spent in bringing together in friendly conference representatives of many countries—one of the best ways of forwarding peaceful relations among the nations.

Some of the well-established Unions—Astronomy, Geodesy and Geophysics, Chemistry and Radio-Science—quickly returned to their former activities on well-established lines. To others—Physics, Biological Sciences and Geography—came a new lease of life and greatly enhanced activity. Fresh applications for the admission of new unions soon came along, and within a year three were admitted by the Council—Unions of Crystallography, Theoretical and Applied Mechanics, and History of Sciences. Some opposition was offered to the acceptance of new unions in rather specialized fields; but the view that we should feel our way experimentally in the fluid state of affairs following the War prevailed.

Two classes of unions now exist, namely, General Unions, covering a wide basic field, and Specialized Unions.

The whole policy of admission of new unions is at present under review. There are two conflicting views. One is that to have too many unions would make the whole organisation unwieldy and would lay too heavy a burden on the national adhering bodies that carry the chief financial load of supporting the unions and the Council. The other is that it is the Council's responsibility to assist the development of science, especially in the newer and rapidly growing subjects, and that so far as possible the Council should cover the whole range of science. The difficulties can be partly, but not wholly, met by attaching new bodies to existing unions and by divisions of unions into sections. Basically, however, the fact has to be faced that fresh developments must involve increased financial support, and that considerations other than finance must be given full weight in coming to any general decision.

The past history of the Council and its Unions has been described in a pamphlet on the Unions prepared by Dr. John A. Fleming, a past president of the Council, and issued by the Council. It gives short historical accounts of the Council and the Unions, details of their publications, statutes, officers, sections and organisation generally; altogether, it gives an impressive picture of the extent to which, in some subjects at least, international co-operation has forwarded the progress of a particular branch of science.

One of the newer developments of the International Council of Scientific Unions since 1946 has lain in the formation of joint commissions to cover ground lying between the domains covered by two or more unions; radiobiology and rheology may be quoted as examples. In these cases a commission comes especially under one union, its mother union; but members are nominated by the other unions concerned. It is anticipated that such joint commissions will in due course be absorbed by the union that turns out to be chiefly interested, arrangements being made for other bodies to be represented in their membership.

Another body which has existed under the International Council since 1937 is a Committee on Science and Social Relations. This Committee has had to steer its way carefully between political questions, which do not fall within its terms of reference, and idealist statements which lack the desired practical effectiveness. No one will deny the great importance of the problems that it has to face; but it must be admitted that, on the whole, the organisations adhering to the International Council are not as actively interested in its activities as its originators had hoped.

One difficulty common to the International Council and its Unions is felt more particularly by the Council itself, and that is the need to keep a living contact with the more distant parts of the world. Europe, as was natural in 1919 when its predecessor the International Research Council was founded, has been all along its centre of activity: its General Assembly has never met outside Europe, and nearly half of its forty-three national adhering bodies are European countries. Though the modern ease of travel has brought the countries of the world as a whole nearer together, the greatly increased cost of travel has made meetings in the more isolated countries more difficult to arrange. Regional decentralization

may be the solution; but there are difficulties in the way of dividing up a fully international organisation, and the right answer may be close co-operation with existing regional bodies, such as the Pacific Science Council.

Finally, just a few figures about the International Council at the present moment. It has forty-three adhering countries, while the ten Unions have a number of adhering countries ranging from eleven to thirty-seven. It has ten Unions and eleven Joint Commissions; of the ten Unions, five, namely, Astronomy, Geodesy and Geophysics, Chemistry, Physics and Biological Sciences, are General Unions; while the other five, Radio-Science, Geography, Crystallography, Mechanics and History of Sciences, are Specialized Unions. The International Council is one of a small group of non-governmental international organisations that have formal agreements with the United Nations Educational, Scientific and Cultural Organisation, which recognizes it as providing a natural and appropriate form for the international organisation of science. A liaison officer, Dr. R. Fraser, established at Unesco headquarters, assures close co-operation between the two bodies. The president of the International Council is Prof. A. von Muralt, professor of physiology at the University of Berne, and director of the High-Altitude Research Station on the Jungfrauoch.

WATER CONSERVATION IN TERRESTRIAL ARTHROPODS

A DISCUSSION on "Water Conservation in Terrestrial Arthropods", arranged by Section D (Zoology) of the British Association, was held in Birmingham on August 31.

Owing to the small size and relatively large surface area of most arthropods, water conservation is a matter of vital importance, particularly to those species living in dry environments. Indeed, this need is often reflected in the anatomy and physiology of many of their organ systems; for example, in the closing mechanisms of the spiracles, in the digestive and excretory systems and, not least, in the cuticle and egg-shell. Since most attention has recently been focused upon the latter topics, it is natural that the discussion at Birmingham should have been devoted largely to the water-protective properties of arthropod cuticle and egg-shell.

A general introduction on the cuticle was given by Dr. V. B. Wigglesworth, who recalled the main growing-points over the past ten years. The typical hardening and darkening of the insect cuticle which arise from the tanning action of quinones on a water-soluble protein was discovered by M. G. M. Pryor. The process, just as in the tanning of leather, has the further effect of rendering the material hydrophobe and receptive to waxes and other waterproofing agents. A few years previously, J. A. Ramsay had pointed the way to further advances in our understanding of waterproofing mechanisms by his work on the cockroach cuticle. Among other findings he showed that the evaporation of water from the cuticle does not vary in a linear manner with the saturation deficit but, owing to a change in the physical properties of a waterproofing grease present at the cuticle surface,

increases abruptly at a critical temperature of about 30° C. This observation was later extended by V. B. Wigglesworth to other insects. Marked specific differences were found; in general, the more resistant the insect to desiccation, the higher the critical temperature. These variations were in turn related to the variable nature of the cuticular waxes, which were found to have graded properties when extracted. Conclusive evidence that the typical break in the temperature/evaporation curve is indeed due to changes in the properties of the waxes and not to any other component of the cuticle was advanced by J. W. L. Beament, who extracted and deposited the waxes on artificial membranes; the evaporation curves of such membranes showed critical temperatures closely approximating to those of the intact insects from which the waxes were obtained. The more rapid passage of water at the critical temperature is probably caused by a disturbance in the alignment of the wax crystallites owing to thermal agitation.

As a result of these and other studies on the mode of action of solvents and abrasive dusts on the cuticle, a new interpretation of epicuticle structure was proposed. Shown by the light microscope as an apparently uniform membrane, these indirect methods revealed the epicuticle as composite and built up from four very thin superimposed layers of tanned protein (cuticulin), polyphenols, wax and a cement-like covering substance.

Dr. J. W. L. Beament next described his more recent work on the waterproofing mechanisms of insect eggs. After briefly reviewing the remarkable range in size and shape of different eggs, he directed attention to the fundamental structural characters which render compatible the essential functions of mechanical rigidity and ability to hatch, water-conservation and respiration. The insect egg-shell consists of superimposed layers of protein which may be altered by tanning or other processes. All these layers are primarily water-permeable. Like the cuticle, the shell is made waterproof by the deposition of continuous films of wax or oil, although in some examples an existing layer may become impregnated with lipoid. But their arrangement is 'inside out', for the waterproofing layer is usually situated inside the shell and not at the external surface.

Various types of waterproofing systems can be traced. In what is perhaps a primitive condition, as exemplified by the tick egg, the wax is smeared on the outside of the egg by a special waxing organ. In *Dixippus* and apple sucker eggs, the waterproofing agent is also contributed by the mother and consists of an oily grease incorporated between the layers of the chorion. On the other hand, in such typical eggs as those of the blowfly and aphid, the wax layer is internal and is secreted by the oocyte. In *Rhodnius* there are two such internal layers laid down at different stages in the development of the egg. Dr. Beament concluded by describing the formation of the wax layers in *Rhodnius* and in the fruit tree red spider mite, both of which possess waterproofing layers of the double type.

It was a particular pleasure to hear Dr. E. H. Slifer, of the University of Iowa, describe her elegant researches on the conservation of water in the egg of the grasshopper *Melanoplus differentialis*. Here the main point of biological interest centres around the control of water uptake, since this phenomenon is intimately related to the onset and elimination of diapause. The fully formed egg-shell is again a