movement of water in saturated and unsaturated conditions through the soil. Soil chemists in Commission 2 concerned themselves with fundamental problems of research, and in particular research pertaining to the properties and formation of humus complexes. The importance of chemical change, especially exchangeable cation relationships, associated with soil genesis was also discussed. The investigation of the soil solution assumes even greater importance in the semi-arid areas where salt concentrations are sufficient to affect crop production. The influence of irrigation on saline and alkaline soils was reviewed by delegates from Egypt, Israel, the United States, Spain, Tunis, Hungary, Turkey, the U.S.S.R., and Romania. At the other extreme of the *p*H scale, the moderation of acid soils and their improvement for agriculture were the subjects of several papers. In a joint session with Commission 4 (Soil Fertility) the problems of the chemistry and biochemistry of phosphorus in the soil and in plant nutrition aroused considerable interest.

Problems involved in the examination of soil micro- and macro-fauna were discussed, and of special interest to the non-specialist in this field was the section dealing with the possibility of control of the activity of soil organisms. The variation of the natural environment within the soil and its repercussions on populations of organisms enables the soil biologists to gauge the effects of modern pesticides on the beneficial inhabitants of the soil. Interactions of soil micro-organisms and higher plants were discussed as well as the nature and effect of bacterial fertilizers.

The role and efficiency of fertilizers were the province of Commission 4, and the influence of soil conditions on nutrient availability to plants was discussed, as was the part played by organic matter in soil fertility. The section of the programme dealing with the efficacy of fertilizers on genetic soil types with different crops under irrigated or non-irrigated conditions provided an interesting link with the work of those concerned with soil classification. Many problems arising from the deficiency of major plant nutrients are now fairly well understood and have been remedied in advanced countries. However, the minute amount of the minor elements necessary has become an important investigation: papers read included reference to boron, zinc, molybdenum and sulphur, in various soils.

The most extensive programme was that undertaken by Commission 5 (Soil Genesis, Classification and Cartography). In this section alone more than 160 papers were read. As might be expected, the soils of south-eastern Europe were discussed at some length by delegates from the host country, Romania, and from Hungary and Bulgaria. Other sections were devoted to the origin and genesis of soils of the desert and semi-desert, steppe, mountain and cold regions, tropical, Mediterranean and sub-tropical regions. Progress in soil mapping and cartography was outlined by speakers from many different parts of the world.

Soil technology is never far removed from the fundamental investigations of soil chemistry and physics, and it was no surprise to find that there were joint sessions of Commission 6 with Commissions 1 and 2. Soil erosion is always a danger, particularly in semi-arid lands, and methods for its control have been developed from fundamental investigations of the physical and chemical conditions of soils. The improvement of eroded land provides the soil scientists with special problems, and on this point papers were read dealing with wind and water erosion and its control in Europe and in North and South America. Other topics in this Commission were the reclamation of saline and alkaline soils under irrigated and non-irrigated conditions; factors regarding the time and amount of irrigation water; and the influence of tillage depth and fertilizer placement on plant rooting.

Delegates to Commission 7 (Soil Mineralogy) were especially concerned with the genesis and changes that occur in the minerals present in soils; methods of identification of these minerals and research techniques were discussed. Clay mineralogy was extensively dealt with especially from the point of view of the influence of clay minerals on the structure of soils and their chemical and physical properties. Papers were also included on clay migration and the specificity of clay minerals to certain types of soil-forming processes.

Particular interest was stimulated by the general sessions of the Congress when a number of invited lectures were given. The session on the World Soil Map has already been mentioned; other topics were: "The Dynamics of Water in Soils and Plants", by M. B. Russell; "New Methods of Research in Soil Science", by J. J. Fripiat; "Some Aspects of Nitrogen Metabolism in Soils", by G. W. Harmsen; "Tropical Soils", by G. Aubert; and a paper on "The Modern Dokuchaev Approach to Soil Classification" was read on behalf of I. P. Gerassimov, who was unfortunately unable to be present at the Congress.

Three symposia were held outside the scope of the Commissions: these dealt with the fertility of forest soils, the interaction of photosynthesis and mineral nutrition of plants, and metabolism of the primary assimilation of nutritive elements in the absorbent zone of roots.

For the energetic there was the choice of one of three tours, before or after the Congress. These proved extremely successful and were arranged to demonstrate the soils of south-east, east and north-east, and central and west Romania. For the not-so-energetic, profiles of all the major soil groups found in Romania were assembled in a magnificent display which was on view throughout the Congress. The All-Union Soil Science Society of the U.S.S.R. also organized an excursion from Moscow to Kherson, illustrating the soils of European Russia, and providing many interesting comparisons with similar soils on the plains of Romania.

The soil scientists of Romania have achieved a great deal in recent years, and the results of their hard work were well shown in the excellent presentation of the soil landscape of their country during the Congress and its tours. All who attended the eighth International Congress of Soil Science will want to congratulate their Romanian hosts on the smooth way in which the Congress was run and to wish them success in their future work.

E. M. Bridges

USE OF FILMS IN RESEARCH AND TEACHING

A WORKING party, with Dr. W. L. Francis as chairman, formed by the Department of Scientific and Industrial Research in June 1960, following a meeting of those interested in scientific films from universities, industry and Government departments, has now reported on *The Film in Scientific Research* *.

The working party was to consider what is needed, in terms of information, research and development, in the field of scientific film and the appropriate functions of a central organization for scientific cinematography. It decided to limit its report mainly to the needs of scientific ciné-photography and photography, and to the uses of research film in research and in advanced teaching. An enquiry made for the working party by Mr. G. E. D. Bouler-Carter of Production Engineering, Ltd., indicated

* Department of Scientific and Industrial Research. *The Film in Scientific Research: Report of a Working Party*. Pp. vi + 67. (London: Department of Scientific and Industrial Research, 1963.)

that existing arrangements for training scientists, technicians and managements in scientific photography are inadequate, and that the low pay offered to scientific and medical photographers does not encourage pursuit of these occupations. Research workers have difficulty in obtaining information which would assist them in applying photographic methods, but certain advisory technical and research facilities could usefully be provided to assist them. Facilities for research photography are unco-ordinated in many universities; there is also lack of co-ordination between users and producers of educational film for universities, and existing distribution facilities for research films are inadequate.

The working party surveyed the demand for research films and their availability, and the use and improvement of scientific photography in research in Britain, as well as its use overseas. Recommendations were adopted proposing the establishment of an information service, preferably in some Government research establishment. The establishment was suggested of a central research photography unit, incorporating the information centre and financed jointly by Government and industry, the main function of which would be to conduct research on the techniques and development of scientific photography, and to encourage its use in industry and the universities. This it would do by rendering technical assistance and consultancy services where these are not readily available. Besides the establishment of a department of scientific photography in a suitable university or college of advanced technology, short advanced courses in scientific photography should be instituted in such colleges, particularly directed to the needs of scientists in industry. Central photography units should be encouraged in universities and, with the help of these units, universities should form their own libraries of 'concept film' as an aid in advanced teaching. The working party considered that the Department of Scientific and Industrial Research should be invited to compile, primarily as an aid in locating research film, a directory of users of cinematography in research in Britain, based on information already collected. The possibilities of making or compiling a film or films illustrating the techniques and applications of scientific photography should also be looked into carefully.

The recommendations relating to a university department of scientific photography, central photography units in universities and a research film library fall within the terms of reference of a Joint Committee of the University Grants Committee, the Department of Education and Science and the Scottish Education Department. It was appointed in 1963 to survey the present use of audio-visual aids in teaching and research in the pure and applied sciences in higher education. It is not expected, therefore, that these particular recommendations will be implemented before that Committee reports in 1965.

OCEANOGRAPHY IN THE CARIBBEAN AND EASTERN ATLANTIC

No. 2 of the first volume of the *Boletin* issued by the recently established Oceanographic Institute at the Universidad de Oriente, Cumana, Venezuela*, contains five papers, the high standard and choice of subject-matter of which promise well for the future of the subject, in an area where oceanography and the scientific approach to fisheries problems have hitherto received little attention; and that little mainly offshore work during long-range cruises by research ships from the United States and other countries, with all the unavoidable lack of seasonal coverage that this implies.

The emphasis has clearly been on filling the gaps in basic knowledge of the hydrology of the region, both seasonally and into the inshore areas where no extensive observations had hitherto been made; while on the biological side correlation between organic sedimentation and the hydrology of the bay most readily accessible from the new laboratory and the revision of the systematics of a group of fishes important to the local inshore fishery, with detailed description of their osteology, will both help to provide a basis for future research on obviously desirable lines.

For these reasons it would seem that the director of the new institute deserves congratulations on his choice of studies to be encouraged, no less than the individual researchers on the high standard of presentation of their observations. Apart from their local significance the hydrological papers contain much of interest to oceanographers generally.

In the first paper, Herman G. Gade describes oceanographic observations in the south-eastern Caribbean Sea and adjacent Atlantic waters with special reference to the influence of the Orinoco River. Two cruises carried out in August 1960 and April 1961 by the R.V. *Guaiqueri* give adequate coverage for the region northwards from the delta, with a special investigation of the shallow Gulf of Paria between Trinidad and the mainland, and "round the corner" into the Caribbean.

There was great seasonal fluctuation in the volume of the upper water of the region. In the Atlantic the depth of the transition zone varied from 100 m in August to 160 m in April. The offshore surface water changed from less than 34 ‰ to more than 36 ‰ salinity during the same period. The slope of the isopycnals indicated moderate upwelling towards the coast in both Atlantic and Caribbean regions. This was considered to be a result of strong currents parallel to the coast, and was most intense during the dry season. There were indications of a counter current below and within the transition zone in both regions. This seems analogous to the similar effect suspected (though not yet proved) to exist below the upwelling zone in the Benguela current[1]. Here, the maintenance of the sub-surface salinity maximum is attributed to this feature. The negative anomaly of surface temperature in the coastal upwelling zone of the Caribbean region reached as much as 5° C in the dry season. The ocean current entering the Caribbean through Tobago Sound appeared as a strong jet affecting conditions as far west as Curaçao.

Within the Gulf of Paria a western region of low salinity was separate from a region of more oceanic water to the east. The eastern and central waters of the Gulf appeared to be rotating clock-wise. In the north, three layers of water were distinguished: the two upper ones of Gulf water, the lower one of Caribbean origin. While the residual current flows through the Gulf from south to north, Caribbean water may at times penetrate into it at all levels under the influence of tidal currents, but chiefly below the surface layer through the Dragon's Mouth. In the appendix the strength of the anticyclonic circulation in the gulf is discussed on the basis of the deformation of the sub-surface isopycnals. In the theoretical model the water rotates as a rigid body. Applied to the observed

* *Boletin del Instituto Oceanografico*, Volumen 1, Numero 2. Pp. 287–482. Suscripcion: Bs. 10 por volumen de dos numeros; Bs. 6 por numero suelto. (Cumana, Venezuela: Universidad de Oriente, Instituto Oceanografico, 1961.)