and medical books, which are needed by specialists. In the Western countries where libraries are largely taken for granted, it is hard to realize that in many places a student may have access to very few books which he does not buy for himself; and the cost of one book may be more than a whole month's salary. In many places it is even impossible to get up-to-date lists of British books and their very existence is in danger of being forgotten.

The Americans have got round the currency restrictions by export schemes in which the publishers are paid directly by the Government, so that the importing countries need no dollars to pay for books. This was originally a British idea (invented by Sir Stanley Unwin) which the Americans have adopted. British text-books have been deservedly popular in Asia and Africa for many years, but there is a serious danger that they will soon be swept out of some important markets. Mr. Hampden said we are not afraid of fair competition, but British publications cannot compete with exports heavily subsidized by foreign governments. It is a matter of considerable concern to those familiar with the situation that the journals of many British learned societies are not organized as the book-publishers are to increase their sales overseas, and it looks as though these journals are getting seriously left behind. It is essential that more information about British scientific books and journals should be made available overseas. The British Council is doing all it can to spread this information abroad.

Dr. P. Rosbaud said that the cultural importance of scientific books has only recently been appreciated in Great Britain. The export of scientific and technical books is not only of benefit to the book trade but also has a far-reaching influence on education and commerce in general, so that it pays high political dividends as well. One of the main factors influencing distribution abroad is the cost. Why are scientific books so expensive in comparison with other books of similar size, and where do all the profits go? For a typical book of 250 pages selling at 30*s*. the publisher may hope to sell 3,000 copies and break even at 2,400—if he sold less than 2,400 he loses; if more, he gains. For such a book the printer's estimate may be 8*s*. a copy, including the cost of correction, blocks and paper. There is little to be saved by using paper of cheaper quality. The publisher's overheads might be 2*s*. 6*d*., advertising 2*s*. and the author's royalty at 12½ per cent would be 3*s*. 9*d*. Allowing 33 per cent, or 10*s*. for the bookseller, that left the publisher with only 3*s*. 9*d*. as his profit. In any sales in the United States the publisher may need the services of an American distributor who would ask 50–60 per cent of the selling price, and the British publisher would also have to pay the additional cost of freight. There is the alternative of selling a small number of books at a high price or a larger number at a lower price, as with text-books. Text-books have got to be cheap, and this might be achieved by bringing out a large first issue of 5,000 copies without profit and then making a profit on subsequent issues. It was not right that the author should ever be asked to waive his royalty, which was little enough anyway: no reputable publisher would ever ask that. In the publication of scientific journals great patience might be needed before a profit could be made. Sir Richard Gregory had told Dr. P. Rosbaud that *Nature* took more than twenty years before the circulation was sufficient for it to make its first profit. Publishing a journal is like cultivating a garden in which one must wait a long time for the harvest. As the circulation increases and the journal gradually becomes more profitable, the publisher can pass some of this on to the consumer by reducing the price or increasing the size. Scientific journals could be made considerably cheaper by including advertising space. Otherwise, the only way of reducing the cost is to increase the circulation. Where publishing is a government monopoly, as in the U.S.S.R., books and journals can be produced at a very low cost; but there are objections to this practice. Such publications may have plenty of room for the Lysenkos, but not for the Vavilovs and Pasternaks, and the results are tragic. There is an urgent need for the British Government to develop an effective export scheme in answer to the floods of cheap State-subsidized publications from other countries.

The chairman, Prof. G. W. Harris, asked how scientists in Britain could best help in getting scientific books and journals distributed in the countries that need them. Mr. Hampden thought that the Scientific Publications Council might help in bringing the problem to the notice of the learned societies. Dr. F. N. L. Poynter described the work of the Wellcome Historical Medical Library in collecting scientific books and medical journals and distributing them in under-developed countries abroad. He thought it would be helpful if the existence of a voluntary distributing centre of this kind were made more widely known.

MAPPING VEGETATION

An international symposium on mapping vegetation was held during March 23–26 in Stolzenau/Weser, in the Federal Republic of Germany. This gathering of 112 scientists from sixteen countries, including Japan and the United States of America, was organized by the head of the Bundesanstalt für Vegetationskartierung, Prof. R. Tüxen (Stolzenau), on behalf of the International Society for Plant Geography and Ecology.

The rapid progress of phytosociology (phytocenology) in this century, especially during the past three decades, has made feasible the scientific mapping of vegetation based upon well-defined plant communities. In view of recent advancements in this field, an international meeting to facilitate exchange of views, personal contacts and assessment of new future developments was very timely.

Mapping of vegetation at the Bundesanstalt für Vegetationskartierung (formerly Zentralstelle für Vegetationskartierung des Reiches) began in 1931 for the Nature Conservancy Service in Hanover. Then, as now, the mapping of vegetation was preceded by extensive field work on existing plant communities in the respective area by the methods of the Zurich–Montpellier school of phytosociology. In addition to fundamental research on plant communities, their

ecology and distribution, a large variety of applied research programmes have been completed which involved mapping actual and potential vegetation for various practical aims in agriculture, forestry, water supply, transport and nature conservancy. At present, a large programme of vegetation mapping has been undertaken for the West Germany railways, in which the vegetation along about 30,000 km. of its railway network will be mapped to provide a sound basis for certain practical measures. For some time the Institute has been working on a complex research problem concerning the relationship of a particular plant community to the soil profile, and members of the symposium were much impressed by the exhibition of about 300 large, well-prepared soil profile mounts from north-west Germany. In solving many complex problems on vegetation for Germany, this independent research institute has become indispensable to other neighbouring countries in Europe, which face similar problems of a fundamental or applied nature. It is hoped that recent progress will be maintained and its sound future development preserved.

The papers presented at the conference may be subdivided into three major groups: (*a*) methods, (*b*) recent advances, and (*c*) applications.

(*a*) *Methods.* The importance of fundamental principles, methods and aims is of much concern in any mapping of vegetation. In his introduction, Prof. M. Schwickerath (Aachen) referred to the significance of 'association diagrams' in mapping, by illustrating this with examples of the *Violon calaminariae* and *Sphagnum* associations. Prof. A. W. Küchler (Kansas) explained the compilation of a small-scale vegetation map of the United States and the various problems involved. Prof. A. Scamoni (Eberswalde) presented the new vegetation map of the East German Republic on a scale of 1 : 1,000,000 and indicated the principles applied in this work. Prof. I. Horvat (Zagreb) referred to the basic considerations in applying higher units of vegetation while outlining the main features of vegetation in Yugoslavia. Prof. A. Noirfalise (Brussels) reviewed the aims and methods used in mapping the vegetation of Belgium; and those for recording marine biocenoses of the sea bottom off the coasts of France were outlined by Dr. R. Molinier (Marseilles). On this topic Dr. Molinier gave a lecture illustrated by excellent colour slides of underwater scenes taken on various trips in the Mediterranean. Prof. H. Gaussen (Toulouse) explained the choice of colours in cartography, illustrated by his excellent bioclimatic maps of Africa and South America. The following five papers from the Bundesanstalt für Vegetationskartierung dealt with the main principles, methods and techniques adopted there. Dr. W. Trautmann discussed his field experiences, and Dr. W. Lohmeyer assessed the value of aerophotography. Prof. R. Tüxen stressed the importance of mapping potential vegetation, which is more advantageous in forestry than the actual vegetation. Dr. K. Walter spoke on introductory courses in phytosociology held in Stolzenau, and Dr. A. Wenzel explained techniques in cartography employed there.

(*b*) *Recent advances.* The advances made in recent years in phytosociology in various countries and the value of vegetation maps in related fields of science constituted the second topic of the symposium. Dr. A. E. Apinis (Nottingham) stressed the relationships of soil micro-organisms to higher plants and the value of vegetation maps for the fundamental research in soil microbiology. Prof. F. Major (Davis, California) outlined the basic approach to vegetation necessary for their mapping on a scale of 2 in. to 1 mile, while Mr. A. Miyawaki (Yokohama) dealt with the occurrence in Japan of snow-patch communities similar to those of the European mountains. Mr. S. Bertovic (Zagreb) described vegetation mapping in Croatia and in other parts of Yugoslavia, while Dr. A. O. Horvat (Pecs, Hungary) presented a detailed map of forest phytocenoses of the Mecsek Mountains in southern Hungary, and Dr. R. Neuhäusel (Brno) spoke on mapping natural vegetation in Moravia. Mr. I. S. Zonneveld (Sleeuwijk, Holland) explained the mapping of both alluvial soils and vegetation in the tidal fresh-water area of the Rhine delta, combining the direct field method with that of aerial photography. Mr. Doing Kraft (Wageningen) is using physiognomic characteristics in recording the unstable dune vegetation near Harlem. Dr. J. Tüxen (Stolzenau) spoke of the application of vegetation maps in solving problems in the historical investigation of rural landscape, while Prof. J. Schmithüsen (Karlsruhe) emphasized the significance of vegetation maps of various scales in phytogeography and other related sciences.

(*c*) *Applications.* The variety of purposes to which the mapping of vegetation may be applied was revealed by the following papers, which were illustrated by a number of excellent large-scale maps. Prof. A. Matuszkiewicz (Warsaw) spoke of developments in phytosociological mapping in Poland and its present applications. The possibilities of ecological and phytosociological mapping for applied purposes was discussed by Dr. G. Long (Montpellier). Prof. P. Fukarek (Sarajevo) outlined the application of vegetation maps in the forestry work of Bosnia and Herzogowina, and Prof. M. Wraber (Ljubljana) explained the use of the general map on a scale of 1 : 100,000 of potential natural vegetation of north-west Yugoslavia as a basis for re-afforestation work on the degraded Karst and Flysh areas. The paper of Mr. K. Mraz and Mr. V. Samek (Prague) on certain problems on the cartography of vegetation and its applications in forestry was read by Prof. R. Tüxen.

The mapping of vegetation is regarded as the best approach to solving problems of water relations in various plant communities. On this aspect Prof. H. Wagner (Vienna) reviewed the mapping of vegetation for certain purposes in connexion with hydroelectric works in Austria, while Dr. K. Meisel (Stolzenau) spoke on its importance for the assessment of damage to vegetation due to water. Dr. P. Seibert (Munich) showed the application of phytosociological mapping of 'Pupplinger Au' near Munich to the water economy service there, and an assessment of damage due to salt water to meadows of the Werra Valley was given and its prevention planned on the basis of a vegetation map described by Dr. B. Speidel (Bad Hersfeld). According to Mr. Th. A. de Boer (Wageningen) mapping of various grasslands in Holland has been combined with soil mapping to provide an efficient agricultural advisory service in certain areas. Prof. L. Steubing (Giessen) found the regular occurrence of certain grassland communities in areas where wind-break hedges are common. The importance and practice of mapping Alpine grasslands in Oberengadin was demonstrated by Dr. F. Marschall (Zurich). The two last papers dealt with certain aspects of nature conservancy. Dr. E. Preising (Hanover) reviewed mapping of vegetation in relation to problems of

nature conservancy and landscape, and Mr. P. Tideman (Doorwerth, Holland) found direct mapping combined with aerial photography very useful in the management of the various protected areas in Holland.

Two decisions of general interest may be briefly mentioned. (1) A permanent commission was formed for the preparation of a vegetation map of Europe, with Prof. R. Tüxen (Stolzenau) as chairman and the following members : Prof. J. Braun-Blanquet (Montpellier), Prof. L. Emberger (Montpellier), Prof. I. Horvat (Zagreb), Prof. A. Noirfalise (Brussels) and Prof. B. Pawlowski (Cracow). (2) The following resolution was adopted for submission to Unesco and all the member Governments concerned : "The vegetation of the Earth represents the vital productive potential upon which all life depends. Therefore, the comprehensive study of vegetation is of the utmost importance, and for this purpose the combination of ecological, phytosociological and cartographical methods are required.

"The present-day methods of mapping vegetation greatly enlarge our fundamental knowledge of plant communities, their development and distribution as well as providing a deep insight into their environments. In applied phytosociology the mapping of vegetation constitutes a solid basis for assessment of habitats, for utilization of vegetation, and for the evaluation, or even the forecasting, of any change or damage to vegetation by erosion, wind, water and other natural or human factors.

"It is suggested that no large-scale technical measures should be planned or carried out which may influence the vegetation or landscape without first mapping the vegetation prior to the respective technical measures being put into effect."

A. E. Apinis

BIOLOGICAL FIBRES

IT is some time since the X-ray Analysis Group of the Institute of Physics has met to consider biological fibres, so that the conference in Leeds held during April 17–18, even if only partly devoted to fibres, was very welcome. It is, however, symptomatic of the present place of specialist techniques (even if they are as well established as X-ray diffraction) in such fields as the study of fibre structure, and perhaps even more of the trend of development of the corresponding specialist groups, that of the seven papers presented on this occasion only two could be classed as predominantly crystallographic in content, whereas in two others, which dealt respectively with infra-red absorption and the electron microscope, X-rays had no more than a casual mention. That these other techniques are now essential partners with X-ray diffraction in research on fibre structure was emphasized by the part they played in the other three papers. Nevertheless, in this account attention will be confined chiefly to topics which are more closely associated with the nominal activities of the Group.

The successful study of the cellulose fibre by X-ray analysis set a fashion which is evidently, even after more than thirty years, not yet outmoded. This fibre is still presenting fundamental crystallographic problems for investigation ; for example, it seems still to be possible to argue about whether the cellulose chain molecules are all oriented in the same sense, or form two antiparallel systems. D. W. Jones and his colleagues (British Rayon Research Association) are non-committal about it in their discussion of cellulose I, but favour alternation in cellulose II. Prof. R. D. Preston (Leeds) suggests that in cellulose I alternation is unlikely, basing his argument on the idea that growth is by end-synthesis. His conclusion was, however, criticized in discussion, and also seems impossible to reconcile with the almost universal acceptance of alternation in cellulose II, although whether this is necessary or merely a convenient dogma is not at all clear. It does seem reasonable to expect that, if chain polarity is of any significance at all, the same type of arrangement will be present in both modifications.

Another controversial feature is the type of hydrogen bonding, about which there are two schools of thought respectively accepting or denying the presence of diagonal hydrogen bonds (specifically perpendicular to the [101] normals in the Meyer and Misch cell). The orthodox, among them the British Rayon Research Association team, agree with Meyer and Misch at least on this one point, that the hydrogen bonds are parallel to the a-axis of the unit cell. Both schools have recently adduced infra-red absorption results in favour of their arguments, creating further confusion for the non-specialist.

Agreement does seem to be reached on one point, that there is more than one cellulose I structure ; the eucellulose (Preston) or type A cellulose (Marrinan and Mann) of *Valonia* must, one supposes, be cellulose I proper ; ramie, the typical type B cellulose, is classed with most of the other plant fibres as yielding on hydrolysis, besides glucose, other sugars which are to be regarded as contaminants.

Some fibrillar aspects of the fine structure of cellulose also received attention. Preston believes that the microfibrils retain their identity when surrounded by incrustants in the cell wall, and that their surface structure is in some way responsible for the electron diffraction patterns which he and his colleagues have obtained from metal–cellulose complexes.

The application of X-ray analysis to the problem of the structure of silk fibroin is nearly as old as its application to cellulose, and we have been accustomed for a long time to distinguish between the structures of the two principal silks of commerce, domestic and tussah. It is now clear that these are but two of a family of at least six fibroins produced by various members of the orders Lepidoptera and Araneae ; the silks produced by some fifty species were examined by J. O. Warwicker (Shirley Institute, Manchester) to establish this. A disturbing observation is that there appears to be no strict correlation between the crystallographic type of the fibroin and the biological classification of the producing species. Structurally, the fibroins differ in the separation of the hydrogen-bonded pleated sheets of polypeptide