which has not yet been necessary. In any event no drug can be regarded to-day as being freely available, and economy is necessary in the use of all drugs. This second edition of the Memorandum has therefore classified substances into *A*, drugs which are important therapeutic agents and which should be made available so far as is possible; *B*, drugs which are needed for certain purposes, but supplies of them are limited—it is left to the good sense of the prescriber to use these only for purposes for which they are known to be valuable; alternatives to them are indicated, whenever this is possible; *C*, drugs which are not essential and do not justify importation or manufacture for home use in war-time. The list includes many substances which are used in chemical, biological and other laboratories, as well as those used by medical men and veterinarians.

SUMMER SCHOOL IN X-RAY CRYSTALLOGRAPHY AT CAMBRIDGE

THE second Summer School of X-Ray Crystallography, held at Cambridge during September 4–15, was opened by Sir Lawrence Bragg, and the nineteen lectures, followed by sessions of practical work, were shared by Miss A. M. B. Parker and Drs. N. F. M. Henry, H. Lipson, D. P. Riley and W. A. Wooster. The organization and syllabus of the course were similar to those of last year (see *Nature*, Oct. 2, 1943, p. 381).

The application of X-rays to crystallographic problems of industrial importance has made dynamic advances, but remains a young science still largely cradled in the universities and similar academic laboratories. Many of the senior technical men attached to industrial organizations have had no opportunity of acquiring more than a superficial knowledge of the subject and its possibilities; while graduates just entering industry, though they may have received some training in X-ray methods, can scarcely be expected fully to appreciate their application to practical technology. A gap clearly exists which it was the purpose of the School in some measure to bridge; to quote the syllabus of the course, "the chief aim is to give scientists and technicians a training in the fundamentals of the subject, to bring them into touch with the wide range of methods used, to teach them the newest techniques, and to indicate the many types of industrial problems in which this work can be used with advantage". There is no doubt that these aims were admirably fulfilled.

Twenty-nine people assembled for the lectures, and as nearly half the number were concerned more or less directly with metals it is fitting that the course had a distinct bias, especially in its later and more practical part, towards the metallurgical field. During the first week attention was confined to the more fundamental aspects of the subject, dealing with the representation in projection of the symmetry and internal structure of crystals, the laws governing the 'reflexion' of X-rays from lattice planes and the several methods of taking and interpreting X-ray photographs of single crystals. In the second week, the knowledge so acquired was applied to the study of polycrystalline aggregates by means of 'back-reflexion' and 'powder' photographs, and the essen-

tially practical nature of the course emerged. Familiarity was gained with such matters as the accurate determination of lattice spacings, the identification of crystalline substances and of the phases present in alloys; the assessment of preferred orientation, internal stress and grain-size in metals and the study of imperfect forms of crystals such as those occurring in rubber, textile fibres and plastics.

An important aspect of the more advanced work was the pains taken to point out the limitations of the methods at present available, and to indicate the probable lines of future progress.

E. VOCE.

SPORE-FORMING BACTERIA PATHOGENIC TO PLANTS

IT is a curious fact that whereas the bacterial diseases of animals are due to many types including spore-formers, the large number of bacterial diseases of plants which have been carefully investigated are caused by bacteria which do not form spores. That some spore-forming bacteria of the *Bacillus subtilis* group can be pathogenic to plants has often been stated but never generally accepted by plant pathologists, either for lack of adequate proof or because of failure to obtain positive results on re-investigation.

There are, however, at least two accounts of experimental work which conform to the standards of rigid proof required in such work. Brierley (*Phytopath.*, 18, 819; 1928) presented good evidence to show that a bacterial rot of potato tubers was due to a spore-forming organism identified as a strain of *B. mesentericus*, and recently Madhok (*Indian J. Agric. Sci.*, 13, 129; 1943) has investigated a rot of tomato fruits due to a member of the same group and for which the name *B. fructodestruens* is proposed. A sticky bacterial rot of potato tubers is under investigation at Cambridge due to *B. polymyxa* which, according to Dowson (*Nature*, 152, 331; 1943), is pathogenic to a large number of plants including green tomato fruits when inoculated under laboratory conditions. Allen (*Nature*, 153, 224; 1944) has shown that certain strains of *B. subtilis* secrete pectinases which rapidly disintegrate pieces of raw potato when immersed in their solutions and which are concerned in the separation of flax fibres in retting.

From these investigations it would appear that some spore-formers of the *B. subtilis* group and *B. polymyxa* possess the necessary enzyme apparatus to attack and destroy the middle lamella of parenchymatous tissues under certain conditions, chief of which is the presence of water (not vapour), an adequate amount of which is necessary to start the enzyme system working.

The *B. subtilis* group has been recently investigated by Gibson (*J. Dairy Res.*, 13, 248; 1944), who has shown that this group of spore-forming bacteria can be considered as consisting of three main species each of which comprises a large number of closely related forms hitherto given distinct specific names. It seems possible, therefore, that failure to repeat some of the earlier work on the disintegration of plant tissues by some of these bacteria may be due to errors in identification. The possibility that other spore-formers may possess pathogenic powers as regards plants calls for further investigation and is much to be desired in view of the serious losses caused by bacterial rots.