

routine operations but also in devising developments towards realising the progress inevitably suggested by discussion in relation to first principles.

It will be clear from the foregoing that the author has produced a work based on an unusual range of appreciative study of the sciences in their most recent developments contributing to the elucidation of the general theme, which, primarily indicated by its title, extends to the natural history of the vegetable kingdom.

We note in the text a considerable contribution of original investigations, which will probably be the subject of special publications in scientific journals. Lastly, the author is restrained in his criticisms of the researches of his fellow-workers; but a careful study of this work suggests that a notable proportion of the more speculative theories which they endeavour to establish will be excised from the student's memorabilia.

C. F. CROSS.

### War Record of the Survey of India.

*Record of the Survey of India.* Vol. 20: *The War Record, 1914-1920.* (Published under the direction of Colonel-Commandant E. A. Tandy, R.E., Surveyor General of India.) Pp. xxv+155+27 plates +9 maps. (Dehra Dun: Survey of India, 1925.) 3 rupees; 5s. 3d.

SINCE its foundation in 1767, officers and surveyors of the Survey of India have accompanied every military expedition with which India has been connected. In order to provide a reserve of surveyors for war it has been the policy, as in most other countries, to employ army officers during peace time on the ordinary mapping of the country, so that they may be available at the outbreak of war to provide maps always required during the progress of military operations, though never so much as under the conditions which obtain to-day.

There is no essential difference between peace and war mapping except that in the former case the work is of a more deliberate character, while in war it has, of necessity, to adapt itself to the exigencies of military operations. Until the recent War, tactical topographical maps on a scale of a half or one inch to the mile sufficed, but now trench warfare imposes much larger scales. Artillery maps, also on large scales, require to be of the highest order of accuracy to be of any practical value, while accurate control is required for the location of enemy guns. These new duties have largely enhanced the importance of the surveyor's work in war.

On the outbreak of the War the Survey of India found itself in a position to provide, at once, officers and surveyors proficient in their art ready to take the

field in accordance with its long-standing traditions. As the War went on, the call for officers became so insistent for survey and other duties that of the 54 regular officers employed in the Survey of India, 49 went on active service outside India. Of these eight were killed—all officers of the Royal Engineers—and eleven wounded. Of the 44 civilian officers who took part in the War, two were killed and two wounded. In addition, five Indian surveyors and 44 *khalasis* lost their lives in the service of the Empire.

The volume before us is a record of the operations carried out by the officers and surveyors in Mesopotamia, Kurdistan, Macedonia, Arabia, Persia, Palestine, East Africa, and Afghanistan. These explorations and surveys were accomplished in face of many difficulties and in every variety of terrain, from the icy highlands of Central Asia to the waterless deserts of Persia and Arabia. The total area thus explored by members of the department, often in unknown and unmapped regions, is almost comparable to that of Europe, while trustworthy new surveys, based on fixed points, covered an area more than twice that of Great Britain. In addition to a graphic description of the adventures that befell the surveyors in many lands, there is much valuable technical information to be found in the reports as to the methods of survey adopted, suitable to the different situations which presented themselves, and as to the climatic and political difficulties encountered.

The larger portion of the volume is naturally devoted to operations in Mesopotamia and Persia, where by far the greater part of the mapping was carried out. It is a record of intense devotion to duty on the part of officers and surveyors; nor must we forget the Indian survey *khalasi*, whose devotion to duty, whether in peace or war, though occupying but a humble sphere, ranks high among the servants of Government.

A roll of honour is included, and there are a number of photographs illustrating the different types of country concerned, as well as a series of index maps showing the areas actually surveyed. On the whole, this is a most interesting history of survey in war, and its production reflects the greatest credit on all concerned.

### Our Bookshelf.

*A Text-Book of Inorganic Chemistry.* By Prof. Dr. Fritz Ephraim. English edition by P. C. L. Thorne. Pp. xii+805. (London and Edinburgh: Gurney and Jackson, 1926.) 28s. net.

PROF. EPHRAIM has written a very modern "Text-book of Inorganic Chemistry," in which the names of Rutherford and Bohr appear in the twelfth line of the text, whilst Laue and the Braggs appear on p. 12 of