The *Zoological Record* itself was begun in 1865 as a publication by Van Voorst, under the editorship of Dr. Albert Günther, with a distinguished staff of recorders. The publisher paid for the printing, but the manuscript, we believe, was compiled for nothing. Mr. Van Voorst soon found the loss too great, and, though he continued as publisher, an association was founded in 1871 to guarantee the expenses. This carried on till 1887, when the *Record* was saved from extinction by the Zoological Society, which generously shouldered the burden and bore it unaided until the establishment of the International Catalogue of Scientific Literature. The question then arose whether the record of zoology should merely become one part in that vast scheme. Fortunately the secretary of the Zoological Society was far-sighted enough to preserve the continuity and title of the record and the control of the society, by inducing his council to contribute largely to the expense and to maintain its record committee. Consequently, when the International Catalogue failed, and when the Royal Society declined to undertake the huge expenditure on what had virtually become its sole responsibility, then zoologists still found their record appearing—retarded and weakened, but in being and ready to resume its old strength and value whenever they themselves would provide the necessary sustenance. Unfortunately, the increased costs of production have coincided with the loss of a number of subscribers owing to the effects of war and its *sequelæ*. The secretary of the Zoological Society has over and over again sought in various directions to supply this loss, but has not met with any cheering response. All these facts must be remembered before we venture to blame the society for its present decision. * * * *

For thirty-six years the Zoological Society has earned the thanks and praise of zoologists for its support of this indispensable aid. But zoologists at large must now do their share if they wish this support to continue. On their side, as well as on that of the recorders, there must be a little more enthusiasm and self-sacrifice. The vessel is stranded, but with good will from all hands she can be kept afloat till the high tide returns. If the workers will give some real earnest of this good will, we can not believe that the society which has so long served as pilot will leave her to be broken up.—*Nature.*

SCIENTIFIC BOOKS

THE NEW VOLUMES OF THE ENCYCLOPAEDIA BRITANNICA

MY experience as a reader of the *Encyclopædia Britannica* has been so intimate and long continued that I may perhaps be allowed to undertake what no one person can do perfectly, namely, the writing of a review of the three new volumes which were recently added to the twenty-nine volumes of the eleventh edition to convert it into the twelfth.[1] A lifetime given wholly to the study of such an extensive and varied work would not suffice as a suitable preparation for analyzing it adequately. It was the ninth edition which first stimulated my intellectual life and afforded me the earliest means of entry into the wealth of the world's culture; and I have never ceased to look upon this magnificent work with affection and gratitude. The eleventh edition marked an immense improvement over the preceding ones, excellent as these were; and it gave me a new lease of enjoyment of the intellectual heritage of our humankind. My occasional and partly systematic reading of the *Britannica* during the last eleven years has taken me through more than ten per cent. of this eleventh edition, and I have now read nearly as large a portion of the new volumes.

It is needless to say that in the field of my specialty the *Britannica* is too brief to serve my purpose. If it was sufficient for the specialist in every field it would be too large for general use and would lose its primary value as a storehouse of that knowledge and culture which is available and suitable for the general needs of educated men and women everywhere. The chief value of every such work must consist in the fact that it makes available to all intellectually minded persons the most important achievements of human thought and action in every division of endeavor which is essential to the civilization of the time. The contri-

[1] *The Encyclopædia Britannica*, The New Volumes, constituting, in combination with the twenty-nine volumes of the eleventh edition, the twelfth edition, 1922.

butions must therefore be broadly conceived and the work must be executed along lines which are not too technical. This is difficult if one is to achieve the character of authoritativeness which is necessary if the work is to be consulted with confidence. With respect to these ideals of clearness, of non-technicality, of authoritativeness, the eleventh edition of the *Encyclopædia Britannica* has succeeded more fully, I believe, than any other publication in any age or in any language; and the new volumes, under the same editorial management as the eleventh edition, have maintained a similar excellence.

In the 155 years since the *Britannica* made its first appearance in 1768 there has been a single occasion on which a new edition or a supplement to a previous edition appeared under circumstances comparable to those which existed at the time of the publication of these new volumes. During the years 1816 to 1824 there was published, under the editorship of Macvey Napier, a six-volume "Supplement to the fourth, fifth and sixth editions." This supplement was conceived in response to the pressing demand for a review of the world's situation immediately after the great wars of Napoleon which had just ended at Waterloo in 1815. It formed the only critical and universal survey then available for the troubled period to which it referred. Much of the information brought together in this supplement was of permanent value; and some of it could never have been procured if it had not been put on record at that time.

A similar need and a similar opportunity lay before Hugh Chisholm, the present editor of the *Britannica*, as he (just a hundred years later) undertook the task of organizing the material for the "new volumes" to cover the period from 1910 to 1921. He had an important advantage over his predecessor. The new volumes were prepared simultaneously and their publication took place practically at once. The whole work could therefore be under editorial supervision at one time. This gives greater unity to the text and puts the entire work at once into the hands of the reader.

There exists at present no other work comparable to these new volumes as a survey of the period of the Great War. They are arranged, as the editor says, "so that the articles may be adapted either for continuous reading or for occasional reference." They "have been planned as a guide to an appreciative understanding of contemporary affairs." In these volumes "the reader has before him what may be described as an international stock-taking" based on the comprehensive view of human culture afforded by the eleventh edition. There is never a way to understand the present, and especially a present so complicated as ours, except by seeing it in the light of the past. "The eye which looks only at the passing scene is too often color-blind." Our post-war world cannot be understood without a knowledge of our pre-war world. To behold current events in perspective we must employ the searchlight of the past. In this respect the preparation of the "New Volumes" was greatly facilitated by the existence of the eleventh edition completed only a short time before the outbreak of the Great War. No such cross-section of human progress as that contained in the eleventh edition could be taken now or can be taken at any time for some years to come. It is particularly fortunate that that great work was produced near the end of the long period of calm preceding 1914 when men could give themselves coolly to the task of evaluating the elements of human progress. The existence of such a work as the basis and starting-point of the "New Volumes" gives them an important advantage over any other survey of the war period likely to be produced in the near future. These new volumes are therefore an almost essential prerequisite to the needed stock-taking of our times.

The break-up of society following the Great War has so much turned attention everywhere to conditions of urgency and emergency and has so concentrated thought upon the immediate conduct of life and has so reduced experts everywhere, both in scholarship and in science, to the necessity of living (as it were) from hand to mouth and has so interrupted or suspended the accustomed intellectual activities that it has become a difficult matter to find intellects which are ready for the task of constructive analysis necessary to produce a work which meets the standards of the *Encyclopædia Britannica*. In this difficult undertaking the

editor has succeeded remarkably well. He has even been able to revive something of the international cooperation which was so useful in the preparation of the eleventh edition. The English speaking portion of the more advanced part of the world has been less dislocated from its intellectual foundations than any other portion; it is therefore natural that the first carefully planned universal stock-taking since the war should be carried out by them. Nowhere else has it yet become possible for such a work to be performed adequately.

It is inevitable that the Great War should loom large in these new volumes, and it is equally inevitable that they should be prepared under the assumption and the conviction that the war "was won by those who had right and justice for their cause" and "the historical justification for this belief is indeed given in the proper articles." By starting with the article on "The World War" and by employing the summary and references given in it the reader may easily organize for himself a systematic course giving an elaborate and authoritative history of the whole conflict.

Necessarily, the war and those things which grew out of it hold a prominent place throughout the "New Volumes"; it is this which gives to them a large part of their value. But the work as a whole is much more than a history of the war, much more indeed than the larger general history of the whole period of the war. All aspects of human progress and culture and knowledge for the period of 1910-1921 are taken into account; and the roots of some of the recent developments are traced far back to their beginnings. In this way some deficiencies of the eleventh edition are removed, as in the articles on Relativity, Protozoology and Nomography, for instance. The filling in of these gaps increases the usefulness of the earlier volumes and serves to complete the survey afforded by them. It is a matter of considerable surprise to me that so few of these gaps have been discovered. I do not know of any that escaped attention, and yet the number of important gaps filled in is very small. This makes clear as nothing else could the extraordinary adequacy of the eleventh edition.

Where the range of subject matter is so great as that in an encyclopedia a selection of the more valuable articles made by any one person will necessarily reflect his interests more than the character of the work itself. But it may be worth while to mention a few of the special topics which attracted my attention other than those dealing with the history of the period. No attempt will be made to indicate the more important articles as such; I intend rather to select some which appealed to me, and particularly those which one might perhaps overlook if his attention was not directed to them.

The article on Protozoology goes back to the beginning of that science; the account of its subject given in it affords very fascinating reading. In the article on Agriculture there is an equally interesting and related section on the "Progress of scientific research." The article on Geology should have many readers; this is especially true of the first two divisions of it. That on Anthropology is remarkable; in it we have a different view of the subject from that given in the eleventh edition. Under the heading of Relativity is found a brief and clear account of a modern subject which has attracted more general attention perhaps than any other subject in science has ever drawn to itself. Some of the surveys of recent national literatures are very entertaining; others are less so, and some are perhaps even a little disappointing. The articles on the electrical properties of gases and the constitution of matter are masterpieces of scientific writing. An excellent account of the League of Nations is given. The articles on Philosophy, Psychical Research and Palaeontology are fascinating. That on Zoology is a masterpiece. The one on mathematics is very pleasing, but the greater portion of it is too technical for one not well versed in this exacting science. Among other articles which I found very interesting are the following: Cytology, Archaeology, Astronomy, Botany, Chemistry and Embryology. In a survey which reviews the principal sciences under their general names it is somewhat surprising to find no article with the title Psychology. By some this may be counted a real omission. But there is an interesting article on Behaviourism. That this in a way takes the place of an article on psychology is significant of certain present tendencies in psychological

investigations—tendencies which (in my opinion) are likely soon to give way in part to those in the opposite direction.

My examination of these volumes has revealed remarkably few defects. The index will probably not prove to be as good as it might have been made, if one may judge from the omissions detected by looking occasionally to the index for references to interesting passages which were being read. One misses the "Classified table of contents" promised on the title page to the last volume but not supplied (at least in the copy I have and in one other which I consulted). The few pages required for this would have added greatly to the value of the work as a whole. But the defects are so few and the merits are so many that one should probably forget the former in his enjoyment of the latter. The distribution into articles is along the lines of an almost ideal arrangement; and the articles which I have read maintain generally a very high degree of excellence.

It remains to mention one other feature which should commend the work to all English speaking peoples. We may put this in the words of the editor, as given in the preface. "In the material structure of the New Volumes, and their sub-editing, the same note of Anglo-Saxon solidarity is struck as in the Eleventh Edition; and this is again emphasized by their being dedicated jointly to the two Heads of the English-speaking peoples, by express permission of King George V and President Harding. Nowhere except in Great Britain and the United States would it have been possible, under the world conditions of 1921, to find the standard of poise and perspective required in their construction." In concluding his preface, written after twenty-one years of continuous service as editor of the *Encyclopædia Britannica,* Hugh Chisholm says: "As architect both of the Eleventh Edition and of the superstructure which now converts it into the Twelfth Edition, it has been the present writer's privilege to be served by an international company of practical builders, supplying the world's best available materials and masonry; and he has been inspired by the ambition of cementing and adorning, in the completed edifice, that great movement for Anglo-American cooperation, on whose progress from strength to strength the recovery of civilization after the World War of 1914-19 must so largely depend."

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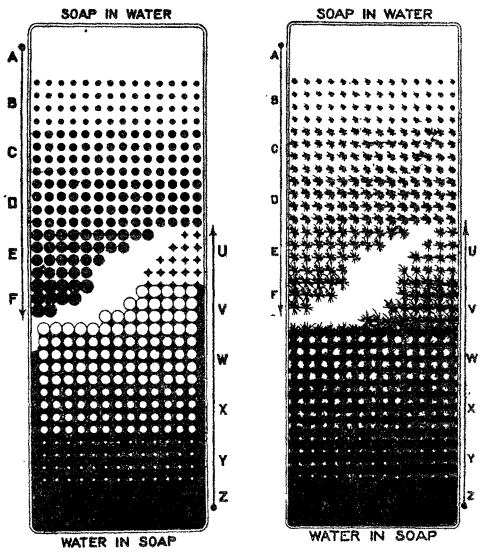
SPECIAL ARTICLES

ON THE ELECTRICAL RESISTANCE OF PHENOL WATER SYSTEMS AND OF PROTOPLASM

I

WE have tried to show in previous communications[1] that the characteristics of lyophilic colloid systems are best explained on the assumption that they are mutually soluble systems of the type phenol/water, butyric acid/water, etc.

Any lyophilic colloid system (like soap/water or protein/water) is, like phenol/water, capable of forming two types of solution, one of phenol in water and a second of water in phenol. When an ordinary soap/water system is permitted to cool, say from 100° to room temperature, it



changes from the first of these two types of solutions to the second. In the course of such change two zones of mixed systems are passed which are of special significance. As shown

1 Martin H. Fischer and Marian O. Hooker, SCIENCE, xlviii, 143 (1918); Martin H. Fischer, SCIENCE, xlix, 615 (1919); *Chemical Engineer,* xxvii, 186 (1919); Soaps and Proteins, 64, New York, 1921.