

that passes, and one of the questions of method which calls loudest for settlement is what particular plan should be adopted for the preparation of such indexes. The feeling of bibliographers now leans strongly towards the general adoption of the ingenious system of decimal notation devised by Mr. Melvil Dewey, the director of the New York State library—a numerical system of indicating and distinguishing the divisional sections and sub-sections of a classification to any desired degree of subdivision, the number affixed to an entry distinguishing not only the particular ultimate subdivision of the general subject, but at the same time indicating all the superior divisions to which the work in question also belongs. The merits of this principle of notation are independent of those of the elaborate classification of all literature which Mr. Dewey has laboriously prepared for use with it. The latter may be open to criticism, but it must be remembered that no classification is likely to satisfy every one. Some sacrifices are inevitable, and we believe that, even as it stands, Mr. Dewey's classification is a workable scheme adequate for most practical purposes. Indeed, American experience has tested this point for some years now. Accordingly, the International Conference of Bibliography, which met at Brussels last autumn, recommended the entire adoption of Mr. Dewey's system, which has also been approved and adopted, among others, and not to mention its American supporters, by the Association Française, the International Congress of Zoology, the recently-founded Institut International de Bibliographie (Brussels), and our Paris contemporaries, the *Revue Scientifique* and the *Revue Générale des Sciences*.

Other questions which remain to be settled by general agreement are the mode of preparing the material, the extent to which cognisance should be taken of the contents of papers as well as of their titles, the degree of subdivision to which classification should be carried, the terminology, and the language or languages to be employed. These and other associated questions are all ripe for settlement, and it cannot be said that any of them are beyond the reach of general agreement when all are convinced of the urgent need for their practical solution. Meanwhile schemes are formulating and maturing. M. Otlet, of Brussels, and his collaborators of the Institut de Bibliographie have developed and are applying a comprehensive system. The Faculty of Medicine of Harvard University have appointed a special committee to report on the question of a general bibliography of science. The French Ministry of Public Instruction is publishing a "Bibliographie des Travaux Scientifiques publiés par les Sociétés Savantes de la France."

About the last-mentioned work, an undertaking presenting, on a smaller scale, many points of similarity to that of the Royal Society, we may say a word or two. The idea originated with M. Milne-Edwards, and the work is being carried out by Dr. Deniker, the librarian of the Muséum d'Histoire Naturelle. It covers the long period from 1700 to 1888, and is to be divided into three sections. The first section, which is now going through the press, is an enumeration, volume by volume, of all the scientific articles contained in every serial, the serials being taken in alphabetical order of departments, and of the towns in each department, in which the societies are domiciled.

The second section is to be the general "Index Auctorum," each title bearing as reference the *numéro d'ordre* prefixed to it in the first section; and the third section is to be the "Index Rerum," each entry again bearing its reference number as before. This plan may be open to criticism, but the bibliography will be a fine piece of work when completed, and, as we said, to some extent parallel to the Royal Society's Catalogue, and indeed duplicating a large fraction of its contents. While admiring the industry and enthusiasm of its compiler, we are bound to feel some degree of regret when skill, labour and time are thus expended upon isolated sporadic and unco-ordinated undertakings, while they might be far more efficiently employed in co-operating upon one well-considered and carefully organised international scheme. This is the direction which future indexing work must inevitably take, and we look forward with impatience to the realisation of this crowning development of the Royal Society's long-sustained labours.

NATURAL SELECTION AND ITS CRITICS.

Nature v. Natural Selection. An Essay on Organic Evolution. By Charles Clement Coe. Pp. 591. (London: Swan Sonnenschein and Co., 1895.)

THE author at the outset of this work tells us he "believes that the process of organic evolution has taken place, but he does not believe that natural selection has been the means by which that result has been brought about." The object of his work is the attempt to support the latter contention. He does not profess to speak as an expert, or to bring forward any new observations, but chiefly occupies himself with the quotation and criticism of isolated passages from previous writers. He evidently feels a very sincere disbelief in the adequacy of natural selection, and regards himself as compelled by some sort of inspiration to communicate this disbelief to the world.

It is evident that the criticisms are intended to be fair, and they are conceived in no unfriendly spirit, and expressed with no want of respect to the great writers on the subject; but the method of minute verbal criticism of single sentences and short passages is one which almost invariably leads to unfairness, however unintentional, and the work before us has certainly not escaped from this very natural tendency.

A few instances, upon all of which comment is superfluous, will sufficiently indicate the competence of the author to deal with his subject, and the spirit in which he approaches it.

In speaking (p. 23) of the two phrases (he unaccountably calls them "two contradictory theories"), "Natural Selection" and "Survival of the Fittest," he says: "It seems almost incredible that a great writer should have rejected the more accurate in favour of the sometimes more convenient phrase." He seems to forget that it was too late to withdraw a phrase which was already world-wide, and, furthermore, that convenience in such matters is of very high importance. As the author inquires why natural selection is more convenient, he may be referred to Darwin's "Life and Letters," in which the subject is

discussed in detail. His own remarks on this point afford a clear example of the means by which the unnecessary size of the volume has been attained.

In Book i., Chapter v., numerous examples of co-operation in nature are quoted from various writers, and it seems to the author "to be quite impossible to harmonise the demands of the theory of natural selection . . . with the co-operation which is constantly found in nature."

In attempting to account for the extermination of the black rat by the brown, on other grounds than those of natural selection pure and simple, we meet with the suggestion (pp. 107, 108) that the proportion of brown females was increased in consequence of the proteid diet of black rats!

Upon the destruction of the watercress in the New Zealand streams by means of the willow, he remarks—"There is no abstract survival of the fittest: both are equally fit apart from one another."

The work is divided into three books, each of which contains seven chapters. The first book discusses the possibility, the third the evidences of natural selection, while the second compares it with other attempts to explain evolution.

It would have been far better if the author could have found "peace"—to use his own phraseology—by performing a task of less herculean proportions. In these days of hurry and hard work the world will find it difficult, if not impossible, to absorb a message which requires 591 pages to deliver.

E. B. P.

OUR BOOK SHELF.

Minerals, and how to Study them: a Book for Beginners in Mineralogy. By Edward Salisbury Dana. 8vo, 380 pp.; 319 figs. (New York: Wiley and Sons. London: Chapman and Hall, 1895.)

A GLANCE at this volume is sufficient to show that we have here a book of the sort which is wanted for quite elementary students. A sentence chosen at random from the introductory chapter will indicate at once how it differs from the ordinary text-books, both in style and method. Speaking of the trial of hardness, the author says: "It is necessary to be sure and distinguish between a real scratch on a smooth surface and the crushing of a rough surface by the knife-edge; a very hard mineral may often be scratched in this way. The danger of making a mistake of this kind is made less if, besides the useful knife-point, the mineral be rubbed on a piece of glass; better have a piece at hand (not disfigure a window-pane). Only do not make the opposite mistake and call a white ridge left by a soft mineral on the glass, which can be easily rubbed off, a scratch." Here is a real attempt to guide the beginner through the pitfalls which beset an unwary student; how different from the usual bald statement of facts, in which the possibility of any difficulty which may occur is not even mentioned. The same is true of the excellent chapter on blowpipe-testing; thus: "Another trial may be made with sphalerite or zinc blende, but to succeed now the mineral should be pulverised first, since it is infusible before the blowpipe, and the compound is only with difficulty decomposed on charcoal," &c.

It is of course difficult to maintain this style of writing when the author comes to the description of the various mineral species, but in that portion of the book also he

has contrived to present the facts in attractive language and make them interesting to an elementary student, and he is content to describe only the most important minerals; the smaller text-books at present available, excellent though they may be in other respects, are usually condensed epitomes of the larger treatises; they contain too much, and are not written in simple language calculated to engage the attention of beginners.

The book closes with an excellent chapter on the determination of minerals, full of useful and suggestive hints.

As might be expected from the author, or joint-author, of the best and most exhaustive treatise on minerals which exists, Prof. Dana's book, though elementary, maintains throughout a high standard of scientific method.

From the educational point of view, we note some striking defects due to the use of language which, though picturesque, may be misunderstood by a beginner. For example, the statement that "the reflecting goniometer demands polished faces if good results are to be obtained," will inevitably suggest the need of artificial polish to the student who takes all things literally; a similar misunderstanding will be produced by the description of Chalcotrichite as a variety of Cuprite, in which "the cubes are spun out into long threads."

The illustrations are mostly new, and among them are many good pictures of typical minerals; it is only unfortunate that the figures of the simple forms and combinations in the third chapter are so shaded that the faces appear concave. These defects can be easily corrected in a second edition, and do not detract from the merits of the book as a really useful and attractive introduction to mineralogy, which can be safely recommended to beginners.

H. A. M.

Heating and Ventilating Buildings. By Rolla C. Carpenter, Professor of Experimental Engineering, Cornell University. Pp. 400. (New York: John Wiley and Sons. London: Chapman and Hall, Limited, 1895.)

THE subject of heating and ventilating buildings has of late years been more and more considered by engineers in this country. In the United States, on the other hand, the question has received satisfactory treatment, and we have therefore much to learn from the systems in vogue there. The object of this volume is to present to the reader a general idea of the principles which apply, and of the methods of construction usually adopted in various systems of heating and ventilating. The author deals with the subject in a clear and concise manner, the information given being the result of extensive practice in designing and operating heating apparatus. Taken as a whole, the volume is of much value; it is well printed and nicely bound.

The author divides the matter into sixteen chapters, commencing with a description of the "nature and properties of heat"; he very fully enumerates the many laws pertaining thereto. On the general principles of ventilation we find much useful information. Some experiments made by Mr. Warren R. Briggs, of Bridgeport, Conn., on the subject of the proper method of introducing pure air into rooms, and the best location for the inlet and outlet, are described. The illustrations showing graphically the results are highly interesting, the best being obtained by placing the air inlet on the side of the room near the top, and the outlet in the bottom and near the centre of the room. The outlet, of course, must be connected with a flue of ample size, and maintained at a temperature higher than that of the surrounding air. Many authorities are quoted, and extracts from technical papers are given. The loss of heat through walls of various thicknesses is pointed out, and Mr. Alfred R. Wolff's lecture before the Franklin