counts of the results attained by scientific management as depicted by some of its enthusiasts, and after being solemly assured that the railroads of this country could save a million dollars a day by introducing the principles of scientific management, it is refreshing to read a calm, dispassionate, but keenly analytical paper like that of Mr. Bradlee, and, after finishing it we shall find ourselves less enthusiastic but more sane.

Another important paper in this section is that contributed by Mr. S. M. Felton, president of the Chicago Great Western Railroad, on the scientific management of American railways. This is the longest paper in the volume covering, with cuts, 46 pages. It gives a very interesting account of the development of American railways since 1850, with cuts illustrating the differences between rolling stock at the present time and forty or fifty years ago, and many interesting facts, figures and historical comparisons, both as to the physical characteristics of railways and the operating results.

Section *D* treats of recent industrial development, and includes 15 papers treating of improvements in electric lighting, illuminating engineering, gasolene engines, electric propulsion, the mechanical handling of materials and mail, electro-chemistry power plants, ore-dressing, etc.

Section *E* treats of public health and sanitation, and contains nine papers. This section is especially indicative of the work of the institute, for this school, it is fair to say, has been the leader in the training of sanitary engineers. The graduates from its department of sanitary engineering have taken a foremost part in the modern improvements in methods of water supply, filtration, and sewage disposal, and are found occupying positions of responsibility all over the country. The part that the institute has played in this development is traced in one of these papers by Professor George C. Whipple, himself one of the most eminent examples of the leadership of the institute in this department. Another paper, by Professor Phelps, gives an account of the work of the sanitary research laboratory and sewage experiment station, a novel and important adjunct of the institute.

Section *F* is devoted to architecture. In comparison with the splendid architectural department of the institute and the eminence of the men who have graduated therefrom, this section is the least satisfactory in the volume. It contains but four papers, two of them written by civil engineering graduates, and one by a mechanical engineering graduate, only one being contributed by a graduate in architecture. Possibly this is due to the fact that in pure architecture there may have been less development in recent years than in the other branches of applied science, most of the improvements in the construction of buildings having been of an engineering rather than of an architectural nature.

As a whole, the volume will well repay reading. Almost everybody will find material of interest in it, and will be struck with the excellence of the papers as a whole, and especially by the fact that one institution should, in so short a time, have been able to turn out so many men who have attained to leading positions as applied scientists. In this respect, however, the volume is almost as noticeable for the names that are absent as for those that are represented among the authors. Some of the most eminent of the institute graduates have not contributed papers, and it is probably safe to say that the school is quite capable of producing another similar volume of equal size and equal interest. GEO. F. SWAIN

The Mechanics of Building Construction. By HENRY ADAMS, M.Inst.C.E., M.I.Mech.E., F.S.I., F.R.San.I., M.S.A., etc. Longmans, Green, and Co. Cloth; $5\frac{1}{2} \times 9$ in. Pp. xi + 240; 589 figures. $2 net.

A rare combination of qualities is requisite to the authorship of a really good engineering text book. In addition to the literary polish of the novelist one must have the broad point of view of the practising engineer as well as the didactic skill supposed to characterize the college professor. The author of this book is an engineer who has received many tokens of confidence and esteem from his fellow engi-

neers, he has written many papers and books and for thirty-five years he was a college professor. His product, however, can hardly be called a really good book.

The author is chief examiner on engineering for the London Board of Education. At the request of this board a few years ago he gave to a group of teachers a series of lectures upon the "Mechanics of Building Construction, with the object of perfecting their knowledge of the subject and at the same time illustrating the manner in which it should be taught." These lectures have been expanded and form the basis of the present text.

In giving the original lectures and in this work of revision it may be conjectured that the author's duties as examiner were ever present in his mind and unconsciously influenced his style of writing. The attempt is made to explain methods of estimating the strength of all structural parts met in English building practise. The method chosen is generally that of working out particular problems rather than developing the principles involved. In those parts where some attempt has been made to develop principles, the writing seems very careless. In some cases the simplest things are explained and some of the important ones are omitted. While a considerable portion of the book naturally has to do with flexure, the simple principles of the theory of flexure are not given. It is apparent that the writer has not had the same class of readers in mind while he was writing different parts of the text.

The book will doubtless be of assistance to the men who are preparing for the examinations referred to. It can hardly be recommended to the general student. It seems, however, especially well fitted for the use of an architect or builder who has taken up his work without a proper education; his familiarity with the subjects treated will enable him to read the parts in which he is interested with some understanding; but it is a question whether such a man should be encouraged to make his own calculations unless he is willing to begin at the beginning in his study of the subject; otherwise it is almost certain that he will make mistakes due to the fragmentary character of his information.

The book is arbitrarily divided into thirty lectures for the supposed convenience of teachers who, while giving lectures upon the subject, may wish to follow the author in a servile manner. Graphical solutions are used throughout in preference to algebraic solutions; the figures illustrating the text are very numerous. The subjects treated cover fairly well the simpler problems likely to be met in building work in England; they do not include steel building construction as practised in America.

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The Evolution of the Vertebrates and their Kin. By William Patten, Ph.D. Philadelphia, P. Blakiston's Son and Co. 1912. Pp. xxi + 481.

Twenty-two years ago there appeared in the same number of the *Quarterly Journal of Microscopical Science* two papers, one by Professor Gaskell and the other by Professor Patten, both maintaining the inadequacy of all the theories that up to that time had been proposed to account for the origin of the vertebrates and advocating a new one, namely, the derivation of the vertebrate phylum from crustacean-like ancestors. For more than two decades both authors have devoted themselves to working out the details of their theories and we now have the results of their labors collected into single volumes, that by Professor Gaskell having appeared about a year ago, while that of Professor Patten now lies before us.

It must be confessed that a certain amount of scepticism will obtrude itself into the consideration of both works, not from any predilection for older theories, but on account of the fact that on a common foundation the two authors have built up systems of homologies utterly incompatible the one with the other, the result being that the reader, despairing in his search for the truth in either system, is inclined to cry with Mercutio, "A plague o' both your houses." Professor Patten's views,