EDUCATION AND THE TRADES

TO THE EDITOR OF SCIENCE: I was much interested in the letter of Stella V. Kellerman in your issue of November 13, in relation to "Education and the Trades." Her words "Only by teaching honestly what the world needs, and can use, may the schools accomplished their lofty aims" should be taken as a motto by educational leaders and authorities the world over. I should like to ask a question which I hope some day to see answered in SCIENCE:

Suppose a poor man is enabled by close saving to send his son to a high school "to get an education." The boy does not know what he is "going to be," has no ideas of any trade, business or profession, but he wants to be "educated," and is an average student. There may be hidden in this boy a Lincoln, a Carnegie, an Edison or a Rockefeller. He may have it in him to become a book-keeper at $1,000 a year, or a good mechanic at $3 a day. No one knows. By the time he gets through high school he may have acquired the ambition to go to college, or he may be tired of school and want to "go to work" at anything that turns up. *This is the average high school boy.*

What should be the high school curriculum for such a boy? If the elective system is in vogue who shall make the election for him, and on what basis or theory shall it be made, so as *not to waste the time* of the boy while he is in the high school? WM. KENT

THE NEW YORK SERIES

TO THE EDITOR OF SCIENCE: In view of the fact that my article on revision of the New York Series[1] is apparently much antedated by Dr. Grabau's paper before the New York Academy,[2] may I ask space to explain that my manuscript, exactly as printed, was submitted for publication the last of December, 1907, one week before Dr. Grabau's paper was read. A comparison of the two papers will reveal the changes necessary in my table to give proper recognition to the names introduced by Dr. Grabau, which thus acquired priority of publication. GEORGE H. CHADWICK

[1] SCIENCE, No. 715, p. 346, September 11, 1908.
[2] SCIENCE, No. 694, p. 622, April 17, 1908.

SCIENTIFIC BOOKS

A Text-book on Roads and Pavements. By FREDERCIK P. SPALDING, Professor of Civil Engineering, University of Missouri, Member American Society of Civil Engineers. Third edition, revised and enlarged. New York, John Wiley & Sons. 1908.

This book was first issued in 1894 while Professor Spalding was connected with Cornell University. A second edition was published in 1903. The many changes in methods of construction and maintenance, due in part to new traffic conditions, has made it necessary for the author to practically rewrite several chapters for this the third edition. In this, as in former editions, the author discusses the principles involved in the construction and maintenance of the various kinds of streets and roads. The first chapter, on road economics and management, contains, among other things, some interesting paragraphs on tractive resistance, in which is given a valuable table showing the relative loads a horse can draw on different kinds of roads and on grades from one to fifteen per cent. This chapter also contains articles on the economic value of better roads, sources of revenue and systems of road management. The second chapter deals with drainage of streets and roads and contains a table showing the proportions and dimensions of materials used in building reinforced concrete culverts of different sizes. This table should be of especial value to highway engineers and road builders. The third chapter relates to the location of country roads, and is treated from an engineering as well as from a practical standpoint. Chapter four, on the improvement and maintenance of country roads contains information on the building of earth roads, the use of the split-log drag, best methods of building gravel, oil, sand-clay and burnt-clay roads, and the advantages of wide tires. Broken-stone roads are considered in chapter five, which contains articles on the macadam and Telford methods of construction, rock for road building, methods for testing materials, main-

tenance of roads, bituminous macadam, etc. The theory and practise of foundations for pavements are presented in chapter six. Chapter seven relates to brick pavements, and contains complete information as to the most approved method of testing paving brick, and the construction and maintenance of brick pavements. The use of asphalts and bitumen in paving is discussed fully in chapter eight. The treatment and testing of wood blocks and the construction of streets of this material are treated in chapter nine. Chapter ten presents the most approved method of building pavements of granite and sand-stone blocks. The eleventh and last chapter presents various methods of arranging city streets so as to best accommodate the traffic. This is a practical book, and is advanced in character. On the whole the author covers his subject well. However, the first chapter could have been more complete, especially the portions relating to the economic value of good roads, cost of wagon transportation, and the benefits derived from road improvement. In the paragraphs relating to the testing of road materials, Mr. Spalding draws from what appears to be the latest published information on the subject, and fails to include a number of important improvements which have been made recently by road-material laboratories, notably the Office of Public Roads in Washington, both in testing machines and in the methods of testing road materials. The chapters on brick and bituminous pavements are probably the strongest features of the book.

Allerton S. Cushman

SCIENTIFIC JOURNALS AND ARTICLES

The American Naturalist for December has as its first article a paper on "Some Physiological Effects of Radium Rays" by Charles S. Gager, the author concluding that, up to a certain point the effect of radium is to stimulate growth, while beyond that it causes retardation or death. W. A. Cannon discusses "The Origin of Structures in Plants" and Braxton H. Guilbeau the "Origin and Formation of the Froth in Spittle Insects." His conclusion is that this is made up from two sources; the fluid portion being the anal secretion into which air is introduced by the caudal appendages, while the mucilaginous part is secreted by the glands of Batelli. William A. Hilton has a note, with an illustration, of "Peculiar Abnormal Teeth in a Jack Rabbit"; David Starr Jordan furnishes an unusually large number of "Ichthyological Notes," relating to many papers, and H. E. Jordan gives a "Digest of C. Correns's Memoir on the Inheritance of Sex in Higher Plants." The number is accompanied by the index to Vol. XLII.

Bird-Lore for November-December has articles on "The Sea Birds' Fortress (Bird Rocks)," by A. C. Bent; "The Drumming of the Ruffed Grouse," by E. J. Sawyer, with a picture from life; "The Use of a Blind in the Study of Bird Life," by Frank M. Chapman; "A Thrasher Friend," by Emeline Maddock and the seventh paper on "The Migration of Fly-catchers," by W. W. Cooke. The number contains the Report of the Annual Meeting of the National Association (of Audubon Societies) and the Reports of State Societies. This portion of *Bird-Lore* has grown in size and importance and now constitutes one half the number.

BOTANICAL NOTES

NOTES ON RECENT GENERAL PAPERS

Professor H. M. Richard's admirable lecture on "Botany" delivered in the Science, Philosophy and Art course at Columbia University is a concise answer to the questions as to the content and scope of the science of botany. Answering the question that it considers "all the questions as to the form, the functions, the classification and distribution" of plants, the author rapidly sketches the history of the science from Aristotle to Darwin in a few pages, and then discusses the present aspects of the different departments of the subject. Its reading will well repay any botanical student who wishes to be better informed as to the place that botany fills to-day in the world of science.

Here may be noted Mr. B. C. Gruenberg's thoughtful paper on "Some By-products of