so that the work ought to be done over before the conclusion can be accepted.

Since Professor Chamberlin has again and again mistaken my position, or has otherwise changed the point at issue, and since little of scientific value is likely to come of this discussion, I shall write no more upon this point.

RALPH S. TARR,

CORNELL UNIVERSITY.

POUDRÉ.

TO THE EDITOR OF SCIENCE: Mr. Goode's description of what he calls *Pseudo-Aurora* (SCIENCE, January 29, 1897), as seen by him at Moorhead, Minn., is abundantly confirmed by my own observations at this place. The complete manifestation of the phenomena is comparatively rare. The finest I ever saw was on January 22, 1890, an account of which was furnished by me at that time to the *American Meteorological Journal*, and published in the February number, and to which the title of this article was given by the editor, Mr. M. W. Harrington. From this article I condense the following extract: After a ten days' period of continued cold weather the thermometer reaching $-20°$ to $-32°$ at night, a south wind set in on the 22d, and the temperature rose to $+10°$. During the afternoon and evening the air seemed full of small ice crystals; and my recollection is that I examined them, and found them to be, as Goode describes them, minute, thin, perfectly clear, hexagonal ice-crystals. The reflection of street lamps and electric lights made long streams of light, *all tending to the zenith of the observer;* that produced by the electric light being so nearly like the Aurora Borealis as readily to be mistaken for it.

LUDOVIC ESTES.

UNIVERSITY OF NORTH DAKOTA, April 28, 1897.

EARLIEST PUBLISHED NOTE OF THE LATE CHAS. E. BENDIRE.

IN my obituary of Major Bendire, published in SCIENCE of February 12, 1897 (pp. 261–262), I stated that "his earliest published writings are in the form of letters to well-known naturalists, chiefly Allen, Baird and Brewer." While this statement is correct as it stands, the first letters mentioned by me were published in 1876. Dr. Coues calls my attention to an earlier note I had overlooked, one by himself in the *American Naturalist* for June, 1872 (p. 370), in which a quotation is given from a letter about a small owl, written by Bendire, from Tucson, Arizona. So far as I am aware, this is the earliest publication of any of Bendire's notes.

C. H. M.

SCIENTIFIC LITERATURE.

RECENT TEXT-BOOKS IN PHYSICS.

Elementary Text-books on Physics. ANTHONY AND BRACKETT. Revised by W. F. MAGIE. John Wiley & Son. Eighth edition. 1897.

The Elements of Physics. NICHOLS AND FRANKLIN. Volume III., Light and Sound. The Macmillan Co. 1897.

The Outlines of Physics. E. L. NICHOLS. The Macmillan Company. 1897.

Problems and Questions in Physics. MATTHEWS AND SHEARER. The Macmillan Company. 1897.

Intermediate Course of Practical Physics. SCHUSTER AND SEES. The Macmillan Company. 1896.

Experimental Physics. W. A. STONE. Ginn & Company. 1897.

First Principles of Natural Philosophy. A. E. DOLBEAR. Ginn & Company. 1897.

In view of the enormous number of new books, on all sorts of subjects, which are continually making their appearance, it is important to inquire whether book-makers, publishers and authors are not increasing at an abnormal rate. Indeed, it begins to look as if some check on their activity would shortly be necessary for the protection of those old fashioned people whose pleasure it is to read rather than to write books. At the present rate of book production it will not be long before that day, which has often been foretold, is actually at hand when every man will have time to read only his own works, and even now there must be some authors who are too busy for that.

The intellectual, and especially the scientific, activity of the present period is in some measure finding an outlet in the preparation of text-books for schools and colleges, and this is particularly true in the domain of the physical sciences.

It is easy for a teacher to convince himself that there is no existing book quite suitable for his work, and the feeling that he can make one which will meet his own wants and those of many other teachers is entirely natural. The result is a continually increasing number of texts, which are multiplying so rapidly that before long every class will be using that of its teacher for the time being, and no more dreadful catastrophe could overtake the long-suffering body of students whose interests are often lost sight of by teachers ambitious to become authors.

Although a very general practice, it is by no means always a sound one, to insist upon a class using the texts prepared by its instructor, and this is true even when that text is one of the very best of its class. American students are often greatly benefited by the use of English text-books, and there are many American books used with profit in English schools. By using a text prepared by one able scholar and sitting under the instruction of another the student is doubly benefited, and the harm which comes from a multiplicity of texts would be greatly lessened if every author were forbidden to use his own book. It is quite true that under such conditions there would be many books never used at all, but this would be one of the principal advantages of the scheme.

The above remarks, while suggested by, are not considered as specially applicable to, the list of new books on Physics which they follow, all of which, and many more, have issued from the press within a very few months. It may safely be asserted that no other science has grown and developed during the past ten or fifteen years as has this, and this growth is reflected in the very large number of text-books and treatises of all grades which have made their appearance during the last few years. They are easily divided into three classes: those that possess real merit and originality of treatment and which could not be spared without serious loss; those that are good, at least not bad, and whose existence is harmless; and those that, for various reasons, are undesirable and unwelcome, because unsound in either matter or method or both. In physics teaching and text-books, as in every other department of education, there appears the fad and the 'faddist.' In these days everybody is running after something *new*, not something good or useful. To achieve reputation in educational circles it seems only necessary to exploit a novelty, but fortunately in science teaching a considerable restriction is put upon this tendency by the inflexibility of natural laws. Curiously enough, in the making of books on physics that which is really most difficult is generally thought to be the easiest and is, therefore, the more frequently attempted. In the preparation of an extensive treatise on the subject the all important feature is matter, method being of only secondary importance; while in a text-book method of presentation rises to an importance fully equal to that of a truthful presentation of the principles and facts of the science, especially as it includes the selection of just what principles and what facts shall be set forth. Yet, although few undertake the preparation of a treatise, many esteem themselves fit to make a text-book. A well written treatise will usually include essentially all that the author knows about the subject; a well prepared text-book will generally represent only a small part of his knowledge.

Unfortunately too many text-books in physics contain all their authors know and much more, but the latter-day willingness of really able scholars to prepare elementary texts will before long put an end to their popularity.

The list of books given above contains several that will do to 'tie to.' The well-known text of Anthony and Brackett, published first about ten years ago, has enjoyed extensive and deserved approval as a college text-book of physics, and in this, the eighth edition, it has undergone extensive revision and improvement at the hands of Professor Magie, of Princeton, who had much to do with its making in the beginning. The changes are most evident in the treatment of electricity and magnetism and in the discussion of mechanics and the Kinetic theory of matter, in which respects as well as along some other lines the book has been practically re-written. The methods of treatment and the conception of fundamentals have been modernized, and the new edition constitutes a distinct advance, although the general features

of the original plan are preserved. The book constitutes an excellent college course on physics when supplemented, as it is meant to be, by full experimental illustrations on the lecture table. It is in no sense a laboratory guide, nor does it imply the existence or use of a laboratory.

For the great majority of students such a book and such a course ought to be supplemented by the use of a collection of problems illustrating the various divisions of the subject, and which are quite necessary to fix its principles.

The *Problems and Questions in Physics*, by Matthews and Shearer, will fairly well satisfy the demand for such a collection. The selection and arrangement of problems is, on the whole, very satisfactory, but the authors seem to have been continually in doubt as to whether they were not, after all, making a 'text-book.' Certain subjects are discussed at greater or less length, although the same matter will be found in almost any standard text. Considerable cost and space might have been saved by adhering strictly to the plan of a book of problems, and, indeed, some of the discussions do not tend to clarify the subject in any degree. No student can go through this book, however, without being greatly benefited.

Similar in grade to and not differing materially in plan from the new edition of Anthony and Brackett is the *Elements of Physics*, by Nichols and Franklin, the third and last volume of which has just been issued. Light and Sound are the subjects considered, and the treatment is largely mathematical yet elementary. There are no problems or exercises, and the scheme assumes lecture-table illustrations and occasional expansions by the instructor supplemented by actual laboratory practice by the student. Those who are familiar with the earlier volumes of this series will not need to be told that the work is well done and that the publication of this volume completes a valuable addition to the growing list of available text-books for use in colleges and in engineering or technical schools.

Professor Nichols also offers, in the *Outlines of Physics*, a text-book for the use of high schools or academies, a thorough knowledge of which he hopes may be accepted in lieu of a year of more advanced mathematics now required for admission to some colleges. There are some serious objections to this plan, to which extended consideration cannot be given in this place, for they in no way concern the character of the book under consideration. Every question concerning the relation of the secondary school to the college has two very distinct sides, but looking at only one of them, namely, the college side of the question, it may seem hardly wise to exchange a preparation in mathematics, which is undoubtedly more perfectly accomplished than anything else in secondary schools to-day, for a course in physics, instruction in which is far from what it should be. Professor Nichols's book contains a good résumé of the principles of the science, and is intended to serve at once as a text-book and laboratory guide. There is much difference of opinion among teachers of physics as to the wisdom of such a combination, many holding that really substantial results in the laboratory are only obtainable *after* a course in a good text-book with lecture-table illustrations, and that encouraging the average student to do laboratory exercises from the start is like plucking fruit before it is ripe. The immediate result is unsatisfactory, and subsequent perfection is well-nigh impossible. To those who believe in the method, however, Professor Nichols's book ought to take rank as one of the best of its kind, and, on account of its sound exposition of fundamental principles, much ahead of many that have appeared within the last decade.

Very similar in general character is the *Intermediate Course of Practical Physics*, by Schuster and Lees, which comes to us from the laboratory of Owens College, Manchester, to which physicists are already indebted for a number of high-class text-books. This book is extremely well done and will be of interest and value to all concerned with elementary instruction in physics. It is more nearly a laboratory guide than is Nichols's Outlines and should be used in connection with a text book. It may be criticised for the rather coarse experimentation which is occasionally employed. The standard of the laboratory should always be high, as the value of the work to the student depends almost entirely upon the degree of refinement and

precision required in its execution No laboratory in which such a book is likely to be used can fail to do better in the way of a simple pendulum than 'a string and a leaden bullet;' and successive values for 'g' ought not to differ from each other by as much as one and a-half per cent.

Professor Dolbear's little book on the *First Principles of Natural Philosophy* might impress one as being, in text as well as title, a protest against the progress of physics during the past quarter of a century. It is true that there are some things in it that were not known twenty-five years ago, but not many. Throughout the volume the author makes no mention of the metric units of mass and length, on the use of which so much of modern physics depends, declaring himself very decidedly against them in his preface. This naturally results in much confusion and difficulty, especially in the matter of electrical measurements. The fundamental principles of dynamics are presented in a confused and uncertain manner, and accuracy is sacrificed often apparently to secure simplicity.

Mr. Stone's *Experimental Physics* is evidently the outcome of his desire to satisfy the demands of the Harvard College entrance examinations in physics. The well-known 'forty experiments' prescribed by the Harvard authorities are included with a considerable number besides. The author says that the book is the result of nearly ten years' experience in teaching experimental physics, but he gives no hint as to how many years he has spent in studying the subject. The latter query is suggested by the numerous evidences of ignorance, or of extremely careless writing, which are scattered through the book.

Without raising the question of the soundness of the method adopted, which is that of laboratory work from the start, and before the student knows the simplest elements of his subject, it is sufficient to note that if the experiments outlined are made with care and reasonable precision very many of them will entirely disprove the principles they are intended to establish; while, on the other hand, if many of the principles laid down are accepted without careful tests the student will acquire many quite erroneous notions regarding the properties of matter and the principles of physical science. This is a serious indictment, but in its support it is only necessary to refer to the assumption that the breaking weights of wires of the same material are proportional to their cross sections; the announcement of the 'law' that for a given tension the elongation is inversely proportional to the area of the cross section of the wire, and other things similar in character. If the author had actually experimented on these things, instead of trying to tell others about them, he would not make such utterly absurd statements. The book contains many excellent problems, and now and then a good suggestion as to experimental methods.

There are many books of this type, and they all enjoy a common distinction of being, on the whole, more likely to create a distaste for real work than an appreciation of, and a love for, the science of physics. The study of the subject is made largely mechanical by having every experiment explained in the utmost detail, so that the student has nothing to do but to put the various pieces that he finds, carefully placed upon his desk, in the several relations explained in the book, and then note the result which the book tells him will follow. Occasionally some unfortunate may note that the prescribed result does *not* follow, but that something else happens, and in good time he may become a physicist, if not too thoroughly instructed.

It ought never to be lost sight of that the *real* value of instruction in physics, and especially in experimental physics, lies in *teaching people to think*. As a means of accomplishing this it has, perhaps, no rival, but both in and out of books the shadow is too often mistaken for the substance.

Antropologia della Stirpe Camitica. By Giuseppe Sergi. Torino, Fratelli Bocca. 1897. 8vo. Illustrated. Pp. 426.

This well-printed volume is part of an extensive study of the anthropology of Africa, projected by the distinguished professor of the University of Rome. It is devoted to the divisions, characteristics and distribution of that branch of the human species which, following

older authorities, he continues to call 'Hamitic.' To him this is more than a branch; it is a separate species of the genus *Homo*, to which, adopting the adjective first proposed by the writer of this notice, he assigns the term, 'Eurafrican,' indicating that its branches are to be found in both Europe and Africa (though he modifies the connotation of the term to suit his peculiar views).

Professor Sergi is best known from his physical studies of man, but in this volume he assigns linguistics a prominent place. In his preface, however, he is certainly unfair to his predecessors in asserting that they have not followed the zoological methods in anthropology. The very plan he puts forward as new, and his own, is perfectly familiar to readers of Darwin and Haeckel, and it can scarcely be ignorance of their anthropologic writings which led him to insert such a statement. His position as a polygenist is, moreover, surely inconsistent with the zoological method, as there is not a single zoologically specific difference to be found between the races of men. Therefore, what he calls in his preface 'the new and unexpected fact' of the specific independence of the Hamitic stock (for such it only is—not even with pure racial peculiarities) will be regarded as new, indeed, but far from true.

Nor will his treatment of the purely physical traits meet general acceptance. Skull forms have become less and less criteria of racial classification, and on these he bases most of his distinctions. The interesting and ethnically important question as to the origin of the blond Libyans he treats in a most unsatisfactory manner. Basing his opinion on a few local observations in Italy (themselves to be explained historically), he makes the extraordinary assertion that we may expect blonds above an altitude of 401 metres, and that the brown Lybians turned blonds by residing above that height! (p. 296.)

While the work is marred by these and some other grave deficiencies, its general composition is highly commendable. He divides the Hamitic stock, as others have done, into two branches, an eastern and a northern (others prefer western, which is more correct). The former are the 'black Hamites,' as the Somali and the Galla. He includes in them the ancient Egyptians, the Ethiopians and the Abyssinians, in which he will be followed but slowly, though no doubt they all partook of Hamitic blood at an early date. He also attaches to this branch the warlike Massai and the Wahuma. His northern branch embraces the Libyans and Berbers (who are, in fact, ethnically one), the tribes of the Sahara, the Tuaregs, Tebu and Fulbi, and the extinct Guanches of the Canary Islands. In these he does not go beyond the schemes of earlier writers.

In his concluding chapter he intimates the extension of his 'Eurafrican species' into Europe, concerning which he proposes to publish another volume. The 'species' will include the ancient peoples of Spain, Italy and Greece, Syria and central Europe, but will exclude the Celts, Slaves, Lithuanians and some Germanic peoples (p. 395). They belong to a different species! Certainly this is a strange use of a zoological term!

The work is well illustrated and contains a sketch map of the geographic position of the Hamites. There is also an excellent index.

To those readers who are acquainted with Professor Sergi's essay on 'the Mediterranean Stock' most of the theories in the work before us will be familiar. But the numerous facts which he has collected bearing on the traits and extension of the Hamitic stock will be gratefully received.

D. G. BRINTON.
UNIVERSITY OF PENNSYLVANIA.

Elementary Human Physiology. By J. G. M'KENDRICK, M.D., F.R.S. W. and R. Chambers, London and Edinburgh. 1896. Small 8vo. Pp. 240, with 164 woodcuts.

This book is based on a small manual on Animal Physiology, written by the author twenty years ago. The chapters are said to have been almost wholly rewritten and 'rearranged to suit the syllabus of the First or Elementary Stage, issued by the Department of Science and Art.' Copies of the examination papers of the Science department, South Kensington, for 1890–95 are given in an appendix.

As to the book itself, it may be said that the reviewer took it up with regret, recalling favorably a larger work by Professor M'Kendrick,

which appeared several years ago. The first impression was that this smaller volume was written around a set of illustrations of respectable age, but for the most part still serviceable. More careful reading, however, makes it clear that we are dealing with a pretty good elementary presentation of the subject, and that our first impression was not altogether just. We are ourselves somewhat skeptical of the scientific value of physiology in the secondary schools. Everything depends here upon the excellence of the teacher, and a good one will find M'Kendrick's book useful. It is to be sure, quite uneven, and in some places there is more detail than can be taken in by the class of students which the author seems elsewhere to have in mind. Much of the discussion is given with evident care and discrimination, and the facts presented are in general, despite the necessary brevity, quite fully modernized; even argon and the hot and cold spots are not forgotten, and the problems of interstitial secretion are suggested. There are, to be sure, many points on which one may well differ with the author, but most of them are perhaps not such as to involve serious defects. It must be said that the account of the nerve cells is altogether inadequate. The picture of them (Fig. 140) is quite in opposition to our present views and will make a stronger impression, we fear, than the explanation which partially corrects them and also shows that Professor M'Kendrick is well aware what the prevailing view is. The description of voice production is unsatisfactory and requires fuller illustrations without which most young students must find Fig. 164 hard to understand.

Joseph W. Warren.
Bryn Mawr College.

The Story of a Piece of Coal—What it is, whence it comes and whither it goes. By Edward A. Martin, F.G.S. New York, D. Appleton & Co. With thirty-eight illustrations. 16mo. Pp. 168.

Mr. Martin's little book shows that the author has read widely, has selected judiciously and has told the story pleasantly. The narration is attractive, and is likely to be commended by the readers for whom it is intended.

All this makes one regret that the judicious selection was not associated with accurate reading. There are serious slips in too many places, and there is too much of positive assertion where modest suggestion would be preferable. As for some of his statements, it must be said that he should have every opportunity to prove them, since many persons would not accept them without hesitation.

Among other things, he tells us that iron, silver and water alone possess the power of expanding, when passing from the liquid to the solid state (p. 80); that no explosions in the anthracite region of Pennsylvania were due to coal dust (p. 100); that coke if properly made, should consist of pure carbon, and that good coal should yield as much as 80 per cent. of coke in the gas retort (p. 109); that our anthracite is inexhaustible, and that the 'mammoth vein' extends for 650 miles along the west bank of the Susquehanna (p. 147).

Mr. Martin says (p. 152) that Britain will feel, with tremendous effect, the blow to her prestige when the first vessel laden with coal weighs anchor in a British harbor. Three such blows were administered in 1896 by one Kentucky concern, and the attack has been continued this year by another.

J. J. Stevenson.

SOCIETIES AND ACADEMIES.

BIOLOGICAL SOCIETY OF WASHINGTON, 276TH MEETING, SATURDAY, APRIL 24.

Mr. M. A. Carleton spoke on 'Climate as an Element in Wheat Environment,' his remarks being mainly a comparison of the conditions prevailing in the wheat belt of southern Russia with those found in the western United States. He stated that low temperature, accompanied by aridity, prevented the raising of spring wheat, and that the successful ripening of grain did not depend on the average temperature, but on the total temperature of the hottest months. Mr. Frederick V. Coville presented a paper on the 'Plantfood of the Wild Ducks in Chesapeake Bay,' and particularly of the canvas back and its favorite food of the tubers of the wild celery. A large portion of the best feeding ground of the upper Chesapeake was de-