ascertained laws." "All religions, all philosophies, all parties, have sought to establish an eternal camp at some mile-stone of progress, but all have failed. It is difficult to grasp the full force of this idea — the individual. . . . Men of lower races are much of one pattern. Civilization is an individualizing process; so in turn men of intense character have done most of the propelling that has constituted civilization." "The first need of a plant is precisely the first need of an animal; and that of man is the same. This common need of all life is to find out facts, — facts about what is not itself, — and then to adapt itself to what it finds out." "Nowhere in nature has there been as much parasitic life as among human beings. It takes a large degree of wit to live idly, and off your neighbor's industry. But some vegetables learned to do this before man did it; and many animals have done the same. The result has been degeneration, loss of structure, loss of faculty, and, as a rule, final helplessness and degeneration of the whole being." "But it is not simply at the height of national existence that this impulse for self-preservation responds to the mimicry of lower life. You will observe its operation in our social customs and common propensities; for it is a fact that not any thing is more dreaded or shunned by average human beings than originality, — that is, unlikeness to others. It has always been dangerous. It is even yet likely to secure for its possessor a great deal of annoyance." "Strange views break out all over the globe by apparent spontaneity. . . . Darwin, and Wallace, and Haeckel, without intercommunication, propounded simultaneously the hypothesis of evolution. It is as when three mountain-tops of equal height catch the morning sunbeam at the same moment."

Sixth Annual Report of the United States Geological Survey (1884–85). J. W. POWELL, director. Washington, Government. 4°.

ALTHOUGH on account of the tardy appearance of this volume, for which the management of the survey does not appear to be responsible, the administrative portions have lost some of their freshness and interest, the work as a whole fully sustains the splendid reputation of its predecessors. These annual reports are admirably designed, when promptly issued, to place the Geological Survey *en rapport* with the general public: for they consist of, first, the report of the director, which is devoted to the organization, new features, and general operations of the survey; second, the short administrative reports of the chiefs of divisions, showing in greater detail the progress made in every department of the survey during the year; and third, and most important of all, the scientific papers or monographs completed during the year. The monographs are also published separately, and appear in the annual report *in extenso* or in abstract form, as convenience or their general interest may demand. The bulletins of the survey are shorter but more technical papers, which are not represented in the annual report; the object being to include in this volume only the results of most general interest, with the view of making it a somewhat popular account of the doings of the survey, that it may be widely read by the intelligent people of the country.

The report is accompanied by the following monographs: 'Mount Taylor and the Zuni Plateau,' by Capt. C. E. Dutton; 'Driftless Area of the Upper Mississippi Valley,' by T. C. Chamberlin and R. D. Salisbury; 'The Quantitative Determination of Silver by Means of the Microscope,' by J. S. Curtis; 'Seacoast Swamps of the Eastern United States,' by Prof. N. S. Shaler; 'Synopsis of the Flora of the Laramie Group,' by Prof L. F. Ward.

The last-named paper has already been noticed in the pages of *Science*, and several of the others are of such great importance and general interest as to demand fuller comment than it is possible to accord them in this preliminary notice.

The force of the survey is now, and must be for several years to come, largely devoted to the construction of a topographic map of the United States; and the director's report begins with the plan and progress of this work, and illustrations of the lettering and conventional signs to be used on the map. The scale of the map is approximately one mile, two, or four miles to the inch, according to the character and prospective needs of the country; the map is constructed in contours, with vertical intervals of 10, 20, 50, 100, and 200 feet, varying with the scale of the map and the magnitude of relief features; and, finally, the map is to be engraved in sheets, of which the unit is to be the square degree, i.e., one degree of latitude and one of longitude. An area of 57,508 square miles was surveyed in the year 1884–85, at an average cost of about three dollars per square mile.

The organization of the survey is more fully explained here than in any of the previous reports. Besides the large topographic corps under Mr. Henry Gannett, it includes the following divisions, each chief or head of division being provided with a strong corps of assistants: 1. Glacial geology, in charge of Prof. T. C. Chamberlin; 2. Volcanic geology, in charge of Capt. Clarence E. Dutton; 3. Archæan geology of the Appalachian region, including all the metamorphic or crystalline strata, of whatever age, extending from northern New England to Georgia, in charge of Prof. Raphael Pumpelly; 4. Archæan geology of the Lake Superior region, in charge of Prof. Roland D. Irving (it is not proposed at present to undertake the study of the crystalline schists of the Rocky Mountain region); 5. Areal, structural, and historical geology of the Appalachian region, in charge of Mr. G. K. Gilbert; 6. A thorough topographic and geologic survey of the Yellowstone National Park is in the charge of Mr. Arnold Hague. When the survey is completed, Mr. Hague's field will be extended so as to include a large part of the Rocky Mountain region. The general geologic work relating to the great areas of fossiliferous formations is very imperfectly and incompletely organized, and this must continue to be the case until the topographic survey approaches completion.

The paleontological work of the survey is carried on in five laboratories, as follows: vertebrate fossils, in charge of Prof. O. C. Marsh; invertebrate fossils of quaternary age, in charge of Mr. William H. Dall; invertebrate fossils of cenozoic and mesozoic age, in charge of Dr. C. A. White; invertebrate fossils of paleozoic age, in charge of Mr. C. D. Walcott; and vegetable fossils, in charge of Mr. Lester F. Ward.

The chemical laboratory, with a large corps of chemists, is in charge of Prof. F. W. Clarke. There is a physical laboratory in the survey, with a small corps of men engaged in physical researches of prime importance in geology. A large corps of lithologists is engaged in the microscopic study of rocks. Besides the division of mining statistics, economic geology is represented by two parties, in charge of Mr. George F. Becker and Mr. S. F. Emmons, engaged in studying various mining districts in the West.

The survey also comprises a division, in charge of Mr. W. H. Holmes, organized for the purpose of preparing illustrations for paleontologic and geologic reports. Illustrations will not hereafter be used for embellishment, and, so far as possible, will be prepared by relief methods, and held permanently for the use of the public at large in scientific periodicals, text-books, etc. The large geologic library and the bibliographic work of the survey are in charge of Mr. C. C. Darwin.

The remaining topics discussed by the director are the publications, appointments, and finances of the survey, and the relations of the Government and State surveys.

Elementary Text-Book of Physics. By Profs. W. A. ANTHONY and C. F. BRACKETT. 3d ed. New York, Wiley. 8°.

THIS is the first appearance, in a complete form, of a long-expected text-book from two well-known American physicists. It is designed to furnish what is necessary and sufficient for that part of a well-adjusted college course which is devoted to the study of physics, and it is the only college text-book of that science which has appeared in this country for several years, aside from revisions and new editions of old works.

Many institutions have hitherto made use of English books, or of translations from the French which have come to us through English hands. This volume is offered as a substitute for such works, and it is little enough to say that it will be found in general to be a very acceptable one. In some respects the book is almost unique. When compared with those largely in use at the present time, it illustrates in a very striking manner the great progress in college instruction in physics during the past decade.

In its plan there is a distinct recognition of the competent instructor with a well-stocked cabinet at his command. Pictorial representations of apparatus are entirely wanting, and the illustra-

tions are only such simple diagrams as are required to elucidate the text. Besides being an advantage in other respects, this plan sets free a vast amount of space which can be utilized in the more thorough presentation of the principles of the science. For illustrations of these principles, by experiment or from facts drawn from observation, the instructor is held responsible, as he is also for their practical application.

In adopting this plan, the authors have unquestionably made a decided advance. Although the treatment is mathematical wherever desirable, it is assumed that the student has no knowledge of the differential and integral calculus. In several instances the method of limits has been used, however, and students who are familiar with the calculus will have no difficulty in its application. The subject is treated in the usual five grand divisions, mechanics, heat, magnetism and electricity, sound, and light.

Many physicists will not be able to agree entirely with the authors in some of their fundamental definitions and statements in the chapters upon mechanics. A close examination of these reveals several inconsistencies, into which they appear to have been led by the adoption of certain time-honored definitions and terms. Some of these questions have received a good deal of attention during the past few years, in the columns of this journal and elsewhere, and probably the disputants are no more nearly in agreement than they were in the beginning; but it seems tolerably certain that even the average student will experience a certain turbidity of mind when he places the definition of 'momentum' (viz., "the *momentum* of a body is its quantity of motion") and that of 'motion' (viz., "the change in position of a material particle is called its *motion*") a very little nearer together than they are now found on the pages of the book. The first sentence of the introduction, "Every thing which can affect our senses we call *matter*," has a ring of materialism about it which one would hardly expect from at least one of the two famous institutions of learning from which the book comes.

If these and other similar statements are admitted to be defects, they are of minor importance, and do not materially detract from the general excellence of the treatise. It is to be greatly regretted, however, that the publisher has not done his part as well as the authors have done theirs. In mechanical execution the book is substantial, but very far from attractive in its appearance.

Industrial Peace. By L. L. F. R. PRICE. New York, Macmillan. 8°.

THOSE who have given attention to the treatment of the labor-question in England have heard of Arnold Toynbee, the young Oxford graduate who founded an institution in the eastern part of London for the purpose of bringing young men of education into contact with the ignorant poor. After the death of Toynbee at an early age, a memorial fund was raised in his honor, and devoted to the work of spreading information by lectures and publications on the subjects in which he was interested; and the volume before us is the first to be issued by the trustees of that fund. The greater part of the work was first read before the Statistical Society of London, and was published in the journal of that society for March, 1887.

Mr. Price opens his work by remarking, what is sometimes lost sight of by enthusiastic reformers, that "there is not, nor indeed is it probable that there can be, any single panacea for social ills. . . . So diversified are the details of even contemporaneous industrial society, that any scheme which professes to cure all economic maladies by an uniform unalterable method of treatment may almost be said to carry with it its own condemnation" (p. 1). Some persons, he remarks, think that co-operation is destined to remove all industrial difficulties; but upon this point he thinks that experience is not encouraging. Co-operative distribution has prospered in England to a surprising extent; but in co-operative production there were in 1884 only £800,000 of capital employed, and only 6,300 men. He believes, therefore, that whatever advance may be made in co-operation and profit-sharing, the old relation of wage-payer and wage-receiver will still continue; and the object of his essay is to inquire by what means this relation can be made more harmonious.

The means that he relies on are the creation of boards of conciliation and arbitration, and the establishment of sliding scales of wages. As an example of the former class, he describes the formation and working of the board of conciliation organized in 1869 in the iron trade of the north of England, which he considers an excellent test of the system, since the fluctuations of wages in the iron trade are greater than in most others, and also because before the board was organized the relations between workmen and employers was very unfriendly. In spite of these difficulties, however, the method of conciliation has proved a great success. The machinery consists of a board comprising representatives of both sides and a standing committee appointed by the board. All questions are first investigated by the committee, and, if they cannot agree, the matter is laid before the board; and, if an agreement is not reached there, an arbitrator is called in to render a decision. The system is similar to the *conseils de prud'hommes* that exist in France and Belgium; but Mr. Price objects to these on account of their legal character, which is contrary to the traditions of English, and, we may add, of American life. He examines at length the working of the boards of conciliation, and then proceeds to consider the method of sliding scales, by which wages are made to vary with the price of the product. The establishment and maintenance of such scales have been attended with considerable difficulty, owing to disagreements as to what standard of prices and wages should be taken as a basis; but nevertheless they have proved successful in many English collieries, and are still in force there. The special advantages of these scales, in Mr. Price's opinion, are their elasticity and their automatic action; but he does not fail to point out at considerable length the difficulties attending the working both of the sliding scales and of the boards of conciliation. The chief of these are, "the possibility that the decision might fail to secure loyal adherence, the contentiousness connected with the preparation and discussion of elaborate arguments, and the difficulty of determining upon a satisfactory basis and of ascertaining accurate data" (p. 89).

Such is a brief analysis of the methods of 'industrial peace' that have been tried with no little success in England; and we would earnestly recommend a study of them to the leaders of our American trade-unions and to the employers with whom they are perpetually contending. It is the duty as well as the interest of both parties to maintain peace, and any methods that have been successfully employed for this purpose ought to be carefully considered by them, and, if possible, put into practice. They will not, of course, solve all industrial problems; but the substitution of peaceful methods for contentious ones would of itself be a great gain, and would pave the way for further improvements in the future.

Elementary Practical Physics. By B. STEWART and W. W. H. GEE. Vol. II. Electricity and Magnetism. New York, Macmillan. 16°.

ALL who are familiar with the contents of the first volume of this work will extend a hearty welcome to the second. Every teacher of physics by laboratory methods has felt the need of a good handbook or guide, which, in the hands of the student, would afford some relief from the labor of giving individual instruction in the details of manipulation, which, when the number of students is large, becomes simply enormous.

Since the publication of Pickering's 'Physical Manipulations' fifteen years ago, the pioneer in this field, a number of attempts have been made to supply the want. It is safe to say that none have been more successful in producing a book at once satisfactory in plan and material than Professors Stewart and Gee, in this series, the second volume of which has now appeared.

In its general character it resembles the first volume. One of the leading features of the series, very prominent in this volume, is the fulness of detail concerning all operations, the making of every experiment, and the nature and construction of every piece of apparatus used. Nearly all of the instruments described are such as were constructed in the laboratory of the authors: they are simple in design, and instructions for their reproduction are so clear that even the unskilful can hardly fail. The amateur instrument-maker is also greatly aided by the numerous diagrams and cuts illustrating methods of construction.

The value of this feature of the work can hardly be overestimated, for it is a fact that many good teachers have little inventive