tensive issues came into use over a large portion of the world, whether for educational, or rural, or journalistic, or touristic wants, has been most gratifying to the author; but this brightness is dimmed by the circumstance that the book has not unfrequently been used even in public departments with perhaps unintentional evasion of all literary or any other acknowledgment. Nor did hardly ever words of appreciation reach the author from wherever rural successes were gained from even practical exertions of the author."

This is too often the experience of the literary and scientific man. His ideas, his knowledge, are seized upon, or his books and papers are received and no hint of the benefits he has conferred ever reaches his ears; no indication is ever apparent that the seed has fallen upon fertile ground. In his postscript the author requests persons using the book to send him suggestions or additions, concluding with the following words:—

"While approaching the eighth decade of his life, the author cannot hope to see many more editions of this work, brought up to the newest standard, through the press himself; but, as he may perhaps still be able to publish one more edition before passing away, he is now particularly eager that the next issue should by some special efforts be rendered as complete as this, within the knowledge of the present days, can be accomplished. Such help, furthermore, would really be a recompense only from those who in using this book derived some practical benefit or instructive advantages from its pages."

The number of practical suggestions is endless. For example, in speaking of the "Black Wattle" of Australia, mention is made of the great value of the bark for tanning purposes. One and one-half pounds of this will do as much as five pounds of English oak bark. The tree is easily grown, and the seeds may be sown broadcast or in drills. It grows on the poorest and dryest soil, and a return may be expected in from five to ten years. Full-grown trees yield about 100 pounds of bark. It grows about an inch in diameter annually, and is hardier than *Eucalyptus globulus* (the gum tree). On this account it would be valuable to introduce into our Southern States and Southern California. The seeds retain their vitality for several years, and can be obtained in Melbourne for 5 shillings per pound, each pound containing from 30,000 to 50,000 grains. They germinate best after being soaked in warm water.

The "rain-tree" is described as reaching a height of 70 feet, with branches extending 150 feet away from the trunk. It grows rapidly and makes an admirable shade-tree in countries where there is no frost, and where the rainfall fluctuates between thirty and sixty inches annually. The leaves shut up at night and allow rain and dew to reach the ground beneath, so that grass will grow. The pods are produced in great abundance, and are fattening to cattle, which feed upon them greedily.

The tea-plant is stated to be hardy near Melbourne, enduring light frosts and scorching hot summer winds. It thrives best, however, in humid valleys with rich alluvial soil, where there are springs for irrigation. The greater the rainfall the larger the yield of tea. In Japan the plant is cultivated as far north as 43° latitude, where the thermometer occasionally falls to 16° F., and the ground remains frozen several inches deep for weeks. In 1840 India sent her first sample of tea to European markets, and in 1864 exported 7,800,000 pounds. In 1889 the amount had risen to 101,000,000 pounds. Three hundred pounds to the acre is the average yield in India. The author believes that for many years to come it will be a profitable business to raise tea-plants for the seeds alone.

Some twenty-five pages are devoted to the *Eucalyptus*, full accounts being given of several of the species. The "giant gum tree" (*Eucalyptus amygdalina*) reaches a height of 415 feet. The tree sometimes measures 69 feet in circumference at the ground, and one has been recorded as 33 feet in diameter at 4 feet from the ground. One 78 feet from the ground was 9 feet in diameter.

CALENDAR OF SOCIETIES.

Philosophical Society, Washington.

Jan. 21.—T. C. Mendenhall, The Use of Planes and Knife-Edges in Pendulums; R. S. Woodward, The Use of Long Steel Tapes for Measuring Base Lines. A report will be presented from the committee appointed to consider suitable commemoration exercises at the 400th meeting of the society.

Agassiz Scientific Society, Corvallis, Ore.

Jan. 11.—G. W. Shaw, Gravitation a Form of Energy.

Publications Received at Editor's Office.

A FREE LAND. The Cry of the Children. London, Williams & Norgate. 123 p. 12°.

BECKER, G. F. Finite Homogeneous Strain, Flow and Rupture of Roc s. Rochester, N. Y., Geol. Soc. Amer. 8°.

BOYD, R. NELSON. Coal Pits and Pitmen. New York, Macmillan & Co. 256 p. 12°. $1.

CARUS, P. Truth in Fiction. Chicago, OpenCourt Pub. Co. 111 p. 8°. $1.

CONGRES INTERNATIONAL DES AMERICANISTES. Compte-rendu de la Nuitième Session. Paris, Ernest Leroux. 704 p., pl. 8°.

DUMBLE, E. T. Report on Brown Coal and Lignite of Texas. Austin, Tex., Geolog. Survey. 243 p., pl. 8°.

FOSTER, L. S. The Published Writings of George Newbold Lawrence, 1844–1891. Washington, Smithsonian Inst. 124 p. 8°

LODGE, Oliver. Pioneers of Science. London and New York, Macmillan. 404 p. 12°. $2.50.

MACDONALD, A. Criminology. Introduction by Dr. C. Lombroso. New York, Funk & Wagnalls Co. 416 p. 12°

SIMMONS, H. M. The Unending Genesis. Chicago, C. H. Kerr & Co. 111 p. 24°. 25 cents

TALMAGE, J. E. Domestic Science. Second Edition. Salt Lake City, Utah, G. Q. Cannon & Sons Co. 389 p. 12°.

THE JOURNAL OF POLITICAL ECONOMY. Vol. I., No. 1. Dec., 1892. Chicago, The University Press. 161 p. 8°. $3 per year.

WORLD'S FAIR ELECTRICAL ENGINEERING. An Illustrated Monthly Magazine. Chicago, Elec. Eng. Pub. Co. 56 p. 8°. $3 per year.

It grows with great rapidity, in France reaching a height of 50 feet in 8 years. It is hardy in the milder parts of England. It yields a valuable volatile oil, and it is said when combined with thymol and other antiseptics to be efficacious in treatment of scarlet fever and other infectious diseases, especially as an external application. Fresh branches placed under the bed of phthisic patients act as an antiseptic, a sedative, and a hypnotic. The plant is also useful in subduing malarial effluvia in fever districts.

We cannot go further into details, but commend the volume to all botanists and horticulturists. Various indexes, of trees best adapted for certain purposes, of genera referred to, of synonyms, of vernacular names and of species best adapted to various regions of the globe, add greatly to the value. The price of the book is only five shillings.

JOSEPH F. JAMES.

Washington, D.C., Jan. 12.

A Text-Book of Least Squares. By MANSFIELD MERRIMAN. 6th Ed. New York, J. Wiley & Sons. 1892. 198 p. 8°.

Theory of Errors and Method of Least Squares. By W. W. JOHNSON. New York, J. Wiley & Sons. 1892. 174 p. 12°.

WE have here two excellent works, written by two able men, and illustrating in an interesting manner those different views of identical principles and methods which independent thinkers are always able to exhibit, however old and well-worked the subject. Professor Merriman wrote his first edition of this treatise in 1877, with the purpose of presenting the facts and principles of this somewhat abstruse subject in such form as to make them easily comprehended by students and by engineers, in practice often less familiar than the student with work underlying the higher mathematics. That treatise, while successful, served nevertheless, to indicate where still further improvement might be effected, and the present is a re-written treatise, of which the major portion was prepared and printed in 1884, as a second edition. The sixth edition, now before us, contains the same matter in substance, but with the usual and unavoidable printers' and other errors, always found in first issues, removed, and some improvements introduced in the treatment of adjustments of two related quantities, and with notes of interest appended. The book has become a standard work of reference, as well as a text-book, and needs no special commendation from us, other than the expression of full agreement with the verdict of the purchasers and users of five issues, who have made necessary this sixth edition.

Professor Johnson has condensed his work into a smaller compass than the preceding; but it is all the more rich and "meaty." The author follows Gauss in the methods laid down in "Theoria Motus Corporum Cœlestium" (Werke, VII.), and treats the "reduced observation equations" by the more explicit methods introduced by Jordan ("Handbuch der Vermessungskunde," 1888) and later writers, including Oppolzer, to whom he goes for some of the more important forms adopted in computations. The book is systematic, logical in its sequence, and well illustrated by carefully chosen examples in application. Appended are tables of values of the probability-integral and of powers and roots.

When a mathematician of eminence undertakes thus to provide a treatise upon a subject of importance, and compiles a text-book, for young students, not only the youth who is thus provided with a text-book but the whole world of observers employing such methods become more indebted to him than to the less distinguished and less talented man doing similar work; we have the assurance, not only that the book will serve its purpose, but that it represents the latest and best thought and labor of the time. This assurance is worth much to teacher and pupil; and it can hardly be doubted that the use of this little treatise will extend beyond the limits of the United States Naval Academy, where it was originally intended by its author to be used, in his own classes.

Exchanges.

[Free of charge to all, if of satisfactory character. Address N. D. C. Hodges, 874 Broadway, New York.]

For sale or exchange.—I have a few copies of my translation of "Strasburger's Manual of Vegetable Histology, 1887," now out of print, which I will send post-paid for $3 or for one dozen good slides illustrating plant or animal structure. Address A. B. Hervey, St. Lawrence University, Canton, N. Y.

The undersigned has the following specimens to exchange for crystals of any eastern or foreign localities or Indian relics: tin ore, metacinnabarite, stibnite, garnierite, calenanite, hanksite, ulexite, rubellite, lepidolite, blue and green onyx, Cal. pinite, aragonite on chalcedony, cinnabar, double refracting spar, clear and clouded, and others. J. R. Bush, care of General Delivery, Los Angeles, Cal.

For sale or exchange.—A private cabinet of about 200 species of fossils, well distributed geologically and geographically. Silurian, about 40; Devonian, about 50; Carboniferous, about 80; others, about 30. Frank S. Aby, State University, Iowa City, Ia.

For exchange.—Minerals, fossils, F. W. shells, land shells, native woods, Indian relics, two vols. of Smithsonian reports, odd numbers of scientific magazines, copper cents, etc., for good minerals not in my collection, good arrow- and spear-heads and natural history specimens of all kinds. Correspondence solicited with list of duplicates. G. E. Wells, Manhattan, Kan.

For sale or suitable exchange.—A spectrometer made by Fauth & Co., Washington, D. C., according to the plan of Prof. C. A. Young. This instrument is suitable for the most advanced investigations and determinations. Cost originally $700 and has been used but little. Will be disposed of at a considerable reduction. Address Department of Physics, Ohio University, Athens, O.

I will send British land and fresh-water shells in return for those of America, any part, sent to me. I have at present about fifty or sixty species, with many varieties. W. A. Gain, Tuxford, Newark, England.

The Biological Department of Hamline University desires to offer microscopic slides of animal tissues, or whole animals, in exchange for first-class fossils. Address correspondence to Henry L. Osborne, Hamline University, Hamline, Minn.

Kindly mention "Science" in writing to Advertisers.

Wants.

WANTED.—American Journal of Conchology, seven volumes. Parties having these for sale will please address the undersigned, stating condition and price. R. Ellsworth Call, Louisville, Ky.

A GRADUATE ENGINEER will give instruction evenings in geometry, trigonometry and surveying, mechanics, physics, mechanical drawing and general engineering construction. Five years' experience in field and editorial work on engineering journal. References furnished. C. S. H., 102 Tribune Building, New York.

WANTED.—By well-qualified and experienced science master and associate of the Royal School of Mines, London, aged 26 (at present in England), a mastership in technical college or university for any of the following subjects: Engineering sciences, geology and mineralogy, physics, chemistry and metallurgy, etc., etc. Can provide excellent references and credentials. Apply, J. G., 17 Sussex St., Rochdale, England.

A GRADUATE of the University of Pennsylvania and a practical mineralogist of twenty years' experience desires to give his services and a cabinet of 25,000 specimens, all named, with about the same number of duplicates, in minerals, crystals, rocks, gems, fossils, shells, archæological and ethnological specimens and woods to any institution desiring a fine outfit for study. The owner will increase the cabinet to 50,000 specimens in two years and will act as curator. Correspondence solicited from any scientific institution. J. W. Hortter, M.D., Ph.D., San Francisco, Cal., General P. O. Delivery.

TO THOSE INTERESTED IN SCIENCE.

[Science (weekly) established in 1883, N. D. C. HODGES, 874 Broadway, New York City.]

Titles of Some Articles Published in *Science* since Jan. 1, 1892.

Aboriginal North American Tea.
Actinism.
Agriculture, Experimental, Status of.
Amenhotep, King, the tomb of.
Anatomy, The Teaching of, to Advanced Medical Students.
Anthropology, Current Notes on.
Architectural Exhibition in Brooklyn.
Arsenical Poisoning from Domestic Fabrics.
Artesian Wells in Iowa.
Astronomical Notes.
Bacteria, Some Uses of.
Bird on Its Nest, The.
Birds Breeding at Hanover, N. H.
Botanical Laboratory, A.
Botanists, American and Nomenclature.
Brain, A Few Characteristics of the Avian.
Bythoscopidæ and Cereopidæ.
Canada, Royal Society of.
Celts, The Question of the.
Chalicotherium, The Ancestry of.
Chemical Laboratory of the Case School.
Children, Growth of.
Collection of Objects Used in Worship.
Cornell, The Change at.
Deaf, Higher Education of the.
Diamonds in Meteorites.
Diphtheria, Tox-Albumin.
Dynamics, Fundamental Hypotheses of.
Electrical Engineer, The Technical Education of.
Eskimo Throwing Sticks.
Etymology of two Iroquoian Compound Stems.
Eye-Habits.
Eyes, Relations of the Motor Muscles of, to Certain Facial Expressions.
Family Traits, Persistency of.
Fishes, The Distribution of.
Fossils, Notice of New Gigantic.
Four-fold Space, Possibility of a Realization of.
Gems, Artificial, Detection of.
Glacial Phenomena in Northeastern New York.
Grasses, Homoptera Injurious to.
Great Lakes, Origin of the Basins of.
"Healing, Divine."
Hemipteron Mouth, Structure of the.
Hofmann, August Wilhelm von.
Hypnotism among the Lower Animals.
Hypnotism, Traumatic.
Indian occupation of New York.
Infant's Movements.
Influenza, Latest Details Concerning the Germs of.
Insects in Popular Dread in New Mexico.
Inventions in Foreign Countries, How to Protect.
Inventors and Manufacturers Association.
Iowa Academy of Sciences.
Jargon, The Chinook.
Jassidæ; Notes on Local.
Keller, Helen.
Klamath Nation, Linguistics.
Laboratory Training, Aims of.
Lewis H. Carvill, Work on the Glacial Phenomena.
Lightning, New Method of Protecting Buildings from.
Lion Breeding.
Lissajou's Curves, Apparatus for the Production of.
Maize Plant, Growth and Chemical Composition of.
Maya Codices, a Key to the Mystery of.
Medicine, Preparation for the Study of.
Mineral Discoveries, Washington.
Museums, The Support of.
Palenque Tablet, a Brief Study of.
Patent Office Building, The.
Physa Heterostropha Say, Notes on the Fertility of.
Pict's House, A.
Pocket Gopher, Attempted Extermination of.
Polariscopes, Direct Reflecting.
Psychological Laboratory at Toronto.
Psychological Training, The Need of.
Psylla, the Pear-Tree.
Rain-Making.
Rice-Culture in Japan, Mexico and the United States.
Rivers, Evolution of the Loup, in Nebraska.
Scientific Alliance, The.
Sistrurus and Crotalophorus.
Star Photography, Notes on.
Star, The New, in Auriga.
Storage of Storm-Waters on the Great Plains.
Teaching of Science.
Tiger, A New Sabre-Toothed, from Kansas.
Timber Trees of West Virginia.
Tracheæ of Insects, Structure of.
Vein-Formation, Valuable Experiments in.
Weeds as Fertilizing Material.
Weeds, American.
Will, a Recent Analysis of.
Wind-Storms and Trees.
Wines, The Sophisticated French.
Zoology in the Public Schools of Washington, D. C.

Some of the Contributors to *Science* Since Jan. 1, 1892.

Aaron, Eugene M., Philadelphia, Pa.
Allen, Harrison, Philadelphia, Pa.
Ashmead, Albert S., New York City.
Bailey, L. H., Cornell University, Ithaca, N. Y.
Baldwin, J. Mark, University of Toronto, Canada.
Ball, V., C. B., LL.D., F.R.S., Dublin, Ireland.
Barnes, Charles Reid, Madison, Wis.
Baur, G., Clark University, Worcester, Mass.
Beal, W. J., Agricultural College, Mich.
Beals, A. H., Milledgeville, Ga.
Beauchamp, W. M., Baldwinsville, N.Y.
Bell, Alexander Graham, Washington, D. C.
Boas, Franz, Clark University, Worcester, Mass.
Bolley, H. L., Fargo, No. Dak.
Bolles, Frank, Cambridge, Mass.
Bostwich, Arthur E., Montclair, N.J.
Bradley, Milton, Springfield, Mass.
Brinton, D. G., Philadelphia, Pa.
Call, E. Ellsworth, Des Moines, Ia.
Chandler, H., Buffalo, N.Y.
Comstock, Theo. B., Tucson, Arizona.
Conn, H. W., Middletown, Conn.
Coulter, John M., Indiana University.
Cragin, F. W., Colorado Springs, Col.
Cresson, Hilborne T., Philadelphia, Pa.
Davis, W. M., Harvard College, Cambridge, Mass.
Dimmock, George, Canobie Lake, N.H.
Dixon, Edward T., Cambridge, England.
Farrington, E. H., Agric. Station, Champaign, Ill.
Ferree, Barr, New York City.
Fessenden, Reginald A., Lafayette, Ind.
Flexner, Simon, Johns Hopkins, Baltimore, Md.
Foshay, P. Max, Rochester, N.Y.
Gallaudet, E. M., Kendall Green, Washington, D.C.
Garman, S., Mus. Comp. Zool., Cambridge, Mass.
Gibbs, Morris, Kalamazoo, Mich.
Golden, Katherine E., Agric. College, Lafayette, Ind.
Grinnell, George B., New York City.
Hale, Edwin M., Chicago, Ill.
Hale, George S., Boston, Mass.
Hale, Horatio, Clinton, Ontario, Canada.
Hall, T. Proctor, Clark University, Worcester, Mass.
Halsted, Byron D., Rutg. Coll., New Brunswick, N.J.
Haworth, Erasmus, Oskaloosa, Iowa.
Hay, O. P., Irvington, Ind.
Haynes, Henry W., Boston Mass.
Hazen, H. A., Weather Bureau, Washington, D.C.
Hewitt, J. N. B., Bureau of Ethnol., Washington, D. C.
Hicks, L. E., Lincoln, Neb.
Hill, E. J., Chicago, Ill.
Hill, Geo. A., Naval Observatory, Washington, D.C.
Hitchcock, Romyn, Washington, D.C.
Holmes, E. L. Chicago, Ill.
Hoskins, L. M., Madison, Wis.
Hotchkiss, Jed., Staunton, Va.
Houston, Edwin J., Philadelphia, Pa.
Howe, Jas. Lewis, Louisville, Ky.
Hubbard, Gardiner G., Washington, D.C.
Jackson, Dugald C., Madison, Wisconsin.
James, Joseph F., Agric. Dept., Washington, D.C.
Johnson, Roger B., Miami University, Oxford, O.
Keane, A. H., London, England.
Kellerman, Mrs. W. A., Columbus, O.
Kellicott, D. S., State University, Columbus, O.
Kellogg, D. S., Plattsburgh, N. Y.
Lintner, J. A., Albany, N. Y.
Loeb, Morris, New York City.
Mabery, Charles F., Cleveland, Ohio.
Macloskie, G., Princeton, N.J.
McCarthy, Gerald, Agric. Station, Raleigh, N. C.
MacDonald, Arthur, Washington, D.C.
MacGregor, J. C., Halifax, Nova Scotia.
MacRitchie, David, Easter Logie, Perthshire, Scotland.
Marshall, D. T., Metuchen, N.J.
Mason, O. T., Smithsonian Inst., Washington, D. C.
Millspaugh, Charles F., Morgantown, W. Va.
Morse, Edward S., Salem, Mass.
Nichols, C. F., Boston, Mass.
Nuttall, George H. F., Johns Hopkins, Baltimore Md.
Oliver, J. E., Cornell University, Ithaca, N.Y.
Osborn, Henry F., Columbia College, New York City.
Osborn, Herbert, Agricultural College, Ames, Iowa.
Pammel, L. H., Agricultural Station, Ames, Iowa.
Pillsbury, J. H., Smith College, Northampton, Mass.
Poteat, W. L., Wake Forest, N. C.
Preble, Jr., W. P., New York City.
Prescott, Albert B., Ann Arbor, Mich.
Riley, C. V., Washington, D. C.
Ruffner, W. H., Lexington, Va.
Sanford, Edmund C., Clark Univ., Worcester, Mass.
Scripture, E. W., Clark University, Worcester, Mass.
Seler, Dr. Ed., Berlin, Germany.
Shufeldt, R. W., Washington, D.C.
Slade, D. D., Museum Comp. Zool., Cambridge, Mass.
Smith, John B., Rutgers Coll., New Brunswick, N. J.
Southwick, Edmund B., New York City.
Stevens, George T., New York City.
Stevenson, S. Y., Philadelphia, Pa.
Stone, G. H., Colorado Springs, Col.
Taylor, Isaac, Settrington, England.
Thomas, Cyrus, Washington, D. C.
Thurston, R. H., Cornell University, Ithaca, N.Y.
Todd, J. E., Tabor, Iowa.
True, Frederick W., Nat. Mus., Washington, D.C.
Turner, C. H., Univ. of Cincinnati, Cincinnati, O.
Wake, C., Staniland, Chicago, Ill.
Ward, R. DeC., Harvard Univ., Cambridge, Mass.
Ward, Stanley M., Scranton, Pa.
Warder, Robert B., Howard Univ., Washington, D.C.
Welch, Wm. H., Johns Hopkins, Baltimore, Md.
West, Gerald M., Clark University, Worcester, Mass.
Whitman, C. O., Clark University, Worcester, Mass.
Williams, Edward H., Lehigh Univ., Bethlehem, Pa.