

CLUB RATES.

	Subscrip- tion.	With SCIENCE.		Subscrip- tion.	With SCIENCE.
Analyst	\$2.00	\$5.50	Iron	7.50	9.34
Appleton's Monthly	3.00	6.26	Journal of the Telegraph	2.00	5.50
AMERICAN NATURALIST	4.00	7.20	London Lancet	5.00	7.50
AMERICAN JOURNAL OF SCIENCE	6.00	8.50	Magazine of American History	5.00	8.00
American Journal of Microscopy	1.00	4.70	MINING AND SCIENTIFIC PRESS	4.00	6.40
American Machinist	3.00	6.70	Nature	6.00	9.15
American Monthly Microscopical Journal	1.00	4.80	N. Y. Medical Journal	4.00	7.00
American Manufacturer and Iron World	4.25	7.00	New England Journal of Education	3.00	6.40
Boston Journal of Chemistry	1.00	4.75	North American Review	5.00	7.75
Chicago Medical Review	2.00	5.50	Operator	1.00	4.80
Chicago Field	4.00	7.00	POPULAR SCIENCE MONTHLY	5.00	8.00
Druggist	1.60	5.25	Sanitary Engineer	3.00	6.50
Druggists' Circular	1.50	5.25	Practical American	1.50	5.00
Educational Monthly (Barnes)	1.50	5.20	Pacific Rural Press	4.00	7.00
Engineering News	3.00	6.25	Scribner's Monthly	4.00	7.20
Engineering and Mining Journal	4.00	7.00	Science Observer50	4.40
Education	4.00	7.00	SCIENTIFIC AMERICAN	3.20	6.56
Engineering Magazine	5.00	8.25	" " SUPPLEMENT	5.00	8.00
Harper's Magazine	4.00	7.00	" " WITH SUPPLEMENT	7.00	9.60
Harpers Weekly	4.00	7.20	Southern Medical Record	2.00	5.40
Harper's Bazar	4.00	7.20	Student	1.00	4.75
Harper's Young People	1.50	5.20	St. Nicholas	3.00	6.40
HUMBOLDT LIBRARY	3.00	6.25	Young Scientist50	4.30
International Review	5.00	8.00			

International Scientists' Directory.

THE INTERNATIONAL SCIENTISTS' DIRECTORY for 1881-2, contains the names and addresses of from 15,000 to 20,000 Scientific men and amateurs in all parts of the world, together with their special branches of Science, and other items of interest relating to collections, duplicates, desiderata, etc. of each.

This is the first work of its kind ever attempted, and it will be found of great value to all who are interested in any department of Science. Price, in paper, \$2.00. In cloth, \$2.50. Sent post-paid on receipt of price.

S. E. CASSINO, Publisher,
32 Hawley Street. Boston, Mass.

SCIENCE

A WEEKLY JOURNAL OF SCIENTIFIC PROGRESS.

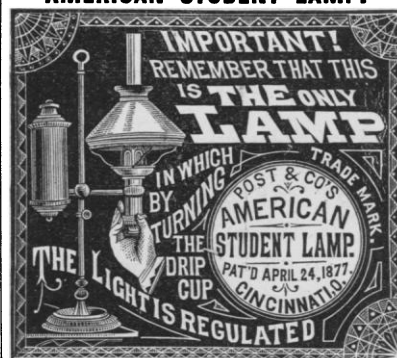
Vol. II, No. 74, - - - November 26, 1881.

CONTENTS.

The Satellites of Mars (Edit.); Theory of the Moon's Motion (Edit.); New York Academy of Sciences, October 31, 1881; The American Chemical Society; On the Nature of the Diphtheritic Contagium; Solar Parallax; Ephemeris of the Satellites of Mars for the Opposition of 1881; Elements of Quarternious; Large Telescopes; On Maximum Synchronous Glaciation; Glucose; Meteorological Report of Prof. D. Draper; etc., etc.

BUY THE BEST

POST & CO'S
AMERICAN STUDENT LAMP.



GUARANTEED THE BEST.

POST & CO., M'FRS & PATENTEES, CINCINNATI, OHIO.

Nickel Plated Double Lamps \$10.00 each.

Nickel Plated Single Lamps \$5.00 each.

SENT C. O. D. ANYWHERE.

Send for Illustrated Catalogue.

POST & CO, Cincinnati, Ohio.

BRAIN AND NERVE FOOD. VITALIZED PHOS-PHITES

Composed of the Vital or Nerve-giving Principles of the Ox-Brain and Wheat-Germ.

IT RESTORES THE ENERGY LOST BY NERVOUSNESS OR INDIGESTION; RELIEVES LASSITUDE, ERRATIC PAINS AND NEURALGIA REFRESHES THE NERVES TIRED BY WORRY, EXCITEMENT, OR EXCESSIVE BRAIN FATIGUE; STRENGTHENS A FAILING MEMORY, AND GIVES RENEWED VIGOR IN ALL DISEASES OF NERVOUS EXHAUSTION OR DEBILITY IT IS THE ONLY **PREVENTIVE** OF CONSUMPTION.

IT GIVES VITALITY TO THE INSUFFICIENT BODILY OR MENTAL GROWTH OF CHILDREN, PREVENTS FRETFULNESS AND GIVES QUIET, REST AND SLEEP. IT GIVES A BETTER DISPOSITION TO INFANTS AND CHILDREN, AS IT PROMOTES GOOD HEALTH TO BRAIN AND BODY.

PHYSICIANS HAVE PRESCRIBED 500,000 PACKAGES. For Sale by Druggists or by Mail, \$1.

MESSRS. F. CROSBY & CO., 664 & 666 Sixth Ave., N. Y.—London, 137 A Strand.

DRAWING INSTRUMENTS

And Materials of all kinds.

OPTICAL INSTRUMENTS,

Microscopes, Telescopes, &c.

**G. S. WOOLMAN, 116 Fulton Street,
NEW YORK.**

Send for Illus. Catalogue, and mention this Journal.

Studies in Astronomy.

A lecture on the Science, embracing its sublimity, history, progress, wonders and utility, together with an explanation of Spectrum Analysis, and a discourse on the Evolution of the Sky, involving the growth and decay of worlds, by **Arthur K. Bartlett**. Second Edition revised, re-written and enlarged. Price, 35 cents. Published by the Author, **BATTLE CREEK, MICHIGAN.**

INSTRUCTION!

Mt. Carroll Seminary,

CARROLL CO., ILLS.

Incorporated 1852, with its

MUSICAL CONSERVATORY

has ORIGINAL FEATURES PECULIAR and VALUABLE. In THOROUGH, PRACTICAL, COMMON SENSE work; it acknowledges no superior. THE OREAD, giving particulars sent *free*.

American Journal of Science.

FOUNDED BY PROF. SILLIMAN IN 1818.

Devoted to Chemistry, Physics, Geology, Physical Geography, Mineralogy, Natural History, Astronomy, and Meteorology.

Editors: JAS. D. DANA, EDW. S. DANA and B. SILLIMAN.
Associate Editors: Professors ASA GRAY, J. P. COOKE, JR., and JOHN TROWBRIDGE, of Cambridge; H. A. NEWTON and A. E. VERRILL, of Yale; and G. F. BARKER, of the University of Pennsylvania, Phila. Subscription Price \$6; 50 Cents a Number. Address the Proprietors.

JAMES D. & E. S. DANA, New Haven, Conn.

New York & New England R. R.

THROUGH TRAINS Via N.Y., N. H. & H. R. R.

Between Boston and New York.

FROM GRAND CENTRAL DEPOT.
Leave New York, 4.00 P.M., with Elegant Through Car.
“ “ “ 11.35 P.M., week days, with Through New Pullman Sleepers.
“ “ “ 10.30 P.M., Sundays.
FROM DEPOT, FOOT OF SUMMER ST.
Leave Boston, 9.00 A.M., week days, with Through Cars to Grand Central Depot.
“ “ 10.40 P.M., daily, with elegant new Pullman Sleepers.

TAKE THE BEST.

THE INTERNATIONAL REVIEW.

NEW MONTHLY SERIES.

JOHN T. MORSE, JR., HENRY CABOT LODGE, Editors.

Price 50 Cents a month; \$5.00 a year. Specimen copies sent post-paid on receipt of 15 cents.

AGENTS WANTED who understand the character, scope and value of the REVIEW, to solicit subscriptions.

A. S. BARNES & CO.,

111 & 113 William Street, New York.

H. M. RAYNOR,

No. 25 Bond St.,

NEW YORK.

(Established
1859).



FOR ALL

Laboratory
AND

Manufacturing Purposes.

Wholesale and Retail.

Scrap Purchased.

Circulars by Mail.

BEST MEDIUM FOR ADVERTISERS.

SCIENCE

Circulates in EVERY STATE IN THE UNION, also Canada, Australia, Japan and Europe.

ALL UNIVERSITIES and COLLEGES.

Subscribers to "SCIENCE" are chiefly among those having few facilities for purchasing goods, and are buyers of Fancy Articles, Household Necessities, Jewelry, Musical Instruments, Dry Goods, Books, Prints, Scientific Instruments and Apparatus; Pure Chemical Substances, Mineral Waters, Novelties and Specialties of every kind.

Terms for Advertising moderate. Small advertisements on this page \$50 a year (52 insertions).

OPTICAL INSTRUMENTS.

BAROMETERS, THERMOMETERS,

RAIN GAUGES, ETC., ETC.

BENJ. PIKE'S SON & CO.

OPTICIANS,

No. 928 Broadway, New York.

Illustrated Catalogue sent free on mentioning "SCIENCE."

R. & J. BECK, MANUFACTURING OPTICIANS,

1016 Chestnut St., Philadelphia.

MICROSCOPES,

And all Accessories of the HIGHEST GRADES at the LOWEST PRICES.

Illustrated Condensed Price List, 23 pages. *Free.*
Full Catalogue of 176 Pages. 15 cts.
Mention this Journal.

CHEAPEst Bookstore IN THE WORLD.

495,873 NEW and OLD BOOKS in every department of literature

ALMOST GIVEN AWAY.

NEW CATALOGUE FREE.

SEND STAMP.

LEGGAT BROTHERS,

31 Chambers Street, West of City Hall Park, New York.

PLEASE MENTION "SCIENCE."

Fine Monocular Microscope,

(FULL SIZED.)

Recently made for the owner under his special supervision. All the latest improvements have been added to make it a perfect instrument. Price, with apparatus, case, 1 inch and 1-5th inch objectives, \$80. Address MICROSCOPE, office of "SCIENCE."

SCIENCE.

A WEEKLY RECORD OF SCIENTIFIC PROGRESS, ILLUSTRATED.

TERMS:

Four Dollars a Year.

Two Dollars Six Months.

One Dollar Three Months.

Single Number Ten Cents.

This journal was established on the 1st of July, 1880, for the purpose of providing a first-class weekly scientific journal, and affording a rapid means of communication between scientific men.

Sixty-eight weekly numbers have been so far issued, and the editor has received letters of congratulations and offers of support from gentlemen representing all branches of science.

Volume one was completed on the 31st of December, 1880, and was provided with an index of 5,000 references. The present volume (II) was commenced on the 1st of January, 1881, and will be completed on the 31st of December. It will be a handsome volume of seven hundred papers, having index with about 10,000 references.

As a standard work of scientific reference the annual volume of "SCIENCE" will stand unsurpassed, will be a valuable addition to every library, and as a scientific handbook should be within the reach of every working scientist and practical man.

The most convenient manner of taking "SCIENCE" is to subscribe, but it can be ordered at your nearest news dealer. It then arrives every week presenting you with the current scientific events, a series of original papers of the highest value, and interesting discussions.

"SCIENCE" is of convenient size for binding, being of the same dimensions as NATURE, and as a work of reference can be handled with ease.

Electro-plates have been taken of every number since the commencement; new subscribers need not therefore at once purchase the back numbers, as they can complete their sets at any time.

We have not made a habit of publishing congratulatory letters, as we have trusted to the merits of the publication to secure support; the following unsolicited indorsements may however be given, as representing the feeling of the scientific men of this country in regard to this journal:

"UNITED STATES SENATE CHAMBER,
WASHINGTON, Sept. 19th, 1881.

"———On my return to Washington, a few days ago, I found my file of 'SCIENCE' complete, and have since gone through the numbers with much pleasure. I sincerely trust that the publication is permanently established, for it has already made a name and place for itself, as one which no working scientist would wish to be without. It seems to me to be up to the times, as well as "up to the mark," and can therefore hardly fail to achieve the lasting success which it obviously merits.
"ELLIOTT COUES."

"WASHINGTON, Aug. 24th, 1881.

"———I am glad to be able to add my voice to those of others in congratulating you upon the success which has attended SCIENCE. I have no doubt that the periodical is destined to occupy in America the same position held by NATURE in England.

"ALEXANDER GRAHAM BELL."

"UNIVERSITY OF PENNSYLVANIA.

"———'SCIENCE' is a credit to all concerned.—GEORGE F. BARKER."

THE EDITORIAL DEPARTMENT is conducted by Mr. John Michels, with the valuable assistance of many of the leading scientific specialists of the United States.

OFFICES OF PUBLICATION.

Tribune Building (Room 17) New York City.

European readers are directed to Mr. Deacon, 150 Leadenhall Street, London, England.

Sample copy sent free from chief office, or can be ordered of any news dealer (Price ten cents) in the United States. If any difficulty is found in obtaining "SCIENCE" send to head quarters.