

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, for the U. S. or Canada, \$3 00
 One copy, six months, for the U. S. or Canada, 1 50
 One copy, one year, to any foreign country belonging to Postal Union, 4 00
 Remit by postal or express money order.

Australia and New Zealand.—Those who desire to receive the SCIENTIFIC AMERICAN, for a little over one year, may remit £1 in current Colonial bank notes. Address
 MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, for U. S. and Canada. \$6.00 a year to foreign countries belonging to the Postal Union. Single copies, 10 cents. Sold by all newsdealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to any address in U. S. or Canada, on receipt of seven dollars.

The safest way to remit is by draft, postal order, express money order, or registered letter.

Australia and New Zealand.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for a little over one year on receipt of £2 current Colonial bank notes.
 Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

NEW YORK, SATURDAY, MAY 25, 1889.

Contents.

(Illustrated articles are marked with an asterisk.)

Ability, standard of.....	324	Inventions, miscellaneous.....	330
Air, respired, poisonous.....	325	Inventions, index of.....	331
Aluminum, alloying and plating with.....	321	Kilns, brick, drying attachment for, Gurnee's.....	323
Apparatus, railway.....	321	License, marine engineer's.....	326
Apprentices.....	321	Morton, vortex.....	329
Barnard, Frederick A. P.*.....	327	Notes and queries.....	330
Boat, torpedo, new.....	324	Patents, foreign, securing.....	321
Books and publications, new.....	331	Phthisis from house sweepings.....	329
Bishop, W. Irving.....	330	Plant life, curiosity in.....	329
Business and personal.....	330	Poppy, red.....	323
Carrier, bundle, Beckman's.....	323	Pot, transplanting, Cooke's.....	323
Clock, electric, Jansen's.....	322	Reinholder, Adams's.....	323
Coupling, hose, Burnett's.....	324	Rice, Allen Thorndike.....	321
Cover, barrel, Lindsey's.....	323	Rig, double topsail.....	325
Curtain, buggy, Thomas's.....	324	Rivet holding device, Weidemeyer's.....	322
De la Rue, Warren.....	328	Screen, gravel, Loughran's.....	324
Detector, lead, Beckman's.....	323	Ship, war, Amiral Baudin's.....	326
Dredging in Glorietta Bay, Cal.*.....	319	Speed, naval, limit in.....	326
Engineers, good advice to.....	329	Steamer, Channel, new.....	326
Explosives.....	321	Summers, Thomas.....	328
Fertilizers.....	328	Support, hammock, Collins's.....	323
Grisonite.....	319	Tails, rats.....	327
Guns, 8-inch, at close range.....	327	Tapping by electricity.....	327
Matchway closing device, Kitteringham's.....	322	Think, learning to.....	322
Headache.....	325	Tower, Eiffel, scientific uses.....	326
Heat and light.....	329	Truss, Dallas's.....	324
Hose, air, brake.....	325	Valkyrie, the.....	329
Induction, electrical, lines of.....	325	Vessels, glass, testing.....	321
Inventions, electrical.....	330	Watch making, profitable.....	325
Inventions, mechanical.....	330	Weather, northwestern.....	325

TABLE OF CONTENTS OF SCIENTIFIC AMERICAN SUPPLEMENT No. 699.

For the Week Ending May 25, 1889.

Price 10 cents. For sale by all newsdealers.

I. AGRICULTURE.—The Relation of Fertilizers to Fruits.—By Prof. PETER T. AUSTEN.—A recent paper read before the New Jersey State Horticultural Society, giving a scientific view of the possibility of the future in the development of scientific fruit fertilizers.....	11171
II. BIOGRAPHY.—Zenobe Gramme.—The inventor of the Gramme dynamo-electric machine, a wonderful instance of the development of scientific genius at a late age, his portrait.—1 illustration.....	11167
III. CHEMISTRY.—Gymnemic Acid.—By DAVID HOOPER.—A very interesting investigation of the curious substance that possesses the property of destroying the taste of bitter or sweet substances, with analysis.....	11170
Yorkshire Grease.—By GEORGE H. HURST.—A very interesting investigation of the fatty products from the washing of wool, with numerous tables of analyses and the composition and properties of products derived from the grease.....	11170
IV. CIVIL ENGINEERING.—Improved Steam Inspection Car.—The Ionia steam inspection car, for use of the inspectors and others interested in the condition of the permanent way of railroads.—Details of its use and characteristic features of its construction.—2 illustrations.....	11163
Plant and Material of the Panama Canal.—By WILLIAM PLUMB WILLIAMS, Jr.—The commencement of an elaborate paper on the machinery used in the great engineering operations on the isthmus, with illustrations of the dredges devised by engineers of different nationalities.—5 illustrations.....	11159
Rapid Transit for Chicago.—A review of the future necessities of the great Western metropolis, with suggestions for an improved construction of rapid transit line adapted for the probable developments of the next century.—2 illustrations.....	11163
V. ELECTRICITY.—Electric Wiring of Buildings.—By J. D. F. ANDREWS.—A very excellent and practical paper on this subject, giving details of the method of correctly preparing buildings for electric light installations.—5 illustrations.....	11167
Electric Light at the Paris Exhibition.—Note of a paper by M. Hippolyte Fontaine on the titular subject, accompanied by tables of the lights to be employed, the contractors therefor, and the plan and elevation of machinery hall, showing the disposition of lamps.—2 illustrations.....	11169
VI. EXPLORATION.—Opening of a Pyramid.—The account of an interesting Egyptian find.—A subterranean entrance to a pyramid recently discovered.—Its nearly monolithic chamber and contents.....	11174
The Subterranean Water of the Oued Rir.—A full account of the artesian wells of the Saharan Oasis, with details of the fishes and crustaceans found there, and map of the Ourlana region.—5 illustrations.....	11172
VII. METALLURGY.—A Miniature Steel Works.—A Hindostanee steel works, with full details of the method of working.—A curious instance of native skill and industry.....	11167
VIII. PHOTOGRAPHY.—The Development of Gelatin-Bromide Lantern Plates.—A recent communication to the Manchester Photographic Society, giving numerous formulae of different developers.....	11166
IX. PHYSICS.—A New Photometer.—An efficient and simple substitute for the Bunsen photometer disk, involving a combination of two prisms.—2 illustrations.....	11169
X. TECHNOLOGY.—Improved Sectional Warming Machine.—Description and illustration of a new machine recently constructed in England for warming—1 illustration.....	11165
Improved Wood Pulp Digester.—Description and illustration of a digester of the latest design, with lead lining for sulphite liquor treatment of timber.—1 illustration.....	11166
New Apparatus for the Concentration of Extracts in Vacuo.—By L. A. ADRIAN.—A recent improvement in pharmaceutical technology for the preparation of extracts on the large scale.—2 illustrations.....	11165
Ramie or Rhea Fiber Cleaning Machinery.—An attempt at solving the problem of preparing these fibers.—A recent machine invented by Mr. Wallace, of Belfast, originally intended for flax, and its proposed application to the new fibers.—2 illustrations.....	11164
The Wells Light.—A new reservoir oil burning lamp for use in out-of-door operations for light-giving purposes and for the production of heat.—2 illustrations.....	11166
XI. ZOOLOGY.—The Cape Buffalo.—Note and illustration of this animal, one of the most dangerous of the Bos tribe.—1 illustration.....	11172

THE VALKYRIE.

The acceptance by Lord Dunraven of the somewhat modified conditions that are to govern future contests for the America's cup virtually assures an international yacht race in the autumn. To be sure, it is within the range of possibilities that the Royal Yacht Club will not agree to the conditions imposed upon those who may hereafter be the trustees of the cup, in which case all negotiations looking to the race would likely enough cease. But this is improbable. So far both sides have shown a disposition toward accommodation; a sportsman-like spirit seems to have animated the discussion, now happily closed, and even to the most uninterested observer the cup committee of the New York Yacht Club would seem to have conceded all that was prudent, all that was fair, and considering the terms under which the cup was originally entered for and won, far more than could have been fairly demanded. The America sailed against the fleet at Cowes, and two decades later, when the Cambria came over to sail for the lost cup, she, in like manner, sailed against a fleet. In the following year her owner brought over the Livonia, and the New York Yacht Club, to guard against the chances of mishap where so many sail on the same course, selected several schooners to sail against her, reserving the right to select a particular one on the morning of the race. A little reflection will show that this was not, what it has often been called, and what, indeed, at the first blush it seemed, an unfair advantage. For it is conceded that the entire fleet was fairly entitled to sail against the stranger, and these selected schooners, being part of it, would have been in the lists together against her where now, to save sea room, they were pitted singly.

Later on, the better to encourage such contests, a single yacht was selected, thus generously giving up an obvious advantage, for the best boat often has to give way to an inferior because of phenomenal weather, collision, or other mishap.

In the present case there has been a contention that we should bring to the post a yacht of the same dimensions as the challenger, the Valkyrie. If, it was urged, we were bent only upon keeping the cup, with no desire to encourage international yacht racing, this was the safest policy; but that the requirements of manly sport necessitated our giving the stranger a chance to win. If this were so, and yachtsmen of means could yearly be found to build smaller or larger boats, as the variously sized craft from abroad were beaten, a time would perhaps arrive, this theory being carried out to its conclusion, when on the one hand it might be demanded of us to compete against a cockleshell, or upon the other against a four-master schooner of 2,000 tons. It is the history of all racing that the fastest holds the field till beaten. The old American Black Ball clippers to Liverpool, the Indiamen, even the whalers bound to polar seas, crowded on all sail when a stranger came up—stun's'les broadening out and skysails topping royals. No racing skipper ever turned a reef to accommodate a lagging stranger. If he was not long enough or fast enough to keep up, he was expected to lengthen himself out in a ship yard or build anew. He could not expect the champion of the seas to clip his wings. In the present case, should the Volunteer be chosen in the trial race, and this, of course, is likely, she would, even with the handicap, have a great advantage, there can be no doubt of that. The extra length of the Valkyrie, which brings her up to 98 feet, is all overhang. She belongs to the 70 foot class, for a yacht gets her power from her hold on the water, her draught, her beam, and the ballast that gives the power of holding sail.

W. IRVING BISHOP, "MIND READER."

W. Irving Bishop, whose feats in what is called "mind reading" have made him widely known in this country and in Europe, died at a New York City club house in the early morning of May 13, under extraordinary circumstances. There were present many men of some prominence in New York society, and the evening had been passed until a late hour in the social intercourse usual among club men, when Bishop, who was an invited guest, was asked to give an exhibition of his powers. He commenced with what he called an ordinary trick. On his leaving the room, one of the club members took a small dagger and made the motion of stabbing another member, after which the dagger was hidden. Bishop was brought in blindfolded, and, with the hand of the man who had hidden the dagger upon his own hand, quickly searched out the dagger, and made a similar motion of stabbing the same man in the way it had been done when he was out of the room.

Bishop then made light of the difficulty of this trick, and proposed to do something more astonishing. He asked the secretary of the club to think of some word in the club's books of account or record. The secretary, with Dr. J. A. Irwin, of this city, who was an acquaintance of Bishop, went down stairs where the books are kept, and selected the name of Margaret Townsend, found in some records, both fixing the word "Townsend" in their mind, and noting just where it appeared; they hid the book and went back

up stairs. Bishop, blindfolded, had the secretary's hand placed upon his own, and then led the party down stairs. He found the book without difficulty, turned over the pages rapidly till he came to the page where the name appeared, then, skimming his fingers over it, gradually settled upon the word itself, although he was not then told what the word was. All this had been done while he was blindfolded, and Bishop had been getting into a very excited state.

On being led back up stairs, he proposed to tell what the word was in a manner which would demonstrate that "muscle reading," as it is called, had nothing to do with the performance. He asked all to stand back, and, insisting that the secretary should think intently of the word, stood apparently in a state of half consciousness, the bandage covering his eyes and other parts of his face. Soon he said, "I think it is a name." After further apparently intense mental effort, he exclaimed nervously, "Give me something to write with." Being handed pencil and paper, without an instant's hesitation he wrote, "Townsend," not in natural form, but as the word would appear written on paper and reflected in a mirror. "That is it," he exclaimed, and, as the persons about burst into applause, Bishop stiffened out and sank back unconscious.

Dr. Irwin assured the others that it was only one of the cataleptic fits to which Bishop was frequently subject, and was not dangerous. Bishop was stretched on the floor, and soon, under the care of the doctor, began to show signs of returning consciousness. When he was able to sit up, though apparently only half conscious, the doctor was explaining something of the physical features of the case to those present, stating that the peculiar backward fashion in which the name was written might be accounted for by the fact that the original reflection of everything seen by the eye is inverted as in a mirror, and is reversed by the optic lens on the way to the brain. Bishop, who had apparently heard everything, interrupted the doctor and asked him to make it clear that what was written on the scrap of paper was the exact copy of what appeared in his eye, and was written by him without conscious intervention of the brain.

Bishop was now so excited that the doctor ordered him to be taken to an upstairs room. His pulse was frightfully high, but he so strenuously insisted on doing the trick over again that the doctor finally consented, as affording the best means of quieting him. The book was brought, and Bishop, blindfolded, set out to find the word again. He wandered over the book with great difficulty, but finally hit the right page, found the word, and indicated it by a savage stroke of the pencil across it.

The "mind reader" was now more exhausted and excited than ever, and Dr. Irwin, fearing a nervous collapse, sent for Dr. C. C. Lee to help him. Bishop had frequent spasms, and it was with difficulty that he could be held still. About 4 o'clock in the morning he had another violent cataleptic fit, and went from it into a state of coma, from which he had only moments of half consciousness for two hours, but not a clearly conscious moment from 6 o'clock in the morning until a few minutes past noon, when his pulse and breathing ceased, and he was apparently dead. For fear that it might be only a cataleptic trance, powerful electric currents were applied, and for half an hour some semblance of life was maintained, but at last the current ceased to have any effect, and the doctor said Bishop was unmistakably dead. The body was removed to an undertaking establishment, where, in the afternoon, an autopsy was made by Dr. Irwin and Dr. Ferguson, the pathologist of the New York Hospital.

The suddenness with which this autopsy was made, in the absence of authority from the friends or relatives of the deceased or from the coroner, has caused great feeling in the community. This is heightened by the fact that Bishop, his wife, and his mother, were opposed to any autopsy, and especially desired that in the event of his supposed death at any time the body should be kept as long as possible, for he had frequently been in a state of almost seeming death for a good many hours, as a consequence of these cataleptic fits, as had also his mother.

The autopsy is said to have shown nothing to indicate any cause of death, except the result of the great nervous strain to which Bishop had subjected himself. The brain was a little larger than usual for a man of his size, weighing 40 ounces. The gray matter was unusually dark in color, but there was no malformation or other physical indication that the brain was other than that of an ordinary man. The case is one, however, that is sure to attract wide attention in the medical fraternity, and the controversies about it commenced on the very day the "mind reader" died.

Bishop was born in Boston in 1836, and early obtained a reputation as a "mind reader." Some ten years ago, in England, he attracted much attention by what he did to expose the alleged tricks of Slade and other spiritualists, and did some surprising feats in telling the numbers upon bank notes which he had not seen. About three years ago, in Boston, he successfully discovered a hidden article, to get at which it was