

Scientific American.

ESTABLISHED 1846.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT NO. 87 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, postage included. \$3 20
One copy, six months, postage included. 1 60

Club Rates.

Ten copies, one year, each \$2 70, postage included. \$27 00
Over ten copies, same rate each, postage included. 2 70

The postage is payable in advance by the publishers, and the subscriber then receives the paper free of charge.

NOTE.—Persons subscribing will please to give their full names, and Post Office and State address, plainly written. In case of changing residence state former address, as well as give the new one. No changes can be made unless the former address is given.

Scientific American Supplement.

A distinct paper from the SCIENTIFIC AMERICAN, but of the same size and published simultaneously with the regular edition.

TERMS.

One year by mail. \$5 00
SCIENTIFIC AMERICAN and SUPPLEMENT, to one address. 7 00
Single Copies. 10

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

Address MUNN & Co., 87 Park Row, N. Y.

Subscriptions received and single copies of either paper sold by all the news agents.

VOLUME XXXV., No. 17. [NEW SERIES.] Thirty-first Year.

NEW YORK, SATURDAY, OCTOBER 21, 1876.

Contents.

(Illustrated articles are marked with an asterisk.)

Answers to correspondents. 268
Ball puzzle, the*. 262
Battery difficulty, a (10). 268
Black knot, the. 258
Brake, improved car. 258
Business and personal. 268
Capital and labor. 258
Centennial buildings, preserve the. 268
Centennial, the—Rubber shoes*. 262
Centennial, the—Russian schools. 268
Dye stuff, a new. 264
Electrical dust figures. 259
Engine, exhaust of an (4). 268
Engine, power of an (6). 268
Engine, the Corliss (8). 268
Fearn, Mr. Thomas. 258
Fire engines, English. 258
Fish commission, the. 258
Forker fork, a new*. 258
Force, tractive (9). 258
Gas process, the Lowe. 256
Gunpowder, the blessings of. 261
Huxley's mistake, Professor. 258
Illumination, cost of. 266
Irrigation, profits of. 266
Lick, Mr. James. 268
Lighting rods (2). 268
Locomotive draft, etc. (1). 268
Look out for him. 261
Manganese, the literature of. 259
Mercury in the human system. 261
Metal, polished (7). 268
Nail extractor*. 258
Naval engineer gazette. 256
New books and publications. 262
Ourselves as others see us. 262
Patents, advantages of cheap. 256
Patents, American and foreign. 267
Patents, official list of. 258
Photographic test plate. 259
Piston rods, cutting (5). 262
Planet, the inter-Mercurial*. 257
Plants, seasonal behavior of. 254
Propeller, a light draft*. 255
Rolls, metals for (3). 268
Rubber overshoes, making*. 262
Russian trade education. 265
Salicylic acid, preparing. 259
Science in America. 261
Scroll saw, the model*. 262
Shingles, how to lay. 263
Silk industry, our. 258
Spiritual slate, the. 257
Steam tramway, a British. 266
Steel manufacture, processes of. 265
Sun, latest news from the. 261
Telegraphs, electric harmonic. 258
Tripartition of an angle*. 259
Trout, singular accident to a*. 255
Tunnel, San Fernando. 260
Turbine water wheels*. 260
Varnish for wood, waterproof. 264
Vienna exposition, reports on the. 260
Wheels on a curve (11). 268

THE SCIENTIFIC AMERICAN SUPPLEMENT.

Vol. II., No. 43.

For the Week ending October 21, 1876.

With 43 Figures.

TABLE OF CONTENTS.

I. THE INTERNATIONAL EXHIBITION OF 1876. With 15 figures.—Meteorites at the Exhibition, with 2 engravings.—The Canadian Log House, 1 engraving.—'Exhibited' Fiber Exhibits.—Mosaic Inlaid Tables.—Germany at the Centennial.—Exhibit of Corundum; Interesting facts Concerning Letter of the Manchester Steam Users' Association to the Judges of the Exhibition.—Compressed Air Engine.—The Lansdowne Bridge, Centennial Grounds, 7 engravings.—Frictionless Taps, by Professor J. E. SWEET, 5 figures.
II. ENGINEERING AND MECHANICS. With 32 figures.—The Progress of the Suspension Bridge between New York and Brooklyn, 1 engraving.—Bement's Milling Machine for Gun Work, 1 engraving.—How to Make Steam and Water Joints, by JOSHUA ROSE.—Methods of Setting Gas Retorts, with 26 figures.—Iron and Steel Manufacture, by W. MATTHEW WILLIAMS, 3 engravings (a valuable paper).—New Boiler Casing and Seating, 2 engravings.
III. TECHNOLOGY, with 36 figures.—Japanese Lacker, its Manufacture and Method of Application, with 25 figures (An interesting and valuable paper).—Chain Making in San Francisco, 1 engraving.—Award of French Prizes for Improvements.—Agricultural Treatment of Concrete, with 1 engraving.—Design for Vault and Colonnade in Iron and Concrete.—Gim-nai Finger Rings, 5 figures.—Panel Ornaments, 17th Century, 1 engraving.—Carved Fountain Ornaments, Ratisbon, 2 engravings.—Designs for Writing Table and Chairs, Vienna, 1 engraving.
IV. LESSONS IN MECHANICAL DRAWING, by Professor MACCORD, with 10 engravings.
V. ELECTRICITY, LIGHT, HEAT, ETC.—Electro-Magnetic Photography.—New Telegraph Repeater, 1 figure.—BRESCHET'S New Electric Machine, 2 engravings.
VI. NATURAL HISTORY.—PROFESSOR HUXLEY on Niagara Falls.—Proceedings of the Entomologica Society.—Congress of Belgian Scientists.
VII. ASTRONOMY.—Supposed Transit of Vulcan across the Sun's Disk.—A Miniature Transit Instrument.—Personal Equation.—Photometric Experiments on the Light of Venus.—Proper Motion of Spots on Jupiter.
VIII. MISCELLANEOUS.—Sketch of the Life of the late Jethro Wood, Inventor of the Modern Cast Iron Plow.—The Standish Monument, Duxbury, Mass.

The Scientific American Supplement

is a distinctive publication issued weekly; every number contains 16 octavo pages, with handsome cover, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all news dealers throughout the country.

All the numbers of the SUPPLEMENT from its commencement, January 1, 1876, can be supplied; subscriptions date with No. 1 unless otherwise ordered.

COMBINED RATES.—The SCIENTIFIC AMERICAN and SCIENTIFIC AMERICAN SUPPLEMENT will be sent together for one year, postage free to subscribers, on receipt of \$7.00.

TO SCIENTIFIC AMERICAN SUBSCRIBERS WHO WISH TO TAKE THE SUPPLEMENT.—A subscriber to the SCIENTIFIC AMERICAN may change at any time to the SUPPLEMENT, or may have both papers sent to him, by remitting to us the difference between the amount already paid for the SCIENTIFIC AMERICAN and the SUPPLEMENT prices above mentioned.

Remit by postal order. Address MUNN & CO., PUBLISHERS, 87 Park Row, New York.

Single copies of any desired number of the SUPPLEMENT sent to any address on receipt of 10 cents.

PROFESSOR HUXLEY'S MISTAKE.

It now appears that Professor Huxley made a grave mistake in giving such prominence to the Miltonic hypothesis of creation in his Chickering Hall lectures.

To say the least, it was a sheer waste of time and effort, and many aver that it was something a good deal worse: indeed, that he might just as appropriately have spent the time arguing that the moon is not made of green cheese, or that the world is not fiat, or in discussing any other childish or antiquated notion, since not one of his audience ever dreamed of entertaining Milton's absurd six-day theory, which every American school boy knows to be inconsistent with the commonest facts of geology. More than one of our thoughtful journalists and clergymen have resented, as almost an insult to the intelligence of our people, the idea that a man of Professor Huxley's reputation should presume to discuss a topic like evolution, before such an audience as was gathered in Chickering Hall, in so trifling and elementary a manner—shirking, or at least shunning, the grand philosophical and moral questions involved in the evolution of protoplasm, apiarian politics, the missing link, monkey's ears, the human soul, and such things. It was altogether an insult, they make no bones of asserting, for Professor Huxley to insinuate, as he did, that Milton's purely imaginative description is commonly accepted in any literal sense as a true account of the manner in which plants and animals came into being.

It looks that way, we must confess; still we cannot bring ourselves to believe that Professor Huxley really intended to insult us. At the worst, it was a mistake, grievous, to be sure, but unintentional: a result, doubtless, of what certain of the daily papers have so pertinently described as "Professor Huxley's habit of generalizing from insufficient data." He had heard of Bishop Coxe, and, so he said, had conversed with some one who insisted that fossils were put into the rocks by the Creator to test our faith; and with characteristic haste, he jumped to the conclusion that all American Christians, or at least the greater part of them, were equally ignorant of right views of geology, the origin of species, and such matters. Had he remained to see and hear the outburst of indignation from pulpit and press which his blunder provoked, he would have returned to his native land, we fancy, much less satisfied with the course he had adopted.

We have just been looking over a considerable pile of the religious papers of last week, to see their comments on the lectures, and we are sure that Professor Huxley would be surprised to witness how generally and how vigorously they repudiate the Miltonic hypothesis. Now and then a belated sheet stands up for it, figuratively speaking; but the majority stoutly put it aside with scorn, and profess that evolution—or, as the favorite phrase runs, "a modified form of evolution"—is not only perfectly reasonable and scriptural, but a theory which they have cherished for years and years! And we sincerely trust that the publishers of all those papers have taken pains to send copies of them to Professor Huxley, that he may be speedily apprised of the grossness of his misapprehension of the intellectual attitude of the American people.

For example, the broadly undenominational Christian Union, speaking of the present order of Nature, remarks: "If Mr. Huxley's object was to illustrate the truth that evolution has performed an important part in producing that order, he has admirably succeeded. But that is a truth which no well informed person in America doubts. The mythical Pennsylvania Dutchman, who still votes for Andrew Jackson and believes that the sun goes round the world, probably supposes that the Universe was created in a week beginning on a Monday morning, January 1, 6,000 B. C. . . . But no one of the exceptionally intelligent audience which listened to Professor Huxley's arguments, and few, if any, who read them, entertain the Miltonian theory of creation."

Here we have not only a positive rebuttal of Professor Huxley's insinuation, but one carrying beautiful internal evidence of its truth. The writer—doubtless one of the younger members of the Christian Union staff—so far from holding that anciently exploded theory, has never learned (or has forgotten) that, according to it, the proper date of creation is, or used to be, not the year 6,000 B. C., but B. C. 4,004!

But, it may be objected, the Christian Union is Mr. Beecher's paper; and Mr. Beecher has always been regarded by the strictly orthodox as a trifle unsound on some points. Well, then, take the intensely evangelical Christian at Work, whose vivacious editor, the Rev. T. De Witt Talmage, as everybody knows, is nothing if not sound. The Christian at Work reprovingly assures Professor Huxley that "it was not at all necessary for him to cross the ocean to demolish a poet's fancies about creation—theories largely imaginative and not consistent with the record in Genesis, and which neither are nor have been held for a century."

That is certainly decisive, though, like most of Mr. Talmage's utterances, it is a little loose in the joints and a trifle extravagant. Our recollection does not cover nearly a century, yet we distinctly remember having been taught precisely that account of creation, order, time, and all, while at school: and to make sure, we have taken pains to hunt up the remains of our old school geographies and histories, wherein we find the Miltonian story set down with great explicitness. We would not presume to say, however, that such absurdities have been imposed upon credulous children of late years.

One more witness against Professor Huxley is all we have space for, and one will suffice. As the evangelical side of the Protestant community has been fully repre-

sented, we will take this time a representative of the other, or non-evangelical, side, the Church Journal and Gospel Messenger. This excellent paper grieves bitterly over Professor Huxley's unfairness in giving his hearers to understand that the Miltonian theory is generally received among Christians at the present day. On the contrary, "the position he attacks is not the educated Christian's position at all. And Dr. Huxley very well knows it."

It may be so: yet charity to the absent compels us to presume that Professor Huxley was ignorant rather than malicious or purposely unfair. Evidently he did not know how rapid has been the progress of sound knowledge on this point among our people. It is truly humiliating, none the less, to think that he could have spent so many weeks among us, and go away at last laboring under such a grave misjudgment of our intelligence. We fear his associations here were hardly what they ought to have been.

Since writing the foregoing, we have been thinking the matter over, and it has occurred to us that, may be, this mistake of Professor Huxley's—annoying as it has been to the moment to us, and must be sooner or later to him—may after all be useful in calling out a general expression of opinion, and so serving to emphasize, as nothing else could, the progress we have been making toward juster views of the origin of things. We believe it was Agassiz who first observed that all great truths have to go through the same course of treatment on the way to popular acceptance. First, they are denounced as false and subversive of religion. Next, they are admitted to be probable, but not proved, and of little account either way. Finally, they are just what everybody has always believed. Evolution, it would seem, has pretty nearly arrived at the final stage.

THE ADVANTAGES OF CHEAP PATENTS.

After paying a high tribute to American Science and Art in his address, as President of the Mathematical and Physical Section of the British Association, Sir William Thomson said, speaking of the Centennial:

"I was much struck with the prevalence of patented inventions in the Exhibition; it seemed to me that every good thing deserving a patent was patented. I asked one inventor of a very good invention: 'Why don't you patent it in England?' He answered: 'The conditions in England are too onerous.'"

"We are certainly far behind America's wisdom in this respect," Sir William continued. "If Europe does not amend its patent laws (England in the opposite direction to that proposed in the bills before the last two sessions of Parliament), America will speedily become the nursery of useful inventions for the world."

Sir William Thomson is a clever inventor as well as an able mathematician and scientist. His apparatus for deep sea sounding with pianoforte wire, for example, has given immense help to that sort of investigation, and promises to be of not less advantage to commerce generally. And it was his galvanometer, we believe, which enabled the electricians to demonstrate, at Hallett's Point, the perfection of the battery connections intended for the instantaneous firing of the enormous mass of explosives distributed throughout the great mine: an experiment even more impressive, when rightly understood, than the final blast. As an inventor, he appreciates the importance of encouraging inventors; as a patentee, he knows that the protection which a patent gives an inventor is at once the cheapest and the most effective encouragement that his country can offer him.

America is, or is rapidly becoming, the nursery of useful inventions for the world, not because we are by nature more inventive than other men—every nationality becomes inventive the moment it comes under our laws—but simply because the poorest man here can patent his devices. And it does not matter how simple the contrivance may be, provided it is new.

In the aggregate the little things—which in England or on the continent either could not be or would not be patented, owing to the excessive cost of the papers or other onerous conditions—probably add more to the wealth and wellbeing of the community, and more to the personal income of the inventors, than the great things do. And very frequently the profit derived from some simple contrivance gives an inventor the independent time and the money required for the development of inventions which he could not otherwise dream of undertaking.

A striking illustration is furnished by the experience of the inventor of what is generally admitted to be the greatest advance made for many years in the art of weaving, the Lyall loom. During the war he invented and patented a simple compound for waterproofing textile fabrics. It was largely used, and brought him a generous revenue. We would not say that his valuable loom would not have been invented except for the fortune which the previous invention brought him; but it is very doubtful if he would otherwise have had the means for completing the work, even if he had had the will to do it. Without the encouragement of low patent fees in the first place, it is altogether likely that he would never have become a practical inventor at all.

Another illustration of the very great importance of some little inventions is found in the galvanometer already alluded to. It saved the first Atlantic cable from being a complete and utter failure, and so demonstrated to the world the grand fact that submarine telegraphy through long distances was not chimerical: yet it consisted essentially of nothing more than a slender magnetic needle, three eighths of an inch long, carrying a circular mirror about a quarter of an inch in diameter, the whole—weighing a grain and a half—being suspended by a film of silk. Without this prompt and acutely sensitive little indicator of electric dis-