# Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 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**

**Clubs.**—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at $3.20 each; additional copies at same proportionate rate. Postage prepaid.

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

Remit by postal order. Address
MUNN & CO., 37 Park Row 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, with handsome cover, uniform in sizewith 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.

**Combined Rates.**—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, postage free, on receipt of *seven dollars*. Both papers to one address or different addresses, as desired.

The safest way to remit is by draft, postal order, or registered letter. Address MUNN & CO., 37 Park Row, N. Y.

**Scientific American Export Edition.**

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing. (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, $5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. ☞ Manufacturers and others who desire to secure foreign trade may have large, and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 37 Park Row, New York.

VOL. XLI., No. 10. [NEW SERIES.] *Thirty-fifth Year.*

NEW YORK, SATURDAY, SEPTEMBER 6, 1879.


**Contents.**

(Illustrated articles are marked with an asterisk.)



TABLE OF CONTENTS OF

**THE SCIENTIFIC AMERICAN SUPPLEMENT**

**No. 192,**

**For the Week ending September 6, 1879.**

Price 10 cents. For sale by all newsdealers.



## INTELLIGENT WORKMEN NEEDED.

Notice was taken in a recent issue of this paper of the experience of a large shoe manufacturer of this State, who advertised in Boston and New York for twenty-five shoe fitters to work in his factory, offering full current rates and steady work. The advertisement brought one application.

About the same time a Boston firm advertised for a book-keeper, and the next day's mail brought three hundred and forty-seven answers.

During the same month an advertisement for a clerk, in a Detroit paper, brought one hundred and thirty applications the first day, and a greater number of letters and personal applications the next day.

An advertisement for a week in the same city, calling for a good carpenter, brought only four replies.

It is altogether probable that in any considerable city in the land, an advertisement for a book-keeper or retail clerk will bring fifty times as many replies as an advertisement for a fair workman in any trade.

It is also probable that in any and every city the average earnings of clerks are nowhere near so large as the earnings of workmen of average skill in the various trades.

Further, it is fairly certain that, with equal capacity, industry, and thrift, the young man who learns any trade will achieve a reasonable competence sooner than the young man who sticks to clerking; while the chances for materially improving one's condition are more numerous in the trades than behind the counter or at the desk.

Why is it, then, that the boys all want to be clerks? Why is it that intelligent parents encourage them in looking for a chance to "get into business," and in looking down on mechanical employments—as though there could be any calling more wretchedly mechanical than average clerking? Why is it that teachers almost invariably train their pupils to "look above" mechanical pursuits?

What the country wants now is workmen—intelligent, industrious, thrifty workmen; men who can do skillfully the work that waits for the doing—who can invent new means and better processes for developing the crude resources of the land, and for converting brute matter into life sustaining and life-enriching wealth. Mere clerks and record keepers are at a discount. There are too many of them. And the professions, so called, are almost equally crowded with men who have nothing to do. There never was a time when ability to do something real and practical was worth so much as now. Yet our young men swarm after clerkships. Why is it?

## HYDROPHOBIA SUCCESSFULLY TREATED WITH CURARE.

The *Medical Record* of Aug. 9 gives a detailed report of a case of hydrophobia successfully treated with curare, by Dr. Ad. Offenberg, of Wickrath, Rhenish Prussia.

The subject was a servant girl, 24 years of age, who was bit in the heel by a rabid Spitz dog, July 28, 1874. Two days after the wound was cauterized by means of a concentrated solution of caustic potash, and shortly after the girl underwent a course of treatment for hydrophobia. Subsequently, for three months or more, the wound was kept suppurating under the direction of a local physician. Seeing that the case was not receiving proper treatment, the pastor of the place brought about the transfer of the patient to a hospital, where she was received October 8. At that time the wound, on the outside of the left foot, extending from the tendo Achillis over the dorsum, presented a reddish granulating surface about the size of the palm of the hand. Under a simple dressing the granulating surface became much smaller, and until October 16 no change was observed in the patient's health and temper. Symptoms of rabies appeared that evening, and by 10:45 P.M. were pronounced and decided. Curare was then injected, under the skin, and the dose was repeated several times during the night, with favorable effects. The last convulsion occurred at twenty-three minutes past four in the morning.

The details of the case would be out of place here; suffice it to say that the patient slowly recovered health and strength, isolated convulsive movements of slight severity occurring at intervals until the 24th, while impaired vision and oversensitiveness of the eyes to light continued still longer. On Dec. 3, the wound on the foot being completely cicatrized, and the patient's general health being good, she was allowed to return to her home. By January, 1875, she was able to resume her duties as servant, though her original health and strength were not restored for more than a year.

The case seems to have been one of genuine hydrophobia, notwithstanding the fact of recovery. The circumstance, however, that the patient attended a hydrophobic neighbor (who was bit by a rabid dog a few days before she was, and died of the disease), witnessing his convulsions and other symptoms, makes her case possibly one of simulation.

## EARLY ADVOCATES OF SHIP RAILWAYS.

Since prominence has been given to Capt. Eads' suggestion for a ship railway across the Isthmus of Panama, there have arisen quite a number of claimants to the credit of first proposing this solution to the great problem. Thus far we have seen none antedating the plan illustrated in the first volume of the SCIENTIFIC AMERICAN; and no one seems to have taken the matter more to heart than the late Horace Day, for he went so far as to take out patents for his devices in this connection.

Before that time, however, the project of transporting ships by railways had been enthusiastically advocated by Mr. Philip C. Friese, in "An Essay on Party," published in this city as early as 1856, and copyrighted the year before. While discussing the competence of the general government to undertake investigations and experiments of a scientific and useful character, for the furtherance of national prosperity, Mr. Friese observed that water conveyances had been increased in size, through many increments, from the slight canoe to the vast steam ship, while land carriages had made no such progress. At that time the rail-car in use was but a small remove from the common road wagon. The American rail-car now shows a considerable increase in carrying capacity, yet the gain in no way approaches that made in shipping.

From this point of view Mr. Friese asked: "Why do we not construct rail-cars as broad and capacious as steamships? Why do we not dip up steamships from a river or ocean, place them in a rail-car, and whirl them overland to another river or ocean? Is it not pitiful that the swift and magnificent vehicles which convey our citizens and our commerce over the stormy deep, and which bear within them the power to scale the lofty mountains and skim the wide plains of our continent, should be checked in their proud career by a narrow isthmus? Why shall not the same power which turns a paddle-wheel through the water be made, by an easy mechanical contrivance, to turn a driving-wheel on a rail? The same power will be immensely more efficient on a rail than on the water, from the fact that friction on a rail is much less than on the water at the same speed, especially at a high rate of speed. Steamships themselves might form the bodies of cars, when placed in a frame, or cradle, over suitable running gear. If the track be made wide enough, cars may be converted into rolling hotels, two or more stories high, and may contain the chambers, parlors, dining-rooms, and other conveniences of steamships, if not of stationary public houses. The great law of economy, in regard to time and power, and fuel and labor, demands the establishment of broad roads, suitable for ships, and for large cars on the principal thoroughfares, say, on the isthmus routes of Panama, Tehuantepec, and Nicaragua, and on the trunk, if not on the branches of the great road which must connect the Atlantic with the Pacific, across the center of our continent. So the Isthmus of Suez may be overcome by a ship railroad. Unless unusual physical obstacles intervene, ship railroads may connect the Black Sea and the Caspian, and perhaps even the Aral, and this with the river Yang Tse Kiang. There would be as much comparative saving of time and power and labor by the employment of large cars instead of small ones, as there is in the employment of ships instead of canoes. Large cars could be driven with safety at a rate of speed not attainable by small ones. If the cars be adapted to steamships, these can leave the Atlantic ports, either going east or west overland, and arrive in the East Indies in a few days, without breaking bulk. For such a road, rivers, lakes, and inland seas would serve as switches and depots."

It is needless to follow Mr. Friese in his remarks concerning the military and naval advantages of ship railways, or to criticise his sweeping indifference to geographical obstructions. Practical railway men will probably laugh now, as they did a quarter of a century ago, at the idea of increasing the economy of ordinary transportation by largely increasing the size of cars; yet it is quite possible that for short portages, to avoid long voyages, ship railways may be more easily constructed and more economically than ship canals; in which case Mr. Friese is obviously entitled to his share of credit for early appreciating their advantages. That the idea of such a means of transportation was original with him is not for a moment to be supposed. The same may be said of Mr. N. W. Evans, who also claims priority in the invention, though he first suggested it in 1854, some ten years after the project had been illustrated in the SCIENTIFIC AMERICAN. Mr. Charles W. S. Heaton, who also puts in a claim, is fully twenty years behind, his proposition having been made as late as "1864, or early in 1865."

## AMERICAN VINES IN FRANCE.

A notable illustration of the balance between animal and vegetable life under natural conditions is furnished by the power of American vines to withstand the attacks of phylloxera. For unnumbered ages the conflict between the plant and the insect has been going on in this country, the result being the survival of those species of the grape capable of enduring the attacks of the parasite. This power of resistance has been found to reside in the rapid lignifying of the roots of the American grapes, so that the punctures of the phylloxera are comparatively harmless. They affect the outer bark only, causing little excrescences which fall off like warts. European vines, on the other hand, have not been subject to such invasions (until recently), and are entirely unable to cope with the pest. When pierced by the insect the tender roots decay, and the entire plant perishes. The consequence is that having once been introduced in Europe, as it was about twenty years ago, the phylloxera meets with no resistance, and the indications are that nothing short of the extermination of all European vines will stay its destroying progress.

Our readers are familiar with the decision of the French Commissioners in favor of the substitution of the native grape stocks by those of American origin, as set forth in their official report, translated for the issue of the SCIENTIFIC AMERICAN, dated August 2. Our American Consul at La Rochelle, Mr. George L. Catlin, now writes that the prefect of that department has taken steps to establish there a monster nursery of American grapes (notably the Jacquez

and Herbemont) to afford the French vine growers, whose vineyards have been ravaged by the phylloxera, an opportunity to re-establish them with resisting stocks. Already the prefect has had planted in a vineyard of his own 42,000 American shoots; and Mr. Catlin anticipates a very large demand for American vines throughout France.

### READING AT SEVEN AND A HALF MILES DISTANCE FROM THE CANDLE.

On the evening of July 12, the Maxim electric light was put in operation on the tower of the Grand Union Hotel, Saratoga Springs, N. Y., with a view to test the extent of its illuminating powers. An open parabolic reflector was used—no lenses—and care was taken by Mr. Maxim to set the points of the carbons a little at one side of each other, and to adjust them to the exact focus of the reflector. When this was fairly accomplished the light was turned toward a spot in Ballston Spa, New York, 7½ miles distant, where, by previous arrangement, a group of several hundred persons were assembled to witness the experiment. So powerful was the light, so accurate the focusing and alignment, that the designated place in Ballston was instantly illuminated, so that ordinary print could be read, the time seen on watches, etc. The night was clear, still, and dark. The experiment was made at 9½ o'clock P. M. This is believed to be the greatest distance at which illumination of equal degree has been accomplished. We are indebted to Mr. H. S. Maxim for the above particulars.

### A COVERING WANTED FOR COTTON BALES.

Among the matters of general interest brought forward at the recent convention of the National Cotton Exchange in this city, one ought to be of special interest to inventors. Speaking of the proposed reform in selling cotton, namely by net weight, President Lafitte said that it would be to the interest of planters not to have any allowance made for bagging. The cheap bagging now used is a poor protection to the cotton, and would soon be superseded under the new rule. In his own words: "If cotton were sold by net weight, some inventive genius would, in a few years, introduce good non-inflammable light material," for covering the bales, thus saving much waste, damage, extra freightage, and so on. The problem does not appear to be a very difficult one, and its solution would pay well. The disadvantages attending the use of unrotted flax bagging was particularly noted. The texture is rough and open, affording an insufficient covering, and allowing the cotton to deteriorate in value, while the expenses for mending the bales were considerably increased. Mr. John G. Dale, agent of the British and Foreign Marine Insurance Company, said that his company had sustained heavy losses from the use of such bagging, and had been obliged to make large deductions from claims by way of protest.

Mr. Trenholm estimated the cotton crop of this year at 5,250,000 bales. If they were placed together in one long string they would measure about 4,500 miles, and stretch from New Orleans to New York, and thence across the Atlantic Ocean. Every linear foot would represent 100 lb. of cotton. With regard to the prospects of the future, Mr. Trenholm said that now but one bale of cotton was produced to 2 4-10 acres of land, but it was possible, by proper management, as experience had demonstrated, to raise one bale to every acre. He believed that ultimately our crop would be 12,500,000 bales.

In view of these figures it is needless to urge the importance of the invention called for. Our wide awake inventors should see that the want is met promptly.

### A SINGULAR MEMORY.

Marvelous stories are told of the curious memory of D. P. Hicks, a Rochester youth, associated with a not less curious faculty for distinguishing sounds. He spent his earlier years in Buffalo, N. Y., where he became known to railway men for his singular knowledge of locomotive bells and numbers.

A short time ago he removed to Rochester, where he is employed at a distance from the railway so great that he rarely hears a passing train. Yet he is able to give the numbers of nearly three hundred locomotives on hearing their bells. The engines that run in the night he names with unerring accuracy, as his house is situated near the track and the bells are heard very plainly. Railroad men state that this is the only case of the kind they ever knew. Old and experienced engineers, switchmen, and those whose work bring them within the hearing of a large number of engine bells, say that at the most they can learn to know only a very few compared to the great number Mr. Hicks can name readily, almost without thought. He can not only give the numbers of several hundred, but in cases where locomotives have been remodeled and renumbered, he can give the old number as well as the new one. He says there are six locomotives familiar to him, the bells of which are keyed in pairs. These six locomotives are the only ones, to his knowledge, in the old class, which have the same key. The new locomotives, that is, those the numbers of which are above 500, are all keyed nearly alike.

The Rochester *Democrat and Chronicle* relates that not long ago an old switch engine, used in the yard at Buffalo, was sent to Rochester for some special purpose. As it passed Dean street Mr. Hicks heard the bell and remarked that the engine was of a certain number, and that he had not heard its bell for six years. A boarder in the house, anxious to test the case, ran to the track and found that Mr. Hicks was correct. Not long since the young man went to Syracuse on business. He heard an engine coming out of the round house, and remarked to a friend that he knew the bell, although he had not heard it in five years. When the engine came into view the number given was found to be correct.

This faculty, it is said, has been tested hundreds of times, and a mistake is rarely made.

### FOUR HOURS IN THE DARK.

It is a humiliating confession to make—but geography is pitiless, and our national vainglory must bow to its decrees—that for four hours in every twenty-four the entire territory of the United States is deprived of sunshine. As the sun goes down on our farthest Aleutian island its morning rays are just lighting up the hill tops of the western coast of Ireland, and the breadth of the Atlantic lies between us and daylight. To our Fenian citizens this may be another and cogent reason for annexing the dear little isle of the harp and the shamrock; but until it is done the exultant cry of the *Rocky Mountain Presbyterian*, that the sun never sets on the United States, must be admitted to be a trifle exaggerated. It does set every day, and, paradoxically, four hours before it rises.

In the depth of our humiliation we may possibly console ourselves with the reflection that—though our British cousins can say with truth what we cannot—the sun really shines on the United States when it is up. We have to submit to four hours of sunlessness a day: England is lucky to get four hours of sunshine. So life has its compensations, and existence in the United States remains endurable, though we do not (geographically speaking) make quite so great a spread as we thought.

### The New Eddystone Lighthouse.

The foundation stone of the new Eddystone Lighthouse was laid, August 19, by the Duke of Edinburgh. The formal commencement of the structure on the 21st of June, as first proposed, was prevented by the roughness of the sea. On the day of the final celebration the weather was rainy, but the water was sufficiently smooth to permit the carrying out of the programme.

The Eddystone rocks are situated in the English Channel, 14 miles southwest of the port of Plymouth and 12½ from Rame Head. They are almost in the line which joins the Start and Lizard points, and in the fair way of all vessels coasting the southern shore of England. So exposed are they to the ocean swell from the south and west that even in comparatively calm weather the waves go raging and thundering over their ledges, and their name indicates the incessant swirl of the deep about them.

The new lighthouse will stand 127 feet from the present tower on the South Reef, a rock which the House Rock protects from the southwest, but which has the disadvantage of being much lower, its highest part being never uncovered before half tide, while the lowest parts, on which most of the foundation rests, are 4 feet beneath the low water level of an ordinary spring tide.

Most of the work done thus far has had to be done under water, and owing to the force of the waves the work could be carried on only at brief and specially favorable intervals. It is expected that the high water level will be reached early next year, when the work will proceed more rapidly, as the courses of stone are all accurately fitted together on shore. It is thought that it will take five years to complete the lighthouse, which is to follow generally the lines of the present one, though it will differ from it slightly in form and considerably in size. To a height of 25½ feet above high water mark the tower will be solid, with the exception of a space for a water tank. The side walls beginning at this level will be 8½ feet thick, diminishing to 2¼ feet at the top. Nothing but granite will be used, and the blocks will be large enough to form the entire thickness of the hollow portion of the tower. Under the cornice, to the top of which it is 138 feet from the rock, the diameter of the tower will be 18½ feet; it will contain nine rooms, besides the lantern, each being 10 feet high and the seven uppermost ones 14 feet in diameter. The focal plane of the new lighthouse will be 130 feet above high water, as compared with 72 feet in the present building, and the actual useful range of the light will thus be extended from 14 to 17½ nautical miles. About 5,100 tons of granite will be employed in the construction, and 50 tons of iron for door casings and the like. The fog-bell, erected in 1872, will be replaced by a powerful siren and the electric light probably be used. The estimated cost of the entire work is between $300,000 and $350,000. A large engraving of the Old Light house, with a view of the foundation of the new structure, is given in the SCIENTIFIC AMERICAN SUPPLEMENT, for August 23.

### American Dental Convention.

The twenty-fifth annual session of the American Dental Convention was held in Saratoga, August 12. The attendance was small. The relative merits of gold, amalgam, and other plastic fillings for teeth, were discussed, the prevailing opinion being in favor of the first named, and against the "new departure," so called, in the direction of substitutes for gold fillings.

### The Oldest Scientific Lecturer.

M. Chevreul, now in his 93d year, began his usual course of lectures on organic chemistry at the Museum of Natural History, Paris, on June 10.

### A New Fluorescent Body.

According to the *Journal of the Chemical Society*, C. O. Harz has discovered a new fluorescent body in *spergulin*. This product occurs in the seed-coverings of the caryophyllaceous plants, *Spergula vulgaris* and *S. maxima* (Anglice "Spurrey"). It is produced at the time when the seeds blacken and are nearly ripe. Spergulin is very soluble in absolute and aqueous alcohol. Viewed by transmitted light the solution appears nearly colorless, with a shade of olive-green; by reflected light it exhibits a dark-blue fluorescence. It has not yet been obtained in the form of crystals. It is very soluble in methylic alcohol, less so in amylic alcohol, and scarcely soluble in ether or petroleum. Concentrated sulphuric acid dissolves it, forming a dark-blue liquid. The fluorescence of an alcoholic solution of spergulin is maintained for more than a year if the liquid be kept in darkness, but is rapidly destroyed by the action of direct sunlight, and more slowly by that of diffused light. Small quantities of caustic alkalies, or alkaline carbonates, added to an alcoholic solution of spergulin, transform it into an emerald-green fluorescent body; and basic lead acetate produces a precipitate. The new compound contains 61·85 per cent of carbon, 7·05 of hydrogen, and 31·8 of oxygen. It appears to be related to chlorophyl, and is probably closely allied to phyllocyanin. An alcoholic solution of the product showed strong absorption, almost entirely in the violet; and in this respect differs considerably from chlorophyl, phyllocyanin, and phylloxanthin. Mr. Harz is disposed to regard spergulin as a feeble acid, the acid salts of which, as well as the acid itself, exhibit blue fluorescence, the neutral salts exhibit green fluorescence, and the basic salts are destitute of fluorescent properties.

### The Railroads of the United States.

The twelfth annual number of Poor's Manual of Railroads of the United States is unprecedentedly full of information, owing to the more detailed statements furnished by the companies and the reports of State departments for the general oversight of railroads. For the first time for several years the introductory article is able to record a very decided recovery of the railway interests of the country from their recent depressed condition. The total mileage in operation at the close of the year was 81,841 miles, 2,694 miles of new line having been opened during the year.

The construction of railways has been entered upon with renewed energy and activity, and it is predicted that construction will proceed rapidly until the mileage is more than double what it is now. In the five years since 1873 there have been constructed in the United States 11,563 miles of railway. A remarkable feature in the railroad operations of the country for several years past has been the enormously increased tonnage in the face of a large falling off of earnings. The decline in earnings has been due to very great reductions in charges for transportation. Within the last decade the tonnage traffic of our railroads longest in operation has been fully doubled, while there has been only an inconsiderable increase in earnings from this source. Since 1873, the year in which the earnings of our railroads reached their maximum, the increase of their tonnage has equaled 50 per cent, although the period has been one of unexampled business depression. At the very time at which there has been the greatest complaint of hard times, the movement of merchandise has steadily and largely increased.

The gross earnings of all the roads whose operations have been reported, have equaled $490,103,361, against $472,909,272 for 1877, $497,257,959 for 1876, and $503,065,505 for 1875.

### Sydney Exhibition.

The last number of the *Illustrated Sydney News* received at this office represents, by a number of well executed wood engravings, the progress of the Sydney Exhibition, showing the arrival and placing of exhibits from all countries, and exhibiting that same degree of hurly-burly activity which was witnessed just before the opening of our Centennial show, and which prevailed just before the opening of the French Exhibition last year.

From these illustrations and the statements of the newspapers of that far-away colony, the success of the Exhibition would seem to be secured. Now for the New York World's Fair in 1883. Are we to have it? If so, it is time steps were taken to select a site, and some announcement made of what the committee intend doing.

### Professor Archibald Geikie.

Professor Geikie, the accomplished chief of the Geological Survey of Scotland, recently passed through this city on his way to the West. His purpose was to go first to Ogden, then, after visiting Salt Lake, to study the Wahsatch and Uintah mountains and the ancient lake basins of that region. On his return to the East, Prof. Geikie will deliver a course of lectures on "Geographical Evolution" at the Lowell Institute.

### The California Big Ferry Boat.

We are indebted to Dr. Edward Gray, M.D., for some additional particulars concerning this vessel, the Solano, recently noticed in our paper. Her length is 425 feet; breadth, 115 feet; built at Oakland, where she is now receiving her finishing touches. The vessel is to ply on the Straits of Carquinez, between the railway station of that name and Benicia, and not on San Francisco bay as stated.