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NEW YORK, SATURDAY, MAY 8, 1886.

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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 540.

For the Week Ending May 8, 1886.

Price 10 cents. For sale by all newsdealers.

OPPOSITION TO NOTABLE INVENTIONS.

Those who by reason of constitution, habit, or ill humor are continually opposing progressive ideas and inventions might learn a profitable lesson, if they would glance for a moment at the history of almost any of our important improvements, and study, through the perspective of several decades, the ungraceful position of those who then maintained a similar attitude toward the advanced projects of their times.

In the presence of electricity, we may find the uncertain gas flame and the harmful products of combustion comparatively objectionable, but for upward of half a century we have considered its illumination a great advantage, after the more primitive methods of lamp and candle. When first introduced, however, our ancestors can scarcely be called enthusiastic about the fluid, if the following curious document represents at all correctly the popular sentiment on the subject. The list of names appended to the petition includes men who were at that time prominent among those most noted for their intelligence.

PHILADELPHIA, Nov. 28, 1833.

REMONSTRANCE AGAINST LIGHTING WITH GAS.

To the Honorable the Select and Common Councils of the City of Philadelphia:

GENTLEMEN: The Subscribers beg leave respectfully to remonstrate against the plan now in agitation for LIGHTING THE CITY WITH GAS, as they consider it a most inexpedient, offensive, and dangerous mode of lighting. In saying this they are fully sustained by the accounts of Explosions, Loss of Life, and great destruction of property, where this mode of lighting has been adopted.

We consider GAS to be an article as IGNITABLE AS GUNPOWDER, and nearly as fatal in its effects: as regards the immense destruction of property, we believe the vast number of fires in New York and other cities, may be in a great measure ascribed to this mode of lighting; the leakage of the pipes and carelessness of stopping off the Gas, furnish almost daily instances of its destructive effects. When we consider that this POWERFUL and DESTRUCTIVE AGENT, must necessarily be often left to the care of youth, domestics and careless people, we only wonder that the consequences have not been more APPALLING. It is also an uncertain light, sometimes suddenly disappearing and leaving the streets and houses in total darkness.

The *Waters of the Delaware and Schuylkill*, now considered the most pure and salubrious in the world, as many long voyages have fully tested, must soon, we fear, experience the deterioration which has reduced the WATERS of the THAMES to the present impure and unhealthy State, for no reservoir will be able to contain the immense fetid drains from such an establishment, and very soon the river must be their receptacle to the destruction of the immense Shoals of *Shad, Herring*, and other fish with which they abound; the same cause must produce like effects. *Salmon, Smelts* and other fish, formerly caught in vast quantities in the Thames have nearly all disappeared. The constant digging up of the streets, the circumstance of the gas pipes which at the intersection of each square must come in contact with the water pipes, are difficulties and evils which we would anxiously avoid.

In conclusion we earnestly solicit that the lighting of our *city with oil may be continued.*

And your petitioners, etc., etc.

P. Syng Physick,	Charles H. Dingee,	Horace Binney,
Jno. S. Warner,	Hartman Kuhn,	Geo. Pepper,
John Sergeant,	Richard Alsop,	Benjamin Chew,
Jacob Ridgway,	Charles Wharton,	E. Styles Ely,
Paul Beck,	John Perot,	Henry Pratt,
Elihu Chauncey,	Jas. C. Fisher,	Roberts Vaux,
Jos. P. Norris,	John Markoe,	Thos. Allibone,
Geo. W. Smith,	Jno. C. Cresson,	Mat. Newkirk,
W. L. Hirst,	Wm. Platt,	Edw. A. Souder,
Wm. J. Duane,	H. Hollingsworth,	Hymen Gratz,
V. L. Bradford,	David Paul Brown,	Wash. J. Duffee,

And several hundred others.

But unreasonable as these apprehensions now appear, they were scarcely comparable with those excited a few years previously by Stephenson's newly invented locomotive. At a time when the commerce between Liverpool and Manchester was absolutely crippled for want of adequate transportation, and a company of gentlemen who had sufficient confidence in the eminent inventor to risk the necessary means stood ready to undertake the construction of a railway between the two cities, so powerful and so prejudiced was the opposition the enterprise encountered that its success for some time remained very doubtful. When the proposition was before Parliament, in 1825, pamphlets were issued offering every possible objection, and the newspapers declared the scheme impracticable and pernicious. It was affirmed that the cows near the line of the road would stop grazing and the hens no longer lay eggs; that birds would die from the poisonous gases discharged from the smokestack, and the preservation of pheasants and foxes be no longer possible.

People were seriously assured that the sparks would certainly set fire to fields and houses, while the air would be polluted with smoke. Prospective passengers were warned that they could not breathe in a train going so rapidly, and that they would be made worse than seasick. Farmers were frightened by the statement that there would be no further use for horses, and with the extension of the system the species would become extinct, and oats and hay would be unsalable. The boilers, it was said, would burst, the country inns be ruined, and the proper caste distinctions be broken down by such indiscriminate traveling. Failing to convince a people threatened with such a series of calamities, the assailants of the new invention took comfort in the belief that even were the railroad ever built, the weight of the locomotive would completely prevent its moving, and that the trains could never be worked by steam. Stephenson's tunnel was found very depressing; it was stated that "the sudden emersion in the gloom of the tunnel and the clash of reverberated sounds in a confined space combined to produce a momentary shudder, an idea of destruction, a thrill of annihilation!"

Yet these statements came from men not altogether unaccustomed to progress. The humiliating failure of their prophecies might well restrain more modern doubters from placing limitations upon the possibilities of the future.

CONDITION OF THE PANAMA CANAL.

It will be remembered that when M. De Lesseps and his party inspected the Panama Canal, in February, they were accompanied by Mr. John Bigelow, as the representative of the New York Chamber of Commerce. He was, by request, a guest of the Canal Company, and went with the special mission of preparing a report upon the present condition of the work, for American publication. Mr. Bigelow has now returned, and the report which he has presented to the Chamber of Commerce furnishes a trustworthy account of the present prospects of the Interoceanic Canal.

The total length of the projected canal is 46½ miles. The depth of navigable water will be about 28 feet. Its course is for the greater part of the way through the valley of the Chagres. A basin 1,600 yards long and 110 yards wide will be necessary at Panama for the accommodation of vessels, and another one, about three miles long, at Tavernilla, to permit vessels to pass each other. The total excavation necessary to accomplish this result is 120,000,000 cubic meters. The excavations made up to Dec. 31, 1885, amounted, by contract, to 11,490,196 cubic meters, and by the company to 1,520,837 cubic meters. During January, 1886, 1,067,823 cubic meters were excavated, giving a total up to Feb. 1 of 14,678,856 cubic meters. This left 105,821,144 cubic meters still to be removed.

These figures make any comment unnecessary. Mr. Bigelow states that it is impossible to say what the final cost of the work will be, or when it can be completed. There were at the time of his visit 15,000 men employed. At the present speed, this force can probably excavate 12,000,000 cubic meters a year. Could the force and machinery be trebled, it would probably be possible to finish the work in 1889. The report mentions as some of the disadvantages to be encountered that the work is in a foreign state, under a weak and unsettled government; in one of the most unhealthy regions on the continent, subject to earthquakes, within 450 miles of the equator, and under a tropical sun, where acclimated labor only is of any service. Everything for the prosecution of the work has to be imported. The country itself supplies absolutely nothing but the site for the canal. So much of the work is experimental that it is believed to be impossible for even the most eminent engineers to make estimates which have greater value than mere conjectures. The most serious difficulties to be overcome may be enumerated under four heads:

First, the control of the waters of the Chagres River, which, in the rainy season, if unrestrained, is liable to flood the larger part of the canal every year. It would be possible to control the river by the construction of an immense dam, or by the enlargement of the derivative channels by which the flood could be carried off, but either work would be very costly.

Second, the cut through the Andes at Culebra. The removal of some 22,000,000 cubic meters of earth and rock at this cut through the Cordilleras has been confided under contract to an Anglo-Dutch Company, which engages to finish the work by July 1, 1889. The contractors are to be paid $32,000,000. But they have not performed their contract more than one-sixth as rapidly as they agreed to, and at the present rate it will take them fifteen years to finish.

Third, keeping that section of the canal which runs from La Boca toward the Island of Perico, in Panama Bay, from being filled in by the ocean and the Rio Grande. The obstacles to be overcome in effecting this result are regarded as very serious, though not insurmountable.

Fourth, securing the amount of labor required at practical rates. The climate is described as one where "life dies and death lives." The natives, having no wants beyond those supplied by nature, will not work, and the difficulty of securing enough men is tremendous. To supply the deficiency, M. De Lesseps has invented a great many machines, so to do away with hand labor as far as possible.

In conclusion, Mr. Bigelow regards the canal as an undoubted possibility if sufficient funds be provided, but he ventures no opinion as to whether they will be, or what sum or what amount of time would be necessary to complete the work. The report shows that from all sources $120,000,000 have been received, but not how much has already been expended. The International Congress of 1879, which was the parent of the present Panama Canal Company, estimated the total cost at $213,500,000. It would seem from the data at hand that at least half of the estimated cost will have been expended by the end of the present year, at which time four-fifths of the excavation, not to speak of the supplementary or precautionary work, will still remain to be accomplished. There is, however, one favorable consideration in the midst of so

much that is discouraging. It seems that a large part of this expenditure was incurred in preparations for building the canal, more, indeed, than upon the canal itself. This being the case, it may be assumed that the remaining portion of the work will cost considerably less in proportion than that already accomplished. A comparison is drawn between the Suez Canal and that at Panama, but it is admitted that the latter work is vastly more perplexing and more costly. As the spectacle of 60,000 men toiling to connect the two oceans is one which is not likely to be presented during the present decade, it is not probable that the canal, if ever completed, will be within the specified time. It will operate strongly against De Lesseps' schemes for raising more money that not only is the cost of the work an unknown quantity, but the revenues and maintenance are equally indefinite.

MINERAL WATERS OF THE UNITED STATES.

It appears from Mr. Peale's monograph on the subject that the consumption of mineral waters in the United States is annually increasing. Though the supply for this demand is drawn largely from abroad, the utilization of our native springs is receiving greater attention each year. In the decade beginning with 1873, the importation of mineral waters of all kinds increased from 394,423 to 1,714,085 gallons. Since 1883, a smaller quantity has been imported, but the increase in the domestic production has been sufficient to supply the deficiency and maintain the proportionate growth of the total consumption.

As yet, the majority of American mineral springs are unimproved. This is due mainly to the comparative newness of the country, and to the consequent inaccessibility of many of them, particularly in the Territories and extreme Western States, and also to the fact that few of our native mineral waters have been as carefully studied as those of foreign springs. People are realizing the importance of these investigations before a spring can be possessed of any value, for the indiscriminate use of mineralized waters has been shown to be not only unproductive of beneficial results, but in many cases to be absolutely injurious. There are, however, sufficient inducements in the profit arising from a well known and well patronized spring to make their improvement and study a matter of but a few years. Economically, they are interesting to their owners in a number of ways. As places of resort, they add to the wealth and population of the districts in which they occur; and the sale of the water, either on the spot or when bottled and shipped to a distance, is often a source of considerable profit.

Though all spring waters are more or less mineralized, the term is limited to those which contain a sufficient amount of mineral matter to have a medicinal effect upon the system. Mr. Peale adds to this definition, "or are characterized by an unusual degree of heat." Evidently, he is not a believer in the tenets of substantialism, for the savants who support this school have announced the retrogressional discovery that heat, or caloric, is a substance; and since it belongs neither to the animal nor vegtable kingdom, it must, by negative reasoning, be a mineral. The therapeutic value of hot water in the treatment of dyspepsia being well known, hot springs would, according to this doctrine, come under the head of mineral waters, without special mention. It is unnecessary to say that we have omitted them for a different reason. By a coincidence, not unnatural, most hot springs are mineralized, but we see no reason why simply thermal springs should be included in this classification. The hot springs of Arkansas, Colorado, New Mexico, California, and other less known localities are for the most part highly charged with chemical salts and gases. A consultation of the mineral spring localities shows that there is scarcely a State or Territory in all our broad domain which is not liberally supplied with mineral springs, many of which possess marked medicinal properties. The majority of these will be improved and utilized in time, and it is probable that an even larger number will be brought to public notice in the future. What is wanted at present, however, is not so much a knowledge of additional springs as of the waters of those already discovered. Many noted resorts in Europe, which were at one time obscure villages, owe their importance to the discovery and utilization of their mineral waters. It is quite safe to predict that many a lonely spring, which is now tasted only by a passing frontiersman or a thirsty Indian, will some day cause a similar metamorphosis.

COMETS FABRY AND BARNARD.

Two comets, visible to the naked eye and not far apart, will be the marked features of the northern sky during the latter part of April and the beginning of May. They are known on astronomical annals as comets Fabry and Barnard.

Comet Fabry was discovered on the 2d of December, 1885, by M. Fabry, of the Paris Observatory. It was a very faint telescopic comet, merely a misty speck in the sky, and gave little token of the importance it was destined to attain. It was, however, approaching the sun, and increasing in size and intensity. It passed its perihelion on the 5th, and is moving rapidly northward. It was seen with the naked eye by a European observer about the 27th of March, and on the 8th inst. by an American observer. The former observer found it a difficult object on account of its low position in the heavens and its nearness to the sun. The latter observer describes it as a hazy star with a faint tail, visible in the northeastern sky from 2 o'clock until the morning dawn.

Dr. S. Oppenheim, an assistant in the observatory at Vienna, gives the following ephemeris of the comet until the 30th of June:

Date.	R. A.	Dec.	Intensity.
May 1·5	3 h. 10 m.	55° 47′ N.	666·80
May 16·5	8 h. 21 m.	16° 3′ N.	192·41
May 31·5	9 h 12 m.	27° 49′ S.	15·58
June 30·5	10 h. 34 m.	36° 41′ S.	2·07

The figures under the head of "Intensity" give the comparative increase in brightness since its discovery, that period being represented by unity.

Comet Fabry will be at its nearest point to the earth about the 1st of May. Its intensity will then be more than six hundred times as great as when discovered.

This is the case according to Dr. Oppenheim's computation, and his estimate is indorsed by Weiss, the director of the Vienna Observatory. Other computers do not give so large an estimate, making the comparative brightness five hundred, four hundred, and even only one hundred times greater than unity. The position of the comet may easily be found on a star map or chart, when the right ascension and declination are given.

On the 1st of May the comet will probably be in the constellation Perseus, and will be visible during nearly the whole night. We say "probably," for there seems to be an unusual discrepancy in the ephemerides of the various computers, and cometic movements are always uncertain. On the 16th of May the comet will be found among the small stars of Cancer, and, quickly losing its transitory brightness, will be lost to the view of northern observers.

We may therefore hope to behold a comet in a good position for observation with the naked eye, and one that may be easily recognized. But the celestial stranger will make a short stay, and observers must eagerly watch for its appearance. Neither must any wonderful show be expected. The highest estimate, six hundred and sixty-eight times the original intensity, is nothing very remarkable, for the comet was nothing but a misty point when first seen by M. Fabry, making its way through the great square of Pegasus.

Barnard's comet, discovered by Prof. Barnard, of Nashville, Tenn., on the 4th of December, 1885, promises to be visible at the same time, although it is not as bright as Fabry's. It will be in perihelion some time during the first week in May, and will be at its nearest point to the earth about the end of May. It will be in the constellation Andromeda early in May, when its brightness will be one hundred times greater than when discovered. If computations are accurate, there is a prospect of beholding two comets visible to the naked eye in two neighboring constellations on the early mornings about the 1st of May, in the northeastern sky, and when the moon is not in an aspect to dim the mild luster of their shining.

PHOTOGRAPHIC NOTES.

Balloon Photographs.—We were recently shown a series of excellent photographs (5 x 8 in. size) made in October, 1885, by John B. Doughty, photographer, and Alfred More, an amateur aeronaut of Winsted, Conn. A special balloon was constructed by Mr. More for the purpose, the basket having a central aperture in the bottom large enough for the lens to project through. It was thought by pointing the lens through the aperture the effect of the gyratory movement of the balloon would be in a measure overcome. The exposures made through this aperture, however, were no more satisfactory than the plan mostly employed, which was to hold the camera in one hand over the side of the basket and release the shutter with the other.

The balloon started off at one o'clock in the afternoon and descended at seven.

Several of the views taken at different altitudes showed distinctly the winding rivers, the peculiar contour of the different farms, particularly their irregular shape, and the location of woods and railroad tracks. The views were in fact complete maps of the country over which the balloon floated.

The most curious pictures were of banks of clouds; one in particular, looking toward the edge of fleecy clouds, had the appearance of surf rolling on the beach.

During the trip a remarkable mirage effect occurred; there appeared to one side of the balloon against a bank of clouds the shadow of the balloon cast by the sun, and also the shadow of an inverted balloon, the bottom of each basket joining, while extending in the shape of a disk from the neck of each balloon was a beautiful circular rainbow.

An exposure was made upon this, but unfortunately the plate was afterward accidentally damaged. Mr. Doughty made a sketch of the appearance. His description of the phenomenon shows that it must have been very beautiful.

Other pictures showed the interior of the balloon while inflated with air, also as it appeared after the descent.

All the pictures were distinct and well focused, and were taken with an ellipse Prosch shutter at its highest speed.

The use of the balloon, in combination with the camera, for taking panoramic and bird's eye views is likely to be extended, but it will be particularly valuable in case of war for securing correct maps of the location of the enemy's lines. By using sensitive paper in place of heavy glass plates, larger pictures can be taken without increasing the load.

The sensation of floating along quietly in the air is said to be very agreeable.

Exhibition of Photographs.—We were recently invited to inspect a very creditable exhibition of photographs representing the first annual exhibit by the Pittsburg Society of Amateur Photographers, of Pittsburg, Pa.

Much of the work shown was of a high character for so young a society; some architectural views by Mr. Geo. S. Orth, instantaneous views by Mr. A. S. Murray, the president, landscapes by Mr. W. S. Bell, portrait composition by Mr. J. B. Clark, mechanical views and blue prints by Mr. Perrine, were all excellent specimens of amateur work.

This society, being located in the midst of a great manufacturing and railroad center, has abundant opportunities for making a photographic record of the progress of important industries.

The exhibition was opened by a reception on Thursday evening, April 15, and terminated on the evening of the 16th with a lantern exhibition, at which there was a large attendance.

THE REMINGTON TYPE WRITER.

Some time previous to the failure of the firm of Remington & Sons, all the rights to manufacture their celebrated type writer had been secured by the firm of Wyckoff, Seamans & Benedict. As the latter firm now owns every department, they will, in the future, make a strong endeavor to improve, if possible, the Remington type writer, and will use every means to keep the supply equal to the demand, which has not been the case in the past, although no less than nine hundred machines were sold during the month of March.

Gambetta's Brain.

At a recent meeting of the Anthropological Society of Paris, a report by MM. Duval and Chudzinski was read on the brain of M. Gambetta. The third frontal convolution was highly developed, the upper part of it being reduplicated.

Reference was made to the brains of persons of low intelligence, and also to the prominence of Broca's convolution in the brains of Wulfert, the lawyer, and Huber, the philosopher, described by Rudinger. In each of these latter *savants*, who were remarkable for their dialectical and rhetorical ability, the convolution was more wavy and complex than in ordinary brains, this being especially marked at the base, but there was no reduplication at the upper extremity of the convolution, as in Gambetta's. In the present case there were other indications that the brain was not that of an ordinary person. The right quadrate lobe was very complicated, and divided into two parts by a furrow branching off from the occipital fissure. Of these two parts, the inferior was divided into several little convolutions by a furrow with numerous stellate branches.

The occipital lobe was very small, especially on the right side. Altogether the brain had a peculiarly fine appearance, due to its great and somewhat diagrammatic regularity, especially in the frontal region.—*Lancet.*

Oiling Wood.

Wagon makers or repairers can save their stock from worms by oiling with linseed oil. Single trees, double trees, neck yokes, spokes, and cross bars that are of white hickory, and are kept in stock for a year or more, will be eaten by worms if not kept in a dark place or otherwise protected. Coal and kerosene oil are good also, and the expense of applying is but little. Linseed oil is preferable, as it acts to some extent as a wood filler, filling the pores, and thus aiding the painting which follows in its proper place. Some manufacturers oil all their white hickory stock before shipping.—*Lumber World.*

THE famous South Metropolitan Station gas holder, of London, 214 feet in diameter, over 150 feet high, and 5,500,000 cubic feet capacity, long held its position as the largest in the world. It has now been eclipsed by a pair of holders erected recently at the Birmingham (Eng). Corporation Gas Works. Each of these is contained in a tank 240 feet in diameter, is said to be 150 feet high, and to hold 6,400,000 cubic feet.