Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW, NEW YORK.

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VOL. XL., No. 17. [NEW SERIES.] *Thirty-fifth Year.*

NEW YORK, SATURDAY, APRIL 26, 1879.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF
THE SCIENTIFIC AMERICAN SUPPLEMENT
No. 178,
For the Week ending April 26, 1879.

Price 10 cents. For sale by all newsdealers.

THE SITE OF THE GREAT NEW YORK EXHIBITION.

The location of the buildings for the New York Exhibition of 1883 is just now the subject of much discussion. Though many conflicting interests are involved it is obvious that the question must be determined by a few paramount conditions.

Whatever local advantages may be offered by any or all of the suburban sites proposed, the single condition that the Exhibition must be easily and quickly accessible to the million people on New York Island, on foot as well as by horse or steam conveyance, should compel the selection of a site on the island and not above Central Park.

Accessibility by water from the surrounding cities, and convenience in handling materials as well as passengers, require that the site chosen should be near the water; the North River front offering by far the greater advantages.

As any money contributed by the city and State should be put into a permanent building (as was done at Philadelphia) the chosen location must comprise, in part at least, lands suitable for permanent occupancy by public buildings, and if possible already belonging to the city.

The temporary structures must be near the permanent buildings, and in a place suitable for the wholesome housing and accommodation of vast multitudes. In all probability the sites of such buildings must also be public land, since the enterprise could not afford to pay rent, and private citizens are not likely to contribute private property for such uses without remuneration.

Where can such a situation be found? The projectors of the Exhibition have pitched upon the lower part of Central Park, against the invasion of which the press and the public have very forcibly protested. It is true that the necessary damage to the park might not be so great as many fear; possibly the use of the Ball Ground and the Green (west of the Mall) might result in no permanent curtailment of those open spaces, and no injury except to the turf, which could soon be replaced. Nevertheless any invasion of the city's too limited breathing space, even temporarily or for the most laudable purpose, should be deprecated. From an artistic point of view the park would make an admirable setting for the Exhibition buildings; but the cost would, at the least, be altogether too great.

The city has already set apart for a museum and zoological garden the sixteen-acre area bounded by 8th and 9th avenues and 78th and 81st streets, and known as Manhattan Square. The plan of a magnificent structure there has already been perfected, and one wing built, making, so far as it goes, the best planned museum building in the world. The money contributed for a permanent building by the city and State of New York could be used in completing the central cross of this museum building. The rest of the plan might be developed as one story temporary buildings, giving, with the main building, 16 acres of exhibition space. Temporary structures covering 40 or 50 acres more will be required for the purposes of the Exhibition.

Instead of going into the park for sites for these buildings why could not the city utilize therefor the now unused roadways between Manhattan Square and the river, comprising four broad avenues intersected by cross streets at right angles, all as yet unoccupied, and all graded, paved, lighted, and drained by the city at enormous cost? A more convenient and wholesome situation for a great fair could not be found. The river front would accommodate all the shipping of the Atlantic coast. The Hudson River Railway and the two elevated roads traverse the region already, and could easily be made to furnish quick and comfortable conveyance for 300,000 visitors a day, in addition to the almost limitless facilities afforded by the river.

The crossing of 9th avenue by the Boulevard at 64th street would furnish an ample site for a vast building in the form of a St. Andrew's cross; the junction of the Boulevard with 10th avenue another site, equally good. Between 78th and 86th streets the Boulevard runs midway between 10th and 11th avenues. The three avenues with the cross streets would, anywhere in this neighborhood, furnish sites for Exhibition buildings surpassing in magnitude any ever dreamed of hitherto.

The diversion of the pleasure driving on the Boulevard to 9th or 11th avenue for a mile or so—the only inconvenience likely to accrue from the temporary occupation of the streets named by Exhibition buildings—would be as nothing compared with the evils and inconveniences sure to attend an invasion of Central Park. And the absence of immediate park surroundings to the buildings would be no serious objection to the proposed site for the fair, since it would be but a step from Manhattan Square into the park opposite the Lake and the Ramble.

The streets proposed to be occupied are of ample width for Exhibition buildings; the Boulevard is 150 feet wide, the avenues 100 feet, and the cross streets from 60 to 100 feet.

FROST AND YELLOW FEVER.

On the theory that yellow fever is propagated by germs which cannot withstand a freezing temperature, the United States Senate has passed a bill appropriating $200,000 for the construction of a steel refrigerating ship to disinfect the holds and cargoes of vessels coming from infected ports.

The projectors of this plan of disinfection claim that no mere experiment is contemplated. The project, they say, is sure to succeed, since artificial refrigeration is a simple and well established process, and it is certain that yellow fever germs cannot withstand frost; accordingly it is perfectly feasible to freeze out any possible yellow fever infection that vessels from the tropics may bring to our shores.

Unfortunately, however, these confident statements involve several hypotheses which sadly lack confirmation. The germs themselves are hypothetical. We have no positive proof of their existence as living organisms; still less proof that frost kills them. It is true that an undetermined something, under favorable conditions not wholly understood, suffices to propagate the disease. It is true also that yellow fever epidemics in this country are stopped by cold weather. Yet, while the fever is not apt to rage in any locality during two successive seasons, except in the tropics, the proof that frost is the arresting agent, and that it is able to put an end to the disease permanently (or until it is reimported) is very far from satisfactory. It is no uncommon thing for refugees from fever districts to return to their homes weeks after frost has set in, and then sicken and die of yellow fever. It is even asserted, on fair authority, that cases of sickness, which no one would hesitate to pronounce yellow fever during the summer season, have occurred repeatedly during the past winter in towns along the lower Mississippi; yet there has been no lack of severe frost in that region.

The recent outbreak of yellow fever on the United States Steamer Plymouth, after spending the winter at Boston, and being subjected to freezing and fumigation, complicates the matter still more. The Plymouth came to Boston last fall, from a cruise among the West Indies, with yellow fever on board. The vessel was free from the disease during the winter; and if there is any truth in the theory that frost is fatal to yellow fever, no cases should have occurred on that vessel without reinfection. Yet as soon as the steamer, which left Boston March 15, had arrived in southern waters (about 300 miles southeast of the Bermudas) fever broke out and the steamer was forced to return. But one stop had been made at St. Georges, Bermuda, where there has been no yellow fever for several years.

If the infection of yellow fever can withstand the winter climate of Boston, why should it not that of Memphis or New Orleans? If it can, the importation of the disease is not necessary to start an epidemic next summer, in which case the most thorough refrigeration of incoming vessels will not suffice to stay the plague.

There is another objection to the spending of so much money on an experimental vessel. If refrigeration should prove adequate for the disinfection of yellow fever ships, one refrigerating vessel will scarcely begin to do the work required in all our southern ports; twenty would be none too many. And why should a special steel ship be constructed to carry the simple apparatus needed for the production of cold? Any existing river steamer or fair sized tugboat would suffice for that purpose; and the $200,000 appropriated would fit up and charter a large number of such small vessels, each provided with all the machinery needed to refrigerate the hold of any vessel, should the experiment sustain the projector's theory. While two hundred thousand, or two hundred million, dollars would not be too much to pay for preventing an epidemic of yellow fever next summer, it is altogether too much to pay for an experiment which could be made for a tenth of the money, especially when there is a possibility that the wasted funds may be sorely needed in the practical application of the methods, the efficiency of which the experiment is expected to confirm.

THE AUSTRALIAN EXHIBITIONS.

The occurrence of two great Exhibitions in Australia, within a year of each other, is in some respects unfortunate; yet it may prove an advantage to exhibitors from this country and Europe, since it will be comparatively easy to transfer exhibits from the one to the other, and thus save the double ocean transit that would be required were the two Exhibitions more widely separated in time. Had Victoria and New South Wales united in a common exhibition, the display might have been grander, though it may well be doubted whether the commercial effect would have been so valuable. It must be remembered that Sydney and Melbourne are capitals of states together as large as France and Germany, and soon to be as populous; and in the absence of means of communication but few in either colony would be reached by an exposition at the capital of the other.

Though the smaller city, Sydney, has boldly taken the lead in inviting the world to compete for her trade, and will open the first world's fair south of the equator in September next, Melbourne follows in October, 1880. Like every other public work in New South Wales, the Sydney Exhibition is a government undertaking, and a large sum of money has been voted for carrying it out. The building is well advanced, and France and England have asked for more space than can be allowed. For American exhibitors there has been reserved 30,000 square feet on the floor of the main building, and half as much more for machinery. Already a considerable quantity of exhibits has been shipped from this port, and there is reason to hope that the United States will be creditably represented. It is proper to add that, with the exception of freightage, exhibitors will have no charges or commissions of any sort to pay. The space provided is free.

The foundation of the Melbourne Exhibition was laid February 19. The building is to stand in the center of a large public park—Carlton Gardens—on the highest land in the city, and is to cover seven acres; the whole Exhibition will occupy about twenty acres. The cost of the buildings and all expenses incidental to the Exhibition will be defrayed out of funds voted by the Victoria Parliament. Applications for space should be made not later than June 30 next. There will be no charge for exhibition space. American manufac-

turers will not need to be urged to secure for themselves a favorable representation in these exhibitions. The Australian market is an inviting one, and American goods have been received there with signal favor.

THE BICYCLE AS A PRACTICAL ROAD VEHICLE.

Now that the interest in this means of locomotion is increasing in this country, the question, Is the bicycle a practical road machine? is often asked, especially by those whose experience with the velocipede of 1869 fully demonstrated the impracticability of that article for such a purpose. In relation to the subject, a correspondent sends us the following:

On January 7 last, the writer purchased a bicycle with 52 inch driving wheel; weight of machine, 44 lb. Since that date, for a period of eleven weeks, I have ridden it 350 miles over the common roads of this section (Essex county, N. J.), riding 26 days, and ranging from 20 minutes to 3 hours' riding time per day. The speed has varied from 6 to 17 miles per hour, and I have ridden without difficulty through slush, mud, and snow, and over ice, frozen ruts, and cobble stone pavement. All ordinary hills have been ascended with comparative ease; extraordinary ones, peculiar to mountainous regions, it has not been my fortune to essay. The fatigue occasioned by a long or swift run is surprisingly slight and transient. No stiffness or soreness follows the effort.

A few days ago your correspondent took a 16 mile run over roads and under circumstances which afforded a good test as to the utility of the machine. Starting at 5 P.M., a stiff hill was ridden down at a walking pace by "backpedaling," a curve at its base rendering it unwise to fly it. Three miles of lumpy, macadam road, very much out of repair, was succeeded by a better one, connecting with a common dirt road, which was slowly recovering from the effects of the winter season. This extended nearly two miles, and was ridden over slowly, but without trouble. Turning to the left, up the knubbly Montclair turnpike, I found the wind strong against me, so getting well over the handles, I climbed slowly for two miles to Montclair. Here I turned and ran down, making the two miles in 7 minutes. The final run home of six miles, including the muddy dirt road, occupied 30 minutes. No fatigue was felt after this run—the exercise manifested itself only in an amazing appetite.

IS THE MOON INHABITED?

The question as to whether the moon is inhabited by organic beings—if not like those that live on our own globe, at least of a kind specially adapted by their structure and nature for existing under the very different physical conditions that obtain on our satellite—is one that has attracted attention for ages, and one, too, that has been argued *pro* and *con* with great ability by many learned and eminent men. The opinion of nearly all scientists of the present day, however, is that the moon is a "dead planet;" and that, inasmuch as she has but a slight and very rare atmosphere, and that, as a consequence, no water exists on her surface, she is entirely unfitted to be the dwelling place of any organic beings whatever—at least of any kinds that our minds can form any conception of. On the other hand, those who take the opposite view argue (to use the words of Dick) that "matter appears to have been created chiefly in subserviency to mind; and it is highly improbable that the Creator would leave a globe containing a surface of 15,000,000 square miles altogether destitute of sensitive and intellectual beings, especially when we behold its surface diversified and adorned with such a vast assemblage of picturesque and sublime scenery, and when we consider that every department connected with our globe is peopled with sentient beings of every description. Although seas and rivers and a dense atmosphere are not to be found connected with the lunar orb, and although some of its arrangements are different from those of the earth, yet these circumstances form no valid objection to the moon being inhabited, for the Creator can in all cases adapt the inhabitant to the nature of the habitation provided for him, as he has adapted the birds for winging their flight through the air, the fishes for gliding in the water, and man and quadrupeds for traveling the dry land."

Among the noted scientists of the present day who hold this opinion, but who found it on the latest discoveries of science rather than on the wisdom of the Creator, is the celebrated French astronomer, M. Camille Flammarion, who is at present organizing a subscription for the purpose of founding at Paris a free observatory created by private means. M. Flammarion not only believes that the moon is inhabited, but he believes that it will be possible to construct a telescope of such power as to bring the lunar orb so near our eyes that the question may be practically settled. In connection with this project he has recently written a long and interesting article entitled "Is the Moon Inhabited?" in which he ably reviews all the facts bearing on the subject. This article, which we have translated from one of our French exchanges, will be found in SCIENTIFIC AMERICAN SUPPLEMENT No. 170.

INTEREST-BEARING NOTES.

By the failure of so many savings banks and trust companies throughout the country a great many persons have not only suffered severe losses, but a large number have been greatly distressed by the loss of all their accumulations, at a time, too, when they most needed them. Not only those who were unfortunate in having their money in these weak institutions have been sorely troubled, but depositors in solid companies naturally become apprehensive for the safety of their savings and withdraw their deposits.

While we do not recommend persons of small means to keep their money about their person or hid in a stocking under the bed to tempt thieves, there are a great many who do this, for the reason they have lost confidence in all savings institutions. To this latter class of persons the new ten dollar interest-bearing certificates, now being issued by the United States Treasury, will be found equally safe and convenient as gold or greenbacks for circulation, and interest on their investment will be constantly accruing, therefore they are better to hoard than either silver or gold.

These notes are convertible with accrued interest at 4 per cent per annum into 4 per cent bonds of the United States, issued under acts of July 14, 1870, and January 20, 1871, upon presentation at the office of the Treasurer, Washington, D. C., in sums of $50 or multiples thereof.

The certificates are a little shorter and somewhat wider than legal tender notes, which they otherwise resemble. A vignette of Benjamin Franklin is in one corner of the face side, with the figures and word ten in the other corner. They are dated April 1, 1879, and certify that the sum of $10 has been deposited with the Treasurer of the United States under act of February 26, 1879; this certification bears the signatures of the Treasurer and the Register, and the Treasury seal.

On the back of the certificate are the words "ten dollars," and the following: "Interest on this note will accrue as follows: For each 9 days, or 1-10 of a quarter, 1 cent; for each quarter year, 10 cents; for each entire year, 40 cents."

THE ANILINE COLORS.

Take a little of any of the brighter aniline colors on the point of a knife and sprinkle it on the surface of still clear water in a transparent vessel. Immediately lines of color will curve downward through the water, intersecting and blending till the whole vessel assumes the brilliant tint. Occasionally a little mass, more abrupt in its movements than the rest, will strike directly downward, but before it goes far it will divide and sub-divide and form an inverted tree of color in the liquid. Having reached the bottom it will sometimes start upward, as though it had accomplished its mission and had no time to spare on its return. Often a mass of colored liquid will take the form of the smoke rings of a locomotive, and sometimes two of these rings will chase each other downward, the one in advance opening and allowing the other to pass through, which in turn waits for its comrade, and so on till they are destroyed by frequent collisions. Some of the colors are very different when seen by reflected and transmitted light, and the blending of the two when the vessel is placed in different positions with regard to the sunlight is very beautiful.

What are these aniline colors, and whence are they procured?

It is surprising what a mine of wealth has been found in the refuse matter of our gas works. The bituminous coal, which is there heated in great retorts, yields much that can be utilized besides the gas upon which our cities are so dependent. Upon the retorts, as a crust, gas carbon is formed; this is a good conductor of heat and electricity, and supplies the carbon cylinders or plates used in several galvanic batteries, and also the poles for the electric light. Most of the devices for electric lighting require this product of the old system for their successful operation. The interesting scientific toy, the microphone, which renders audible the tramp of a fly, the rustling of the softest brush, the noises of insects far too faint to be distinguished by the unaided ear, uses the conducting power of gas carbon as a necessary agency. Certain vapors pass from the retorts and condense in the colder tubes. From some of these almost all the ammonia salts, so indispensable to the chemist and various manufacturers, are procured. The nitrogen of the vegetables of the old carboniferous age, now for the first time released from its long imprisonment in the coal, comes to us in the form of these ammoniacal liquors. Another liquid thus condensed is coal tar, while in the retort, after the volatile ingredients have been expelled, remains a hard material resembling anthracite coal, and which is useful for the same purposes as that article—coke.

We will take the coal tar and trace out some of the products which may be derived from it. No less than forty different materials have been extracted from this unpromising-looking article by the art and skill of chemists. When subjected to distillation it is separated into various substances, which are more or less volatile. By raising its temperature gradually, and collecting in different receivers the compounds that pass off, these may be obtained distinct from each other in tolerable purity. At about the temperature of boiling water, benzol, or benzine, distills. The use of this for dissolving grease is well known. As the temperature is raised there pass off in succession toluol, phenol, naphthalene, anthracene, increasing in weight and solidity, the last being a heavy greenish oil. In the retort is left pitch, which is extensively used in the construction of pavements. The benzol, when subjected to the action of strong nitric acid, forms nitrobenzol, the artificial oil of bitter almonds, which under the name of myrbane is an article of perfumery. By the action of hydrogen this nitro-benzol is converted into aniline. The second product of the distillation of coal tar, toluol, may be passed through a similar operation, the resulting product being toluidine.

We have now arrived at the basis of our aniline colors. From the thick black grimy coal tar are produced the brightest and most beautiful colors which art can show. The most gorgeous dyes, rivaling in beauty the tints of the rainbow or of the sunset clouds, are the coal tar colors. Surely, never was a stranger transformation; no substance could be found which at first sight would be accounted more utterly devoid of beauty than gas tar, and no stronger contrast could be seen than a bottle of it side by side with a transparent brilliant solution of aniline red, green, or violet. Many inks, both black and colored, are nothing but some of the products of aniline or its allied substances, dissolved in alcohol or water, and the brightly dyed ribbons of our streets are made beautiful, but often not permanently so, by the action of these marvelous coal tar colors.

It would not be interesting, except to a scientific man, to go over the various chemical changes by which aniline and toluidine are converted into the various colors. A combination of the two gives rosaniline, which is a kind of starting point in the manufacture. From this base, by the action of various acids, many of the colors are derived, while some are obtained from phenol and the other original products of coal tar distillation, though all are popularly but incorrectly known as aniline colors.

In the laboratory of the chemist the methods have been evolved and the products first obtained. Kept for a long time as a mere curiosity, their value as dyes was finally made known, practical men secured the secret of their manufacture, and vast industries, principally abroad, aggregating millions of dollars of capital, have sprung up. It is one of the many cases where the man of science, not for any mercenary purpose, but impelled by the love of investigation and discovery, has been a great material benefactor. Without his researches the grimy coal tar would have been grimy coal tar still, useful to paint fences, to preserve wood, and a few other minor purposes, but not suspected to be so rich a mine of wealth and beauty. One of the most brilliant discoveries of science in this line has been the artificial production of the coloring matter of madder. The dyeing quality of madder has been known for at least 2,000 years, and raising the plant and preparing the roots have been important industries in Zealand and many tropical countries. But recently two German chemists, working upon the known analysis of alizarine, a coloring principle of madder, have built up the substance itself, using as a base anthracene, one of the results of the distillation of coal tar. The artificial alizarine differs in no respect, chemical or physical, from the natural, possesses the same coloring properties, and its use has to some extent diminished the demand for the cultivation of madder. By what chemical process the plant, in nature's laboratory, forms its coloring principle we do not know; but we can trace every step of its formation from coal tar, and alizarine must henceforth stand side by side with safranine and the other so-called aniline colors.

It was about 50 years ago that Unterdorben separated from indigo a substance which he called crystalline, which afterward became known as aniline, from the Portuguese *anil*—indigo. Until within 20 years it was deemed an unimportant substance, indigo being itself too costly to support any extensive manufacture; but since it has also been found in coal tar a continued succession of coloring products has been drawn from this apparently inexhaustible source; one of the latest of these has been uranine, a beautiful green fluorescent dye.

The aniline colors are not permanent. We have heard of the labels of boxes which were marked with aniline inks becoming entirely white, no vestige of a letter remaining, upon exposure to the sunshine in the transit, to the manifest inconvenience of the expressman. The writer having occasion to use some charts, made them partly with ordinary black ink and partly with crimson. In course of time the crimson faded away, leaving the black characters rather meaningless by themselves; and this in a position where no direct sun rays ever reached.

Some of them are, however, much more permanent than others, and for purposes which do not involve great exposure or rough usage they answer very well, while their brightness gives the dyer a power he cannot possess with the fast colors. Magenta, mauve, solferino, roseine, Tyrian purple, picric acid, and many others, enable him to add immensely not only to the brilliancy but to the variety of his shades.

The extensive employment of these colors in many articles of ordinary use has led to numerous experiments on their physiological effects on the human system. Pure aniline is a strong poison in the stomach, and both aniline and nitrobenzol, when taken into the lungs in a state of vapor, are very injurious. Numerous instances of serious impairment of the health of workmen employed in aniline factories are on record. In one case a workman broke a carboy of the liquid, and in wiping it up respired a large amount of the vapor; in a few hours his face and body assumed a leaden hue; his gums, eyes, and lips a bluish appearance from the formation of coloring matters in the blood, and the whole system was seriously deranged. Energetic treatment, however, saved his life. But the aniline colors, which are not pure aniline, are much less injurious. They adhere so closely to the dyed fabrics that there is no danger of their floating as dust in the air, as in the case of arsenical dyes, and when pure are but slightly poisonous even when taken internally, though hurtful substances, like arsenic, lead, and mercury, are used in the manufacture, and may exist in a greater or less degree in the colors themselves.

AN ingenious apparatus, intended to reproduce telegraphically at a distance the pictures obtained in a camera obscura, has, says *Galignani*, recently been invented by M. Senlecq, of Ardres. The principle on which it is based is the property possessed by selenium of presenting a very variable and very sensitive electrical resistance according to the different gradations of light.