# Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

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

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

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NEW YORK, SATURDAY, JULY 31, 1880.


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**THE SCIENTIFIC AMERICAN SUPPLEMENT**
**No. 289,**
**For the Week ending July 31, 1880.**

Price 10 cents. For sale by all newsdealers.



## THE WORLD'S FAIR OF 1883.

The Secretary of State has appointed August 10 for the first meeting, in this city, of the Commissioners of the proposed International Exhibition. The resident commissioners held a meeting July 13, to appoint committees to arrange for the general meeting. The main purpose of the meeting of August 10 will be to form a temporary organization of the commission, and to provide for the opening of books of subscription for the capital stock, as required by act of Congress. The capital stock is fixed at $12,000,000, and $1,000,000 must be subscribed and $100,000 paid in before any further steps can be taken.

The subscription books are to be kept open sixty days; then the commissioners will reassemble for the election of permanent officers. The first meeting of the shareholders will be called at the same time, to elect from their number a committee of finance, to consist of twenty-five members. Not until then—say October 11, next—can any action be taken with regard to the classification of exhibits, the appointment of judges, examiners, and other officers, the selection of a site, and so on.

There is no reason to anticipate any difficulty or delay in raising all the money needed to make the coming Exhibition great, successful, and entirely creditable to our city and the nation. The selection of capable heads for the several departments may be less easy, but among our many able and experienced business men it ought not to be very hard to find the right man for every place. Though a dozen or more possible sites have been proposed, it is obvious that the choice must lie between two or three which alone present the requisite conditions—ample space, nearness to the heart of the city, easy accessibility by land and water, high, wholesome, and well drained ground, and suitability for the reception of permanent buildings.

The determination of the scope and character of the Exhibition involves many problems of a serious, delicate, and conflicting nature. What is wanted is not the biggest possible show, but the best. It must be understandable as well as large and inviting. The danger is that it will be too big and too chaotic to be intelligible, and bewildering because of the multiplicity of indistinguishable exhibits. Every exhibitor will naturally want to show all that he has to sell, to display the magnitude of his own establishment, regardless of the fact that twenty other men in the same line have an equal right and an equal desire to show the same things; regardless too of the fact that the visitor's time, strength, and patience are necessarily limited.

In deciding upon what should be shown some principle of exclusion will have to be adopted, both to keep the Fair within reasonable bounds and to secure a proper classification of exhibits; and it might be well at the outset to rule out, so far as possible, everything, however worthy, if it cannot show or illustrate an advance upon what was exhibited at Philadelphia, either in the article itself or the method of its production. If this should threaten the exclusion of many staple products of high commercial importance, provision might be made for them in special representative collections, to show in a compact and intelligible way the best the country has to offer in each department, rather than a succession of bewildering displays in which substantially the same articles are endlessly repeated. In a word, the spirit of the naturalist, more than that of the showman or advertiser, should govern the choice and classification of exhibits. It must be borne in mind that in a cosmopolitan city like New York, with its many magnificent shops and warehouses, the visitor can see on all sides, and in every department of trade and industry, displays of the world's best products, which for bulk and variety are unapproachable in any world's fair. To attempt to compete with Broadway on that score would only challenge belittling criticism and failure. The visitor to a stated exhibition of universal scope has time to see, and desires to see, only what is newest and best in each department. Everything else obscures and wearies. And, so far at least as America is concerned, one decade of progress furnishes enough in every department of human activity to stock a creditable world's fair.

## THE REMOVAL OF DIAMOND REEF, NEW YORK HARBOR.

After eleven years of persistent work the four acre obstruction to the commerce of our harbor, known as Diamond Reef, has been entirely cleared away, so as to give over the whole area a depth of twenty-six feet of water at low tide.

The reef was first attacked over twenty years ago, but no substantial progress was made toward its removal until the invention of General Newton's steam drilling scow, after the improvement of the East River channel was undertaken by the United States Government.

An extended description of the work was given in the SCIENTIFIC AMERICAN just a year ago, with a number of illustrations showing the construction of the Government drilling scow and the methods of using it in submarine mining. Thanks to the efficiency and economy of this invention, and the saving effected by the system of deep water hydraulic mining, introduced by General Stone during the past year, the great work has been carried out at a cost far below that of any similar work elsewhere.

The reef was composed in part of hard rock, but mainly of a compact deposit of glacial clay, sand, and bowlders, firmly cemented together. At first the drilling scow was employed in blasting off the projecting points and edges of the rock, so as to secure a channel of moderate depth over all the reef. Latterly a system of face blasting has been carried out, to insure a complete removal of all the rock down to the required depth, the fragments dislodged being raised by grappling. To remove the bowlder drift a different process was found necessary. Though not so hard as rock the cemented drift was more troublesome, the drill bars glancing on the hard bowlders, and the exploding charges of dynamite blowing out without greatly disrupting the body of the reef. To meet these difficulties General Stone devised his system of hydraulic mining under water. By means of powerful streams of water from a force pump, one stream being directed against the face of the reef, the other turned in the opposite direction so as to cause a strong current to carry away through a pipe the earth and stones stirred up by the first stream, it was found comparatively easy to wash away rapidly the lighter materials of the reef and convey them into deep water. The heavier bowlders were at the same time detached from the glacial clay and sand, so as to be readily grappled and removed in the ordinary way.

## NOTES AND OBSERVATIONS ON THE ARMY WORM.

BY C. V. RILEY.

The appearance of this insect in the Atlantic States this year has been marked by several peculiar conditions, and further study of its habits has revealed some new points which enable me to recast the theories which have been proposed in explanation of the phenomena connected with it.

### NUMBER OF ANNUAL GENERATIONS.

From the time Fitch wrote so fully on the species in 1861 until the record of my observations made in 1876, it was the prevailing belief among entomologists that there was but one annual brood of the species, especially in the Northern States, no absolute evidence of a second brood having been obtained. My experiments that year proved conclusively that there were always two, and sometimes three, generations in the latitude of St. Louis. The fact that I also recorded as to the remarkably rapid development of the worm, *i. e.*, that it can reach full growth within a fortnight after hatching, lent favor to the idea, in my mind, that there might be even more generations. Subsequent experience, and especially that of the present year, has convinced me that there is usually one other generation in the latitude indicated, and it is but natural to suppose that there are still more in more Southern latitudes. The moths are to be found laying their eggs as soon as vegetation starts in the spring, and there is a succession of broods from that time until winter sets in, the number differing according to latitude and the length of the growing season. Thus Prof. Comstock reports it as having been received at the Department of Agriculture in the larva state during every month of the past winter, from the Southern States, where, during the mild weather, it was active and injurious to oats and other grain.

There is no doubt that the prevailing theory of its single-broodedness was a result merely of the fact that it is observed in excessive numbers only once during the year, and usually when wheat is just about ripening. But, as I showed in my Missouri Reports (Eighth and Ninth), the worm is always to be found both earlier and later in the season, and attracts no attention at such times because living in its normal cut-worm condition.

### HOW THE INSECT HIBE NATES.

In my previous discussions of this subject I have been led to conclude that the insect might hibernate in any one of the four stages of egg, larva, chrysalis, or moth, the evidence then at hand pointing to the chrysalis state as the more normal mode of hibernation in the northern regions, and the moth or imago state in the southern regions. With present light, and especially with the experience of this year, I am led to revise my opinions materially, and to believe that, as in the case of so many of our ordinary cut worms, the by far more common mode of hibernating is in the larva state. That the insect does hibernate in the larva state is now an established fact, based not only upon the experience just cited from Prof. Comstock, but upon the finding by Prof. S. A. Forbes of a partly grown larva in the stomach of a blue-bird as early as March the 9th, at Normal, Ill., or before vegetation could have fairly started.

The belief is further confirmed by the lateness of the season in which I have found the worms, and by the finding of the chrysalis and breeding of the moth by Mr. Meske, at Albany, N. Y., about the middle of May.* We have absolute evidence, therefore, of the hibernation as larva and as a moth; but none of hibernation either in the egg or chrysalis state, though presumptive evidence of the latter.

We are slow in getting at the simple truths in respect to many of our most common insects, because the original observers are so few compared to those who write fluently and copiously at second hand, and can, of course, never add to our knowledge of the facts. The fact of larval hibernation established, gives us at once a better explanation than we have hitherto had of many experiences with the insect. We can, for instance, at once see why the worm will be less disastrous in fields or meadows that have been burned over, and also at once account for the frequent freshness of the moths that are captured in early spring—a fact attested by many, and especially insisted on by Prof. Thomas from his experience the present spring, as narrated to me.

### THE DESTRUCTIVE GENERATION PROBABLY NOT THE FIRST OF THE SEASON.

The hibernation of the larva being admitted, it follows, in

*Cited in the 8th Missouri Report, p. 44.

my mind, that the injurious brood will be that succeeding the hibernating one; *i. e.*, the resultant from the moths which the hibernating larvæ produce. Passing the winter, in different sizes, under the shelter of matted leaves, in unpastured meadows, in grass fields, and in grain fields sown in the autumn, these worms will go through their transformations and produce moths soon after vegetation starts. The moths will show little tendency to leave the fields where they were bred, but will lay their eggs in such fields, and under favorable conditions their issue may, as during the present year, become so abundant as to be obliged to travel therefrom when approaching full growth.

There are some other interesting questions, as the relation of wet and dry weather to army worm increase, etc., which I will present in a future article.

## MORE OIL TANKS FIRED BY LIGHTNING.

On the 14th of July a terrible storm with thunder and lightning passed over the neighborhood of Bradford, Pa., and as usual quite a number of oil tanks were struck and their contents burned. Property to the amount of half a million dollars is reported as having been destroyed. One stroke of lightning fired a 25,000 bbl. iron tank full of oil, at Custer City, near Bradford, belonging to the United Pipe Lines. Another large tank at Kansas Branch was struck and burned. Tank 367, containing 25,000 bbls., on Lewis Run, was also struck and burned.

At Coleville, a 250 bbl. tank was struck and burned, the flames spreading to other tanks. At Kendall Creek, two wells were struck and 600 bbls. oil consumed. At Sawyer City a well was struck and 250 bbls. oil destroyed. At Red Rock two oil rigs and 100 bbls. oil were struck and burned. The burning oil from the Custer City tank spread to adjoining tanks and great destruction of property ensued. This is a sad catalogue for one storm.

We recently called attention to the remarkable fact that lightning seems to make a special selection of oil tanks as objects for destruction. Almost every thunderstorm that sweeps over the Pennsylvania oil regions sets oil in a blaze somewhere; but up to the present time no observation seems to have shown exactly how these conflagrations are induced or what the remedy is.

We have heretofore presented two theories: 1. That the light hydro-carbon vapors from the oil, rising high in the air above the tank, form a conductor which the lightning follows into the tank and ignites the gas. (See SCIENTIFIC AMERICAN of July 3d and 17th.) 2. That the lightning strikes or is discharged from the iron supply pipe of the tank, at a greater or less distance from the latter, whereby a spark is induced within the tank, between the supply pipe and the iron casing of the tank. The most minute spark of electricity thus appearing in the tank would set fire to the oil, as the end of the supply pipe terminates above the oil, in an atmosphere of highly inflammable gas. If this theory is correct, and it looks reasonable, one remedy would consist in making an electrical connection between the oil supply pipe and the iron casing of the tank. This can readily be done by means of half a dozen short pieces of wires, or strips of copper, the respective ends of the copper being soldered to the outside of the iron casing of the tank and to the exterior of the supply pipe. It might be supposed that if the iron supply pipe is in contact with the iron casing of the pipe, no further connection would be necessary, which is very true. But if there is rust, or a film of oil, between the pipe and the casing, then the contact would not be perfect, a spark might result, and the gas be set on fire. We therefore advise tank owners to make use of soldered connections, done in the most thorough manner as we have indicated.

It is alleged that the use of lightning rods, arranged on masts near the oil tanks, has proved ineffectual. But we have seen no particulars of the manner in which such rods are grounded. If their terminals were simply stuck down a few feet into dry earth—which is the way most of the good-for-nothing rods are arranged—then of course no protection could be expected. If their terminals were soldered to iron underground pipes which were directly connected with the tanks, the protection might be secured.

The value of any lightning rod as a protector chiefly depends upon its being well grounded, or in other words thoroughly connected with the earth. One of the best groundings for a lightning rod is an iron water or gas pipe, which extends for a long distance underground, and thus affords an extensive conducting surface between the rod and the earth. The bottom of the rod should be soldered to such iron pipe.

## THE AMERICAN CHEMICAL SOCIETY.

The June conversazione of the society was held with Dr. C. F. Chandler, at the School of Mines, Columbia College, New York, on Thursday evening, June 20.

A large attendance answered Dr. Chandler's invitation, and a pleasant time was spent examining a number of new additions to the Chemical Museum of the School of Mines.

Among the most interesting of the objects exhibited was a collection of the celebrated Arita porcelain from Japan. This material is true porcelain, made by the admixture of two natural clays found in Japan, without any preparation or other material. It is susceptible of being worked into the most delicate and artistic forms, and is decorated with all the beautiful and curious skill so characteristic of the Japanese.

Dr. Chandler explained the elaborate fittings recently put into the chemical lecture-room of the School of Mines for experiments with the electric light. These are so arranged that the room is lighted with two electric lamps suspended from the ceiling and inclosed in opal glass globes; while by means of an ingeniously devised switch at the side of the lecture table, these lamps can be thrown out of the electric circuit, and at the same instant the current is diverted to the experimental lantern to project objects upon the screen. The advantage of this arrangement is that the sudden change from the electric light of the experimental lantern to gaslight, as ordinarily arranged for lecture rooms, is obviated, and there is no sudden strain upon the eyes.

The electricity is obtained from a Wallace dynamo-electric machine, located in the engine room of the school, which machine is driven at a speed of about eight hundred revolutions per minute. Eight wires run from the different parts of the machine to the switch board in the chemical lecture room, thus giving the means of throwing out or using any desired combination of parts.

With the lantern Dr. Chandler made a number of experiments in spectrum analysis, showing the lines of silver, copper, zinc, and the reversing of the sodium line. He also showed the effect of the change of form in the slit of the lantern, by using Dr. Henry Morton's admirable contrivance to form round disks, circles, and zigzag lines of the spectrum on the screen.

Some examples of the beautiful artotype process of photo-printing were exhibited, and much admired for their near approach to ordinary fine photographs, experts only being able to detect that they are printed.

A very fine and large photograph of Lanyumantel's picture of the arrest of Lavoisier by the officers of the French Revolution, was much admired.

Among a number of other minor objects exhibited were some old hand blocks used in calico printing. Dr. Chandler said he had visited a print works where he found a cord of such blocks stored away among some rubbish, and he secured some of them as relics of a process which is rapidly becoming obsolete, being superseded by the more modern process of machine printing.

## STATEN ISLAND AND OYSTERS.

From the log or bark canoe, that once carried the savages, to the commodious and elegant steamers of to-day, is a great step. Yet such is the change since 1524, when Giovanni Verazzano entered New York Bay, and now, when we can take a steamer down the harbor to Staten Island, and back again through Raritan Bay, Staten Island Sound, Kill von Kull, and Newark Bay.

A visitor at the foot of Charles and Tenth streets, New York, will be much interested in the large oyster boats moored at the docks of the North River at those points. He will find similar boats on the East River side, at the foot of Broome street and that vicinity. When he goes aboard and notes the busy scenes within and around, and the multitudes of yachts and sloops and smaller crafts coming and going about these docks and slips, he must be impressed with the fact that a great amount of business is transacted there. It is in fact the headquarters of a large trade in oysters and clams.

The Staten Island, Jersey, and Long Island oyster planters bring very much of their stock to be sold there. The names on the boats, such as Van Name, Hausmann, Elsworth, etc., direct you at once to Staten Island and its neighborhood. You are moved to go down the New York Bay again, to explore the place that is the occasion of so much business activity. In hunting up the oyster grounds and oyster cultivators, we come upon a number of interesting facts besides.

Verazzano anchored near the island in 1524, but before morning a severe gale compelled him to put to sea again. He never set foot on the land, then densely covered with forests, and occupied more or less by the Raritans, a branch of the great nation of Delawares or Leni-Lenapes Indians. It fell to Henry Hudson, sailing in the Half Moon, and arriving in the bay on September 3, 1609, to make the first landing for a white man. He called the island *Staaten Eylant*, the island of the states—that is, the States-General of Holland, under whose flag he was sailing. He found there tobacco, maize, and wild fruits. He took two of its Indians with him up the river to West Point.

The natives called the island "Aquehonga Manacknong." In some old accounts it is "Egquahous." One name makes it to signify "the place of bad woods."

In 1624 a number of Walloons, from near the river Scheldt, and from Flanders, came over with Peter Minuit, and settled the island. The Indians were always willing to sell, and they did sell the land several times over to successive parties, who came intending to stay, at different periods. The last of their deeds was given to Governor Lovelace in 1670. It was then designated as "the most commodiousest seate and richest land" in America.

Tradition says one of the first houses was built on the heights of New Brighton, and of bricks brought from Holland. In 1640 a "still" was erected, perhaps the first in America. A grist mill, a snuff mill, and a buckskin shop were soon started. At the present time many important industries are pursued on and about the island. Several large dyeing and printing establishments make colored fabrics of silk, cotton, and worsted. There are also fire brick and gas retort manufactories. The linoleum floor cloth, made from pulverized or ground cork and linseed oil, is manufactured here. This is an article more durable than oil cloth. There are white lead, linseed oil, and paper factories on the island. Also several large and extensive breweries. But the oyster farming is the most important of them all. It amounts to more than all the rest put together. This business has built up Mariner's Harbor, Tottenville, Port Richmond, and other places around the shores of the island. It has also had much to do in developing the extensive shipbuilding and commerce now carried on there.

Several things show that oysters and shell fish were abundant in these waters long before white men came. Shell heaps of several feet in thickness are found both on the shore and at points in the interior. They clearly mark the camping grounds of the aborigines, and show what furnished an important part of their food.

In the days when tribal wars were frequent, the Indians would naturally fix their camps amid the dense wood of the hills or vales a mile or two from the coast. The varying surface afforded numerous safe retreats. Squaws picked up the oysters with their hands, and carried them in baskets on their backs to the wigwams. Of course they could procure only such as were to be found in shoal water.

After the Dutch came rakes were used to some extent. But even to a quite recent date the oystermen have done much of their work by hand, wading into the water even in the coldest weather. The Dutch settlers have a number of family names now representing them connected with the various industries at present carried on. Some localities also possess Dutch names. The boats used in early times, and down to the memory of some now living, were the "periauzuas," or "piroguas." These were vessels without keels, having heavy lee boards, two masts, and two large sails.

The word "Kill," which occurs several times, as in "Great Kills," "Fresh Kills," "Kill von Kull," means "stream" or "water passage." Newark Bay was formerly called "the Kull." Kill von Kull means the stream or passage from the Kull. These places, with Prince's Bay, Raritan Bay, and New York Bay, are the spots where the Staten Island oyster cultivators have their farms or grounds. Nearly every one of these places has its local tradition to account for its designation or to mark it. Thus, the highest part of the ridge, which runs a considerable way through the island, is called "Toad Hill." Before the Revolutionary war, a young lady residing on that hill had two suitors at the same time. She had her preference, and took a peculiar course to turn off the unacceptable one. She procured and put into his capacious coat pocket two large toads. He did not discover the trick until the next Sabbath evening as he was dressing, with the expectation of making the girl another visit. The strong perfume led to an investigation that opened his eyes to the state of affairs. He took the hint and called no more. But the story got out. His young acquaintances tormented him by asking "when he intended to go to 'toad hill' again?" or "how the people on 'toad hill' were?" Thus this name, which originated in a jest, became fixed upon the locality.

In the various wars that have raged around New York and New Jersey, Staten Island and its people have had a prominent place. Its peculiar situation has exposed it to many vicissitudes during such conflicts.

Daniel Butler, Lott Rhett, Henry Money, Benjamin Joline, and Aaron Van Name, were among the first persons to see and take advantage of the waters about this island for oyster production. This was between sixty and seventy years ago. For some time they depended solely upon natural supplies. They went South and procured oysters and planted them for a few months in these waters. It was difficult then to find markets for many oysters. They sold a limited quantity in Washington Market, New York. They even took sloop loads to Albany. But it sometimes happened that they were compelled to bring them back unsold. People generally had not learned to eat oysters. At that time the present flourishing village of Tottenville was mostly a forest. Henry Money was its only inhabitant until young Aaron Van Name came to aid him in the oyster business. Afterward John Totten inaugurated and carried on shipbuilding, and gave his name to the place. Now there are quite a number of what are called "shipways," or, in New England phrase, "shipyards," in that part of the island.

To stand on the docks at Tottenville as the tide comes to its flood will afford one a view of the fleet of oyster boats as they return laden from the grounds. Most of the oyster gathering is done at low tide. Hence the men are coming to port as the tide rises. Sometimes they may remain away over two tides. It will be seen that as the tides rise and fall once in twelve hours, and the time changes one hour in every twenty-four, the men must go out to work at all hours of day and night during one month.

When there began to be a greater demand for oysters the natural beds failed to keep up the supply. Prices went up enormously. There were times when it was a great advantage to have a fast sailing vessel in which to carry oysters. The first arrivals netted large returns. The eager retailers would pay almost any price to secure the earliest supplies. From the first oysters have been sold by Staten Island dealers "by the count;" that is, so much a hundred or thousand. The enormous tide of travel through New York city makes a constant demand for this food whatever may be the price. Some will have oysters if they have to pay, like the American in Copenhagen, twenty-one cents a piece for them. Hotels and first-class saloons always expect to have them on hand however costly they may be.

*(To be continued.)*