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(Illustrated articles are marked with an asterisk.)

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

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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.