the gypsy-moth (*Ocneria dispar* Linn.) of Europe; but as the moths were emerging, and laying their eggs for next year's brood, there was nothing to recommend at that time except to destroy the moths and their eggs as far as possible, and prepare for the destruction of the caterpillars when they first appear next spring.

There is a statement in the second volume of the *American Entomologist*, p. 111 (published in 1870), and also in Riley's "Second Missouri Report on Insects," p. 10, that "only a year ago the larva of a certain owlet moth (*Hypogymna dispar*), which is a great pest in Europe both to fruit-trees and forest-trees, was accidentally introduced by a Massachusetts entomologist into New England."

Mr. Samuel Henshaw and Dr. Hagen of Cambridge both state that the entomologist who introduced this insect was Mr. L. Trouvelot, now living in Paris, but at that time living near Glenwood, Medford, where he attempted some experiments in raising silk from our native silk-worms, and also introduced European species for the same purpose.

It seems, then, that this was an accidental introduction, but that they have now become acclimated, and are spreading, and doing so much damage as to cause very great alarm.

The gypsy-moth is abundant in nearly all parts of Europe, northern and western Asia, and it even extends as far as Japan. In this country it occurs only in Medford, Mass., occupying an area in the form of an ellipse about a mile and a half long by half a mile wide. This represents the territory where the outbreak occurred, and where the insects were very abundant. Without doubt, they are distributed in smaller quantities outside of this ellipse, but how far it is now impossible to tell.

This insect was reported as feeding upon the leaves of apple, cherry, quince, elm, linden, maple, balm of Gilead, birch, oak, willow, wisteria, Norway spruce, and corn. The food-plants given in Europe are apple, pear, plum, cherry, quince, apricot, lime, pomegranate, linden, elm, birch, beech, oak, poplar, willow, hornbeam, ash, hazel-nut, larch, fir, azalea, myrtle, rose, cabbage, and many others. Curtis, in his "British Entomology," states that they are sometimes very destructive in gardens. Professor W. P. Brooks reported this insect as very abundant in Sapporo, Japan, in 1883, and gave strawberry as a food-plant in addition to those mentioned above.

The fact that this insect has now been in this country for the last twenty years, and has not only held its own, but has multiplied to such an extent as to cause the entire destruction of the fruit-crop and also to defoliate the shade-trees in the infested region, is sufficient cause for alarm. The citizens of Medford are immediately interested, but the entire Commonwealth and country are threatened with one of the worst insect pests of all Europe. In 1817 the cork-oaks of southern France suffered severely from the attacks of this insect. One of the papers of that time stated that the beautiful cork-oaks which extended from Barbaste to the city of Podenas were nearly destroyed by the caterpillars of the gypsy-moth. After having devoured the leaves and young acorns, they attacked the fields of corn and millet, and also the grass-lands and fruit-trees.

In 1878 the plane trees of the public promenades of Lyons were nearly ruined by this same insect. Mr. Fernald states that only last summer he saw the moths in immense numbers on the trees in the Zoölogical Gardens of Berlin, where the caterpillars had done great injury; and the European works on entomology abound with instances of the destructiveness of this insect. When its long list of food-plants is considered, it will be seen how injurious this insect may become if allowed to spread over the country, and become established.

The opinion was expressed to him by prominent entomologists in Europe, that, if the gypsy-moth should get a foothold in this country, it would become a far greater pest than the Colorado potato-beetle, because it is so prolific, and feeds on so many different plants, while the potato-beetle confines itself to a small number.

In Europe eleven species of the *Ichneumonidæ*, and seven species of flies (*Tachina*), have been known to attack the eggs and caterpillars of this moth; but it is not known that there are any parasitic insects in this country that destroy it. Undoubtedly our predaceous beetles and bugs destroy more or less of them, and mud-wasps and spiders are also to be counted among their enemies.

All the masses of eggs should be scraped from the trees and other places where the females have deposited them, and burned. Crushing is not sufficient, as possibly some might escape uninjured. This should be done in the fall, winter, or early spring, before the eggs hatch. It is not at all probable that one will find all the egg-masses even with the most careful searching on the trees in a small orchard; but, when one remembers that this insect deposits its eggs on all kinds of shade and forest trees also, it appears a hopeless task to exterminate this pest by an attempt to destroy the eggs. It is a habit of these caterpillars, after they have emerged, to cluster together on the trunks or branches of the trees between the times of feeding, and this affords an opportunity of destroying vast numbers by crushing them; and after they have changed to pupæ they may be destroyed wherever they can be found. The female moths are so sluggish in their flight, and so conspicuous, that they may be easily captured and destroyed as soon as they emerge; yet any one or all of these methods which have been employed in Europe are not sufficient for their extermination. At best they will only reduce the numbers more or less, according to the thoroughness with which the work has been done. Mr. Fernald could not learn that any attempts have ever been made in Europe to destroy this insect by means of poisonous insecticides, and it is to this method that we may look for positive results in this country.

If all the trees in the infested region in Medford be thoroughly showered with Paris-green in water (one pound to a hundred and fifty gallons) soon after the hatching of the eggs in the spring, the young caterpillars will surely be destroyed; and, if any escape, it will be because of some neglect or ignorance in the use of the insecticide. It will be absolutely necessary to shower every tree and shrub in that region; for, if a single tree be neglected, it may yield a crop sufficiently large to eventually restock the region.

We can hardly feel confident that all these insects can be exterminated in one year; but if this work of showering the trees be continued during the months of April and May for two or three years under competent direction, we have no doubt but that they may be entirely destroyed.

This is, in the opinion of Mr. Fernald, the cheapest and surest method of exterminating this pest, but its effectiveness depends entirely upon the thoroughness and carefulness with which it is done; and those who do the work must have authority to shower the trees not only on public, but on private grounds.

As this insect was introduced into this country by an entomologist who carelessly allowed it to escape, the same thing may occur elsewhere if the people of Medford allow the eggs or caterpillars to be sent out of the town. The only proper thing to do with such a dangerous and destructive enemy is to burn it.

Several different common names have also been given to the insect in Europe, as the "sponge-moth," the "gypsy-moth," the "great-headed moth," the "fungus-moth," and others.

ELECTRICAL NEWS.

SPECIFIC INDUCTIVE CAPACITY. — Mr. W. A. Rudge writes on the above subject to *Nature* as follows: "On p. 669 of Ganot's 'Physics' (eleventh edition) the following statement is found: 'At a fixed distance above a gold-leaf electroscope, let an electrified sphere be placed, by which a certain divergence of the leaves is produced. If, now, the charges remaining the same, a disk of sulphur or of shellac be interposed, the divergence increases, showing that inductive action takes place through the sulphur to a greater extent than through a layer of air of the same thickness.' If this statement were correct, there should be less electric action on the side of the ball farthest from the electroscope when the dielectric is interposed. To test this, I arranged an experiment as follows: The knob of a charged Leyden jar was placed midway between two insulated plates of metal, each plate being in connection with an electroscope. The leaves of each electroscope now diverged to an equal extent. A plate of ebonite was now placed between the knob of the jar and one of the plates. If the statement above quoted is correct, the leaves of the electroscope in connection with this plate should show an increased divergence, but the reverse effect was observed. The leaves partially collapsed. In all experiments that I have made by inserting dielectrics between a charged body and an electroscope, less electric action has been the result. If, while the charged ball be near the electroscope, the plate of it be touched with the finger, the leaves collapse; and on removing the finger, and then the charged ball, they again diverge. Now let a dielectric be placed between the ball and the electroscope, touch the latter, and remove the finger and ball as before, and much greater divergence will be produced. In both cases the electroscope is charged by induction. Without putting the electroscope to earth, I fail to see theoretically why any greater divergence should occur. I suppose some one must have made the experiment as quoted; but, if a greater effect was produced, it must have been caused by the substance used for a dielectric being charged itself. I have found very great difficulty in preventing plates of ebonite, paraffine, sulphur, etc., becoming electrified when placed near a charged body. I should like to know if any one has experimented in this direction, because either the text-books or myself must be wrong. In Guthrie's book (p. 101) there is a statement similar to Ganot's."

ELECTRIC LIGHTING AT BERLIN. — M. Wybau, a Belgian electrician, has recently read a paper before the Belgian Electrical Society on the electric lighting of Berlin, from which the following particulars of this important system are taken. At Berlin the electric light, as stated in *Engineering*, is supplied from a number of central stations, the two principal of which are situated in Markgrafenstrasse and the Mauerstrasse. Of the other stations, one lights the Kaiser Galerie, and the other a block of houses at the corner of Unter den Linden and Friedrichstrasse. A fifth station, of but small importance, supplies the lighting of Leipzigerstrasse. At the Markgrafenstrasse station there are eight steam-engines, each of 150 horse-power, which drive sixteen Edison dynamos. To this plant there have recently been added four compound inverted engines, each capable of indicating 300 horse-power, which drive direct four dynamos of 165 kilowatts each. These dynamos are of the multipolar type, and are slow-moving machines, their armatures making but eighty-six revolutions per minute in normal working. The boiler-house contains eight De Naeyer tubulous boilers, which supply the steam for the whole plant. In the switch-room is a rheostat of exceptionally large size, which is used to regulate the current in the distributing mains. These mains are eighty in number, most of which are with their coverings about 3 inches in diameter, and the greatest section of copper in any one of them is 800 square millimetres. At the Mauerstrasse station there are six boilers, three engines of 180 horse-power each, and three of 300 horse-power each. At the Friedrichstrasse station there are four engines of 60 horse-power each, and at the Kaiser Galerie four of 80 horse-power each. At the small station on the Leipzigerstrasse there are two engines of 80 horse-power. The floor space required in the above installations per 1,000 lamps for boilers and machinery is from 323 to 377 square feet. At the Edison station in New York about 194 square feet of floor space are required, but the dynamos and engines run at much higher speeds. The total length of cables laid in Berlin is about 170 kilometres, which are laid under the footpaths. In every case Siemens cables are used.

ELECTRICAL SUNSTROKE. — As a remedy against "electrical sunstroke," as the affection is called that attacks men exposed to the intense rays of the electric arc by means of which metals are fused and welded, is a veil or mask of glazed taffeta, supported by a wicker head-piece, and provided with goggles of gray glass.

THE HOUSTHOLM ELECTRIC LIGHTHOUSE. — This lighthouse, the most powerful electric lighthouse in the world, was opened a few weeks ago, and its working has given great satisfaction. Even in rainy weather its light has been distinctly visible at Blokhus, a straight distance of about thirty-five miles. The only undesirable incident attending the working of the new lighthouse is the immense number of birds which get killed, and which amount to thousands, comprising starlings, snipes, larks, etc., basketfuls being collected every morning in the vicinity of the lighthouse. As stated in *Engineering*, the lighthouse is 209 feet high, and the light-power in the beam is 2,000,000 candles. To guard against the stoppage of the light through any accident to the machinery, this is, as far as it has been possible, constructed on the twin principle. There are two engines, three tubular boilers, one of which is a particularly quick-heating one, two electro-magnetic machines with a joint capacity of 45 volts, 250 ampères, from Meritens & Co., Paris, two electric lamps, with various reserve lamps, etc. In connection with the lighthouse, and at a distance of respectively about 2,000 and 16,000 feet, are two powerful sirens, which are fed with compressed air from two air-pumps in the engine-house, and which can be coupled together with the engines. At the siren stations there are reservoirs of compressed air, which are worked by means of electricity and clock-work, and great care and forethought seem to have been bestowed upon the whole installation in all its details.

ELECTRIFICATION DUE TO CONTACT OF GASES WITH LIQUIDS. — At the meeting of the London Physical Society, held on Nov. 15, Mr. Enright read a paper on "The Electrification due to Contact of Gases with Liquids." Repeating his experiments with zinc and hydrochloric acid, the author, by passing the gas into an insulated metallic vessel connected with the electrometer, proved that it was always charged with electricity of the opposite kind to that of the solution. The electrical phenomena of many other reactions have been investigated, with the result that the gas, whether H_1, CO_2, SO_3, SH_2, or Cl, is always electrified positively when escaping from acids, and negatively when leaving a solution of the salt. In some cases, according to *Engineering*, distinct reversal is not obtainable, but all these seem explicable by considering the solubility and power of diffusion of the resulting salts. Various other results given in the paper tend to confirm this hypothesis. Seeking for an explanation of the observed phenomena, the author could arrive at no satisfactory one excepting "contact" between gases and liquids; and, if this be the true explanation, he hoped to prove it directly by passing hydrogen through acid. In this, however, he was unsuccessful, owing, he believes, to the impossibility of bringing the gas into actual contact with the liquid. True contact only seems possible when the gas is in the nascent state. Some difficulty was experienced in obtaining non-electrified gas, for the charge is retained several hours after its production, even if the gas be kept in metallic vessels connected to earth. Such vessels, when recently filled, form condensers, in which the electricity pervades an enclosed space, and whose charge is available on allowing the gas to escape. Soap-bubbles blown with newly generated hydrogen were also found to act as condensers, the liquid of which, when broken, exhibited a negative charge. This fact, the author suggested, may explain the so-called "fire-balls" sometimes seen during thunder-storms; for if, by any abnormal distribution of heat, a quantity of electrified air becomes enclosed by a film of moisture, its movements and behavior would closely resemble those of fire-balls. A similar explanation was proposed for the phenomenon mentioned in a recent number of *Nature*, where part of a thunder-cloud was seen to separate from the mass, descend to earth, and rise again. The latter part of the paper describes methods of measuring the contact potential differences between gases and liquids, the most satisfactory of which is a "water-dropper;" and by its means the potential difference between hydrogen and hydrochloric acid was found to be about 42 volts.

HEALTH MATTERS.

SALT AND MICROBES. — A foreign observer has carried out some instructive researches into the effect of salt on various pathogenic micro-organisms. He found, says the *Medical Press*, that the results varied a good deal, according to the particular microbe experimented upon. The cholora bacillus, for example, curled up and died in a few hours, while the bacillus of typhoid-fever and the micrococci of pus and erysipelas resisted its influence for weeks and even months. That part of his observations bearing on tuberculosis possesses a practical importance, owing to the custom in slaughter-houses of salting the flesh of animals recognized to be tuberculous, and exposing it for sale in the course of a few weeks. M. de Freytag has shown that the tubercle bacillus thrives in the presence of an excess of salt, and salting the tuberculous tissues of an ox in no wise prevented the infection of animals fed thereon: hence it is highly desirable that a stop should be put to a