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Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as Apparatus, reactionary, Appliances, railway, Barometer, iodide of mercury, Beetle, elm, Bell, signal, Olsen's, Books and publications, new, Box, match, watertight, wanted, Bridge, St. Louis, Business and personal, Carrier, lug-gear, bicycle, Cre-dlebaugh's, Cars, heating, apparatus for, Wood's, Ceilings, how to save, Coal in Argentine Republic, Congo, ten years' progress on, Consolidations, electrical, Copra or cocoonut meat, Crane, locomotive, ten-ton, Diphtheria, germ of, Emmensite, Experiment, welder's, Fire burns brightly in winter, why, Flats, danger in, Garments, dyeing of, Gas, damper of, Gas, natural, Gas, natural, in Indiana, Gas, natural, waste of, Guns, great, cost of, Guns, modern, Guns, thirteen-mile incendiarism, strange, Inventions, engineering, Inventions, index of, Inventions, mechanical, Inventions, miscellaneous.

THE DAFT ELECTRIC LOCOMOTIVE.

The trial of the Daft electric motor or locomotive is now in progress on the Ninth Avenue elevated track between Fourteenth Street and Fiftieth Street, a distance of one and four-tenths miles. The electric locomotive, with a train of four cars, switches in between the regular trains, and gaining on the schedule time of the steam trains, which is 13 1/4 miles per hour, the electric train often making a speed of 15 or more miles up a grade of 98 feet to a mile without apparent effort, the puffing of the steam cars being no part of the hard work with the electric locomotive. The highest speed yet attained when the track was unobstructed by other trains has been 30 miles per hour. This locomotive, weighing only ten tons, has drawn a train of eight cars up the grade of 98 feet to a mile below Fiftieth Street, at a speed of 7 1/2 miles per hour.

The conductor is of copper rods on insulated pedestals, at a level with and a few inches outside of the timber guard rail, the return being one of the tracks. The completing of the electric circuit through the driving wheels and the track seems to increase the traction largely, as the wheels do not slip on starting, which otherwise would take place with any locomotive of such light weight.

The train has been running regularly during the past ten days, with the exception of an interruption of two days caused by the frequency of the regular trains during the strike.

The electric current is derived from four dynamos, driven by a Wright engine, 22 in. x 42 in., located in Fifteenth Street, near Tenth Avenue.

The indicated power of the engine for running the four dynamos for the track current and a dynamo for lighting was 240 horse power.

The electric facilities for handling the train seem to be perfect. Slowing and reversing with the slightest movement, for coupling the cars, is as much under the control as in a steam locomotive.

THE GERM OF DIPHTHERIA.

It is claimed that "two professors connected with the Pasteur Institute have discovered the generative microbe of diphtheria, and that a preventive of this disease by means of vaccine virus is expected to follow." Should this expectation be realized, the discovery and its successful application will certainly take rank among the most important triumphs in the realm of medical science. The prevalence of diphtheria, especially in the principal cities, and the very large proportion of fatal cases, is little dreamed of excepting by those who are giving special attention to the subject. In Brooklyn, N. Y., for instance, there were in 1888 984 deaths from diphtheria, which probably represented 3,000 cases. It is safe to say that if the same number of deaths had occurred in the same time from cholera, smallpox, or yellow fever, Brooklyn would be put down as a pest-ridden city indeed.

From four weekly statements of vital statistics issued by the Brooklyn Board of Health, commencing with the date January 12, 1889, and ending February 2, 1889, the following number of deaths from diphtheria appear to have taken place in six of the large cities of the world:

Table with 2 columns: City, Deaths. New York 182, Philadelphia 39, Boston 43, Brooklyn 124, London 92, Paris 118.

It so happens that the new Hoagland Laboratory connected with the Long Island College Hospital, of Brooklyn, is now conducting a series of investigations in bacteriological science, having been especially equipped for this purpose through the munificence of Dr. C. N. Hoagland, the donor of the institution.

The experts connected with the laboratory are pursuing investigations which lead in the same direction as the discoveries claimed to have been made at the Pasteur Institute in Paris. The laboratory has sent to Europe for cultures of what are claimed to be diphtheria germs, which will be compared with those obtained here. Dr. G. T. Kemp, associate director of the bacteriological department of the laboratory, when consulted, said that the discovery of the real diphtheria microbe, and the adoption of vaccination as a means of prevention, was by no means improbable.

The prosecution of the search for a diphtheria germ, which has engaged the attention of scientific experts for the past few years, does away entirely with the popular theory that the disease can be caused by sewer gas or filth conditions. The advanced investigators now generally agree that the disease is carried by a microbe or germ. Filth and gases emanating therefrom are a means of cultivating the same, and may carry it from person to person and from house to house. In other words, that the cause of diphtheria is diphtheria, and not sewer gas or filth.

As an outcome of the germ theory, Drs. H. C. Wood and H. F. Formad, of Philadelphia, were commissioned by the government to investigate the subject in its relation to diphtheria, and the results of their extended investigations were published in 1882, as an appendix to the report of the National Board of Health. They

obtained specimens of micrococci (germs nearly round in shape) from persons suffering from diphtheria and representing the disease in various stages. Rabbits, Guinea pigs, and rats were inoculated with the micrococci, and the result was that they soon manifested symptoms of diphtheria—fever, formation of membrane, paralysis, and, finally, death. Later investigations demonstrated the fact that there is still an undiscovered germ, the means for investigating which were not perfected when Drs. Wood and Formad made their inquiries in 1882. The publication of Loeffler's treatise on the germ of diphtheria, which appeared in 1884, and which fills seventy pages of the quarto volume of the "Kaiserlichen Gesundheitsamte," worked a very great advance in the search for the true germ of diphtheria. Strange as it may seem, this treatise has never been translated, but its contents are known to those who are giving special attention to the subject. It describes the minute, masterly, and exhaustive investigations into this difficult field of bacteriology, which resulted in the author designating the bacillus (a rod-shaped germ) as the genuine diphtheria microbe.

If the work referred to in the dispatch from Paris is the same as that done by Profs. Roud and Yersin, and published in the last number of the "Annales de l'Institut Pasteur," then it is merely a research confirmation of the work already done by Loeffler.

Having assumed that the true germ of diphtheria has been, or that it will eventually be, discovered, the interesting question presents itself whether the introduction of the virus into the human system can prevent the person so inoculated from taking the disease. A number of scientific gentlemen who have been consulted on this point express themselves as having faith in the new process, while others claim that inasmuch as a person who has had diphtheria may have it again, the introduction of diphtheria virus into the system by means of vaccination can give no greater immunity from future attacks. On this point it may be said that when the experimenters inoculated sewer rats with diphtheria virus it was found that they did not take the disease, but when field rats were subjected to the same treatment, the usual symptoms of diphtheria soon appeared. It has been urged against the germ theory, as applied to diphtheria, that if there are innumerable deadly microbes constantly floating in the air, how does it happen that one person is affected by them, and not another? The answer is, that the development of the germ, like the development of the seed, depends upon the soil into which it falls. Of thirty healthy children examined by Loeffler, the diphtheria bacillus was taken from the mouths of four of them.

When the system becomes reduced from various causes, it may be from breathing sewer gas, over-exertion, improper nourishment, or neglect, or other causes, then the microbe develops rapidly and diphtheria is the final result. This may explain why, in apparently healthy and well-guarded homes, cases of diphtheria frequently occur. The germ may be communicated by one child talking with another on the street. Its development depends upon the physical condition of the child to whom it is communicated. If it is well and vigorous, it successfully baffles the effects of the dangerous germ, while if other conditions exist, the germ acts like a spark falling into a pile of shavings.

It will certainly not add to our quietness of mind if it be demonstrated beyond peradventure that the cause of diphtheria is an insidious, an invisible microbe floating in the air, to which all persons are more or less subject. But if coupled with this demonstration it can be shown, as a result of recent investigations, that immunity can be given by vaccination, then every lover of his kind will rejoice, and the discovery will be ranked among the greatest achievements of science.

CHAS. D. BAKER.

STRANGE INCENDIARISM.

A curious story of supposed incendiarism is reported from Pennsylvania. Near Harrisburg a number of barns have been destroyed by fire, until from \$20,000 to \$30,000 worth of property has been burned. The farmers naturally have become very excited, the more so as a mystery overhangs the cause of the conflagrations. No footsteps have been found that would indicate the incendiary, and no tangible clew has been obtained.

To make it still stranger, an account is given of the finding of a mysterious egg in one of the buildings. The egg was picked up by a girl, who found it remarkably heavy. As she held it up, some black material issued from its end and fell to the ground. She took it into the house and it was examined by a physician, who was hastily called as the most accessible scientific representative. He emptied it, and it proved to be full of a black substance resembling gunpowder. On touching a match to it, it burned with a vivid and very large flame. Suspicion has been fixed upon a chemist, who, it is believed, may have evolved some kind of an occult explosive, that for many hours would lie at rest, to eventually explode spontaneously. It will be recollected that an attempt was made some years ago to burn or injure a British ship as she lay at her pier in this city. The agent used was probably in the

last named case, an ethereal or carbon disulphide solution of phosphorus. Such solutions, as they evaporate, leave a thin pellicle of phosphorus that catches fire spontaneously, usually without doing much harm. Spontaneously inflammable phosphureted hydrogen is easily made by boiling phosphorus and caustic potash or lime with water. It is quite conceivable that some mixture which would slowly evolve such a gas might be made, which, inclosed in a thin vessel, sooner or later would burst the inclosure and, issuing into the air, would ignite.

For the sake of the peaceful farmers of York County, it is to be hoped that the resources of chemistry have not been lowered so as to contribute to their injury. Like many other things, it is easier to write about them than to execute them, as practical difficulty attends every step in the development of similar classes of experiment. If the York County hens were to lay eggs containing phosphorus instead of sulphur, then a decayed egg might be expected to give off spontaneously inflammable phosphureted hydrogen, instead of the regular sulphureted hydrogen that now does no injury, save by its odor and its power of blackening any silver that comes in contact with it. This would make the hen an involuntary incendiary.

#### Copra or Coconut Meat.

A correspondent of *Engineering* describes a visit to a little islet in the Pacific as follows:

Washington Island belongs to Messrs. Greig, Bicknell & Co., of Honolulu, and is under British protection. Its main produce is copra, or the inside of coconuts. There are on the island, besides Mr. Briggs, nineteen men, twenty women, and some half a dozen children, all natives of Peru, an island in the Kingsmill group, further to the west—whence they are brought on a three years' engagement.

The method of preparing the copra is as follows:

The men collect the nuts, a certain area being assigned in which they must work during the different days. They are not allowed to pick from the trees, but must confine themselves to taking the nuts from the ground when they fall. This is in order to prevent waste, as a man getting up a coconut tree might cut down unripe fruit with the others, which unripe nuts would be wasted. Immediately the fallen fruit is picked up, the husks are stripped off, except one small strip used for carrying the nuts, which are thus conveyed to the end of the tramways and so to the village. Here they are taken charge of by the women, cracked in two, and set out to dry with the shells uppermost. After a couple of days the inside shrinks, and can be easily picked out, when it is broken up, dried, and stored ready for removal by a schooner which visits the island every six months. The pay of the workers is \$5 a month, the first year being paid in money and the second and third in what they call cloth, that is, prints and bright-colored stuff. Seeing that the natives feed themselves, and that the cloth is valued at 25 cents (about a yard, its original cost being about four, it must be allowed that the labor does not cost much. The earnings of the workpeople vary somewhat, as the amount mentioned is contingent on each pair (a man and his wife) bringing in and preparing 4,000 nuts a month, an increase in this number being paid accordingly. The value of a ton of copra delivered at San Francisco is about \$60, and is equivalent to about 4,300 coconuts. The amount gathered last year amounted to about 180 tons, so taking the salaries of the manager and natives at \$1,700 (the manager gets \$60 a month and all found), the profit per annum should be about \$9,000 = £1,800. The schooner that takes the copra pays her own way by bringing down cloth to trade.

The soil of the island seemed to be very fertile, though based on a foundation of coral. In the year 1886 it rained 79 days, and there is a fresh water lagoon on the island which never dries. Coconuts, bananas, pineapples, melons, and other tropical fruits grow luxuriantly. There are about 2,000 tons of guano on the island, but it is said that it does not pay for removal. Cocks and hens run wild about the woods; they were originally introduced here, but now take care of themselves, and are shot when required for table. We shot a few for our own use and found them pretty wild.

#### Mexican Railways.

The engineers of the Mexican Southern Railway have laid out the line as far as Tecomavaco, 58¼ miles south of Tehuacan, and the preliminary surveys have been carried as far as Puebla, where the new line will connect with the Inter-Oceanic and Mexico and Vera Cruz railways. The contractors hope to begin active construction early in 1889, and they will complete 142½ miles in eighteen months from the date of starting work. This will carry the line to Tecomavaco. The section beyond, to Oaxaca, will be carried on during the succeeding twelve months. The new line will carry the American and Mexican railway systems some 300 miles further south, and will shorten the time from Europe and New York to South American and Pacific ports from a week to ten days in the former, and four to five days in the latter case.

#### The Sparrow Pest.

Mr. J. H. Sherman, in a recent letter to the *New York Tribune*, presents a strong indictment against the English sparrow, the reasons why these birds should be exterminated, and how to do it. He says:

Since importation, they have multiplied at the annual rate of five or six broods of from four to six each to the pair, and spread over more than half of the United States and Territories, with a large portion of Canada, and are covering the remainder at the present (but increasing) rate of more than 500,000 square miles a year, and are everywhere driving out both insectivorous and song birds. In the spring, sparrows bite off or pull up tender garden plants as soon as they come up, and eat out germs from fruit buds of trees, vines, and small fruit plants. Such germs as are not completely destroyed are often mutilated and so form imperfect fruit, which falls a ready prey to the increased swarms of insects. Later in the season they attack the choicest growing vegetables and early ripening fruits, and destroy grapes and peck into mellowing apples and pears in the fall.

Their depredations upon farm crops are becoming more serious, in the entailment of pecuniary loss, than those upon horticultural products. For breeding haunts, and winter food and shelter, they throng by preference into towns and cities. Thence, near harvest time, they flock out to farms round about, alighting upon fields of grain of all sorts, eating the kernels before they are hardened, and eating and wasting those that are ripe. Standing upon grain stalks, swaying to and fro and flapping their wings to keep their balance, they scatter much upon the ground. Thus whole fields are ruined. Shocks and stacks are also covered with them till all exposed heads are left without a kernel. In a visitation from New Haven such crowds collected upon neighboring wheat shocks that the owner killed eighty-nine by one discharge of his double-barreled shotgun. Corn fields do not escape their destructive work—the ends of green ears being torn open and the grain eaten or so mutilated as to ferment and decay.

They disfigure public and private buildings, and ornamental trees and shrubbery with nests and excrements. Not only do cornices, gables, and architectural ornaments suffer, but roofs and water gutters receive their pollutions.

They congregate in vine coverings of churches and other edifices. The luxurious ivy formerly covering portions of the Smithsonian building, at Washington, was thus totally destroyed. The sexton of St. John's Church, at Providence, R. I., took 970 eggs and two cartloads of nests at one time from the ivy upon the walls of that church.

The infliction becomes no more tolerable to us because England herself, and all countries to which Englishmen have migrated with their pet pest, are suffering as badly as America. There is but one worst pest known in the wide world, viz., the rabbit that is ravaging Australia and its neighboring islands. This also was introduced from England a few years after the sparrow came here. The plague of rabbits seems remediless, but that of sparrows is not. These birds are peculiarly gregarious, and gather about human habitations. First filling cities and villages, they next go to farms, and to woods and lonely places only as forced by overcrowding, whence they return if room is again made for them. Hence, they are very accessible to the fowler. Gunning sportsmen killed thousands of them in Ithaca last winter, bringing marked relief in early spring, and an accession of useful birds from forest recesses. But soon, between breeding and collecting from outside, sparrows again nearly monopolized the town. A sweeping destruction, persevered in for two or three years, would free both town and surrounding regions from their presence. Similar concerted action in all cities and villages, with sufficient co-operation by farmers to drive them from their home premises, with a little shotgun watchfulness for strays that might subsequently appear, would insure their extermination from the country.

To this end there is one effective means, and probably only one—and that is poison. To discover the best method of its administration has been the object of much experimenting under the direction of the United States Agricultural Department, described in pages 423 to 426 of the Commissioner's Report for 1887. The resulting recommendation is feeding sparrows with wheat prepared according to directions to be gathered from the report, but which the commissioner, in reply to a letter of inquiry, furnished more clearly in the following formula: Dissolve arseniate of soda in warm water, at the rate of an ounce to a pint; pour this upon as much wheat as it will cover (in a vessel which can be closed so as to prevent evaporation) and allow it to soak at least twenty-four hours. Dry the wheat so prepared and it is ready for use. Three kernels of this will kill. Winter is the best time for operations. Other birds are then absent and sparrows are hungry, alighting in flocks in the streets after passing teams and along railroad tracks, where grain is scattered from wagons and cars. Here poisoned wheat may be administered with wholesale destruction to them and

little danger of harm to anything else. If an occasional pigeon or chicken that has no business abroad should suffer, it is comparatively of little consequence. If the great evil is to be abated at all, it must only be required that it be done with the least practicable injury and inconvenience.

#### Going to Law.

Law has been called a luxury, but surely more with a view to its cost than to the pleasure men can derive from recourse to it. Save in very exceptional cases—such as the settlement of a great question of principle in which whole classes may be involved, and in which the parties to the case are really representative individuals, through which circumstance personal bias or animosity is largely removed from them—law is the resort of the foolish and imprudent. In nine cases out of ten of mere litigation, narrow-mindedness and ill-temper have much to do with it, and, once in, the whole machinery seems contrived, by a hundred little artifices, to fan the flame rather than to allay it. We gratefully remember, as a relief to the depressing story of what we may call legal hunger, the case of Mr. Thomas Brassey, who, in all his long experience as a contractor, engaged in most extensive and complicated transactions, only once allowed himself to be led into a lawsuit, and that, he tells us, was in the case of a Spanish railway in which, unfortunately, he had a partner who would not rest satisfied without recourse to law on some point in dispute. Mr. Brassey declared that he would not enter on another lawsuit in any circumstances whatever; his conviction being that, even if you won your case, it would not repay you for the loss of temper and of peace of mind, the strength taken from your business, and the general disarrangement in your affairs consequent on such a process.

Sir Walter Scott, who knew well what going to law means, being himself a lawyer, has embodied for us the passion for law which grows with what it feeds on in the person of Peter Peebles; and Charles Dickens in nothing showed more humor and more sympathy than in his most graphic pictures of the characters who, like ghosts, haunted the old Chancery Courts in London. And George Eliot in the "Mill on the Floss" well illustrates the absorbing power of the law mania, even on minds otherwise so strong and healthy as that of Mr. Tulliver:

"What I want, you know," said Mr. Tulliver; "what I want is to give Tom a good eddication; an eddication as'll be a bread for him. That was what I was thinking of when I gave notice for him to leave the academy at Lady-day. I mean to put him to a downright good school at midsummer. The two years at th' academy 'ud ha' done well enough, if I'd meant to make a miller and farmer of him; for he's had a fine sight more schoolin' nor I ever got; all the learnin' my father ever paid for was a bit o' birch at one end and the alphabet at the other. But I should like Tom to be a bit of a scholar, so as he might be up to the tricks o' these fellows as talk fine and write with a flourish. It 'ud be a help to me with these lawsuits, and arbitrations, and things. I wouldn't make a downright lawwer o' the lad—I should be sorry for him to be a raskil—but a sort o' engineer or a surveyor, or an auctioneer and vallyer, like Riley; or one o' them smartish businesses as are all profits and no outlay, only for a big watch chain and a high stool. They're pretty nigh all one, and they're not far off being even with the law, I believe. For Riley looks Lawyer Wakem i' the face as hard as one cat looks another. He's none frightened at him."—*Christian Union*.

#### Ninety-three Millions of Money.

Was he insured? is a question we ask almost as naturally after a man's death, as after a fire; because it is coming to be recognized as much a matter of business prudence to insure one's life as it is to insure against loss by fire. There are many good business men in the world, and it might be a matter of wonder where they all insured their lives did not the annual reports of the companies call attention to the immense business done by some of them. Here is the *New York Life*, for example, whose report appears in another column, with an annual income of twenty-five million dollars, with assets to the amount of ninety-three millions, and carrying nearly four hundred and twenty millions of insurance on its books. It paid over ten millions to policy-holders in 1888, and wrote a hundred and twenty-five millions of new insurance. Its success is the result of superior management, and is well deserved.

In a review of our new navy, *London Engineering* says: "In closing these details, we may add that Great Britain has now ten war vessels of 3,000 tons and upward with a minimum speed of 19 knots per hour, the United States eight, France five, Spain three, Japan two, and Russia one. The United States accordingly now claim that, in the important matter of high speed war ships, they rank second, and are not far behind Great Britain. The Americans are, in fact, going in for high-speed cruisers.