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THE DEATH AND BURIAL OF WOEHLER.

We have already briefly referred to the death of the veteran scientist whose name is familiar to every chemist in America and Europe. On the 23d of September, after a brief indisposition of four or five days' duration, the light of his life, which had been flickering in its socket, went out while he was in full possession of his intellectual faculties. The machine which had kept soul and body together ceased working, and life became extinct. When the final hour came, surrounded by all the members of his family, his spirit took its flight so quietly that those present were scarcely able to tell when he ceased to breathe. It was a most gratifying ending to a long life—no pain, no wearing sickness, no anxiety—as peaceful and gentle as his life had been, so was his death.

Up to the Tuesday preceding his death, which took place on Saturday, he continued his literary activity. When he laid down his pen his table was covered with scientific papers, and the correspondence which, as Secretary of the Academy of Sciences, he conducted to the last, having carried his work forward to the very portal of the tomb. Yet death did not find him unprepared. It had long been expected, and in his will he gave full directions about his funeral, and indicated the inscription to be put on his tomb. His funeral was to be of the simplest character; no music, no speeches, no special ceremonies, no procession of students in uniforms, but everything quiet and unobtrusive, just as his own life had been. And thus it was. We are indebted to Prof. C. A Joy, who was present at the funeral, for many of the above facts, and the following description of the burial ceremonies:

"At 10 o'clock on Tuesday morning, September 26, a few of the most prominent professors of the University gathered at the house of the deceased. The coffin stood in the center of the largest room, covered with wreaths and palm leaves, and on each side there was a row of six burning candles. The Chaplain of the University, Pastor Schultz, read the usual selection from the Scriptures, and in his prayer referred to the character of the deceased, but made no remarks. The widow was present during the exercises, surrounded by all her children and grandchildren, with a few other near relatives.

"Among those present at these services were Professor Wm. Weber, now more than eighty years old, Professor Listing, already far in the seventies, and other old and bent colleagues of the deceased. There were but few persons present from a distance, as it was vacation at the University, and no notice of the funeral had been published. But there was one old friend there that could not stay away—Professor Hermann Kopp, who came up from Heidelberg to follow in the mournful procession to the grave.

"After the short exercises at the house the body was placed in a hearse, and the procession slowly and silently moved to the cemetery. The streets were lined with people who felt that they had lost a friend. There were several hundred men in the group, many of them world renowned celebrities.

"At the grave there were no speeches. I threw in several handfuls of earth, according to the German custom, and in behalf of the many American pupils of the illustrious dead. The grave was rapidly filled up, and after the benediction the mourners dispersed."

RAILWAY TRANSPORTATION.

Mr. William P. Shinn, C.E., lately read before the American Society of Civil Engineers a paper on the "Increased Efficiency of Railways for the Transportation of Freight."

The first portion of this paper gave, from carefully gathered statistics, a valuable amount of information in regard to the actual increase of traffic upon American railways. In 1860, the tonnage mileage of the New York Central and Hudson River Railroad, the Erie Railway, and the Pennsylvania Railroad was about equal, and amounted in the aggregate to a little over three-fourths of that of the New York State canals; and in 1870 each of these railroads averaged about the tonnage of the canals, and in 1880 they averaged each nearly double that of canals.

The aggregate tonnage mileage of the other railroads was, in 1881, 1,217 per cent more than 1860. Statistics were also given showing the increase of population, of railroad mileage, of the production and export of grain and other leading exports. The means by which this rapid increase of freight transportation had been developed was considered under two general heads, namely, improvements in the physical conditions of the railroads, and improvements in the administration. The improvements in the physical condition were treated on under these heads:

1. Improved track or "permanent way," including bridge structure.
2. Additional sidings, and second, third, and fourth tracks.
3. Increased capacity and strict classification of locomotives.
4. Increased capacity of freight cars.
5. Additions to terminal facilities.

The improvements in the administration were referred to under the following heads:

6. Improved methods of signaling.
7. Running locomotives "first in, first out," and running freight trains at higher rates of speed.
8. Consolidation of connecting lines under one management by purchase, lease, amalgamation, or otherwise.
9. Running freight cars through from point of production to tide water without transshipment.
10. Issuing through bills of lading (or freight contracts) from Western points of shipment to Atlantic and European ports.

The general introduction of steel rails was stated to be the very corner stone of increased efficiency. The improvements in all the directions referred to were treated of, and described at considerable length.

The second portion of the paper presented the views of the writer as to the means whereby still greater efficiency could be most economically obtained. The constant demand is for more transportation facilities—for more cars. In the opinion of the writer, what is needed is not so much more cars, as more movement of cars. Freight blockades will be prevented, not by having more tracks to stand cars upon, but by having fewer standing cars. It was shown that upon one railway there had been a decrease in the miles run by the cars of 21 per cent between 1868 and 1881, and that the Union Line cars between 1879 and 1882 were increased 49 per cent in number, while the mileage run by them decreased 16 per cent in the same period. The remedies suggested by Mr. Shinn, were more main tracks, more locomotives, more trains, the improvement of the making up of trains at the points where cars are loaded. The detention of cars at stations and private sidings, and the absence of cars on foreign railroads were considered as among the greatest causes of loss, and the writer suggests that the remedy will be to charge a per diem charge for cars when on foreign roads, and that this charge should be based upon the average economic value of the cars in use to their owners.

It was voted that this paper should be discussed at the annual meeting. Members of the society and others interested in this subject are requested to contribute to this discussion. The annual meeting of the society will occur January 17 and 18, at the Society house in New York. The first session of the meeting will be at 10 A.M., January 17, 1883.

DANGEROUS FUNERAL APPLIANCES.

The possible agency of the undertaker in disseminating infectious diseases is not sufficiently regarded by health authorities. In many places public funerals are prohibited in cases of infectious disease, yet they are the rule rather than the exception the country over.

Where the funeral services are held in private houses, it is a common thing for the undertaker to provide chairs or camp-stools for the multitude. These are carried from house to house, and are liable to become carriers of infection. Some careful undertakers may take the trouble to disinfect such appliances in all cases of possible infection; but we doubt its being done very generally.

The ice boxes, in which the dead are laid until the time of burial comes, are still more liable to carry the germs of disease. The ice boxes are costly, are seldom renewed, and are scarcely more frequently disinfected. That they are a source of public peril is gradually becoming recognized by physicians and boards of health; and not a few have taken an interest in the devising of means for their displacement. The most promising substitute is the injection of preserving fluids into the circulatory system. Quite a number of prominent undertakers in this city and Brooklyn are reported as having adopted the new plan, under the instructions of Dr. Lukens and Professor Clark, of the Cincinnati School of Embalming. Demonstrations of the process of injecting preservative fluids have been made in the dead house of Bellevue Hospital. No mutilation of the body is required further than the opening of an artery for the injection of the fluid. There are several fluids which answer for the purpose, and the cost of embalming is said to be little if any greater than the charge for the use of an ice box.

A careless embalmer may still be a carrier of infection, but it would seem to be easier to enforce precautionary measures in the case of a man than with the bulky and variously exposed ice box, which may hold in succession the victims of every sort of disease.

MACHINERY AND LABOR.

Mr. Edward Atkinson says that it takes 160,000 men, women, and children to make the cotton cloth, the use of which is now enjoyed by the people of the United States, who are the best clothed people in the world. If those who do this work were obliged to use machinery no more effective than the spinning wheel or hand loom, it would require, he computes, 16,000,000 persons continuously employed ten hours a day to do the necessary work.

According to the view of a certain class of self-called "labor reformers"—of whom we hear less now than formerly, and less than we are likely to when hard times come again—modern labor-saving cotton machinery must be depriving 15,840,000 men, women, and children of steady work; the "reformers" would assume, remunerative work.

Where are they, and what are they doing? In every department of productive labor, machinery has been and is having a corresponding effect. The displaced millions of mythical hand workers cannot have starved to death, or have been otherwise exterminated, for there has been a rapid increase of population in all manufacturing countries, and the average length of human life is greater than it used to be.

The obvious truth—obvious, that is, to all who can see things as they are—is, that so far from displacing labor, or the demand for it, labor-saving machinery furnishes more and more varied opportunities for remunerative work, larger pay for the worker, and cheaper products for the worker to enjoy.

Machinery increases the cotton worker's capacity a hundredfold, cotton cloth is cheapened, and, as a natural result, a hundred times as many people can afford to use cotton and more of it. And a similar effect is produced in every other department of productive labor.

The anti-machinery argument holds good only on the assumption that savagery—which in our climate means incessant toil with nakedness, hunger, indifferent shelter, and general misery—is better than limited labor, made efficient by steam power and machinery, and surrounded by all the comforts that labor brings where labor is aided, as it is with us, by the fruits of a century of accumulation and invention. If any workman, or class of workmen, remain as badly off as savages are, it is wholly because of their choice to lead the lives of savages, or worse. Intemperance and improvidence, the great sources of misery in industrial communities, are not produced by machinery.

EMULSIONS OF PETROLEUM AS INSECTICIDES.

BY PROF. C. V. RILEY.

In the SCIENTIFIC AMERICAN for May 27 last I gave an account of the successful management of the chief insects injurious to the orange tree, and showed the value of kerosene emulsions based on very thorough experiments by one of my assistants, Mr. H. G. Hubbard, at Crescent City, Fla. In my forthcoming annual report, as entomologist to the Department of Agriculture, a more extended account of Mr. Hubbard's experiments is published, prepared in advance from a special report on the insects injurious to the orange tree. Mr. Hubbard's experiments with kerosene are especially valuable, and while I by no means consider them as final, I know of none ever made that compare with them in fullness or carefulness. His emulsions were made with milk, as set forth in the article in the SCIENTIFIC AMERICAN already alluded to. Emulsions of kerosene with soap suds and lye have been worked at, and recently Mr. Joseph Voyle, of Gainesville, Fla., has been experimenting, under my direction, with an emulsion of kerosene, soap, and fir balsam combined under a high temperature, and to which he gives the name of "Murvite." Experiments made here at the Department show that twenty parts of hard soap, ten parts of water, forty parts of kerosene, and one part of balsam make a very satisfactory emulsion in the form of a permanent paste which dilutes *ad libitum* with water, and it is not likely that the emulsions made by the use of mucilaginous substances or phosphates will ever supersede, for practical insecticide purposes, those made of milk or soap.

On the Pacific coast the horticulturists have, during the last two years, been very active in their attempts to effectually destroy scale insects, and Mr. S. F. Chapin, a member of the State Horticultural Commission, has recently published an extensive and interesting report (*vide* late numbers of the *Pacific Rural Press*) which bears evidence of careful work, and in which kerosene is condemned and various applications of lye and whale-oil soap are strongly recommended as sufficient for the object in view. Now, my own experience with scale-insects, and that of Mr. Hubbard, show that neither of these two substances bears comparison with a proper kerosene emulsion as an effectual destroyer of scale-insects and their eggs.

The discrepancy on the Pacific coast and in Florida can scarcely be explained by the different species dealt with, but may, I think, be explained by the difference in the trees treated and the methods employed, and as I should be sorry to see the California orange growers deterred from the use of kerosene, which has proved so successful in Florida, I have thought that a review of Dr. Chapin's report would prove interesting.

In his experiments he refers mainly to pear trees, and occasionally to other Northern fruit trees, the report being headed, in fact, "Scale-Insects on Deciduous and Ornamental Trees." The orange is not a deciduous tree, and was evidently not experimented on. Other insecticides were used by him upon pear, peach, apple, almond, prune, and plum. Now, there is no doubt but that the action of kerosene proves more injurious to some plants than to others, and in sufficient quantity is hurtful to all. It should, therefore, be used with caution where its effects are not already known, and never employed pure. Even the orange receives a shock from its judicious application, though there is abundant proof of the fact that young vigorous shoots of this tree will withstand a thorough drenching with the pure oil. Again, much will depend upon the condition of the tree and the time of application, as Dr. Le Baron long since showed that kerosene can safely be applied to apple trees in the spring of the year (Second Illinois Report, pp. 114, 115) or during the season of rapid growth. Again, the condition of the atmosphere will have much to do with the results, and the injury by kerosene will be greater during cool damp weather, when evaporation is at a minimum. The fatal results in California may also be due to the large quantity used and the coarse methods of application, for Dr. Chapin's report shows that in most of the experiments it was applied undiluted, in coarse spray, while the quantity is not stated.

As two years have now elapsed since Mr. Hubbard began the use of kerosene emulsions, I recently sent him a copy of Mr. Chapin's report, with the request that he give me a *résumé* of his views, and particularly requested him to examine the trees that had been first treated with kerosene. I give herewith his report:

"I have never seen any serious injury from applications of even pure kerosene. In 1880 one of my neighbors treated some very young orange trees for Lecanium scale by pouring the oil upon them from an oil can. The trees were not in very bad condition at the time and did not appear to suffer any injury at all, and at this date they are in very thrifty condition. The applications were made at evening. On September 13, 1881, I applied to twenty-five young trees in my own grove a wash consisting of 1 pint kerosene emulsified imperfectly with 1 quart fresh milk and diluted with 5½ quarts water. The emulsion (No. 1) was very imperfectly united, and most of the oil rose to the surface, and as the wash was applied with a brush, the first trees washed received a large amount of pure kerosene upon the trunks, branches, and in many cases upon the leaves. This application was made in the afternoon (2 P.M. to 6 P.M.) of a very hot, clear day. The trees so treated received not the slightest harm, and at this date are among the finest in the grove, and most of them have quadrupled their size within the year. About the same date (September 14) I made as a test an application to two young orange trees of a very unstable mixture, of kerosene, 1 pint; of milk, 2 fluid ounces; water, 2 ounces; which, when diluted, separated and floated on top. The mixture was applied with a brush, and the oil could be seen to penetrate the leaves, so that they appeared greasy and translucent. Applied between 12 M. and 1 P.M. on a very hot, clear day. Tree A stood in the shade of an oak tree, B in the sun. September 16, 1881, B, old, devitalized leaves loosened or fallen; A, no leaves loosened or fallen. September 20, 1881, B has dropped its leaves badly; A has dropped fewer leaves. December 17, 1881, both trees apparently cleared of living scales. February 14, 1882, trees pushing out vigorously; no apparent difference in condition of A and B; no living scales can be found. To-day, November 9, 1882, these trees are in splendid condition, and have made nearly, if not quite, the maximum growth possible in the year. In these cases, the effect of the kerosene has been simply to remove the scale; the rest is due, of course, to cultivation.

"Another test, which I intended to be crucial as to the effect of diluted kerosene wash upon the roots of the orange, was made at the same time, September 14, 1881. In this experiment I selected a very small two-year-old budded orange tree, which had made no growth during the year, was starved and hide-bound, and stunted. Every orange grower knows how difficult it is to start such a tree into vigorous growth. I dished the earth around this tree and poured a gallon and a half of kerosene wash, containing 1 pint of the oil in emulsion with milk, into the cavity about the cavity of the tree, so that the whole of it soaked into the sand on and about the roots. The tree had but a few yellowish leaves, and most of these dropped within a week. It, however, pushed out new leaves during the winter, and made a respectable amount of branch growth during the past summer. At this date, far from being in dying condition, it is evidently prospering as well as its gnarled and stunted trunk will allow, and I do not hesitate to say that the shock of the kerosene started it from its dormant condition. I might give other instances of applications with kerosene used unnecessarily strong or in imperfect mixtures with other liquids, in none of which have the trees been killed within the past year, but I prefer to cite only from my own notes. In the California report the concentrated solutions of lye seem to be recommended, although the effect upon the trees is evidently very severe. *E. g.*, 'No. 3, concentrated lye, one and one-half pounds; water, one gallon. June 23, 1881, lye so strong as to burn bark and foliage. . . . August 2, 1881; . . . bark being restored and new foliage appearing.' I should call this heroic treatment. It would never do for orange trees, because it would make them hide-bound, if it did no worse. I made four experiments with potash lye (see Preliminary Report, table 6). The strongest solution is 1 pound to 1½ gallons, applied December 31, 1881 (Exp. 43). I find I have the following notes upon the condition of the tree: January 10, 1882, 'Until within two or three days, the tree has not dropped many leaves. It is now severely defoliated. January 20. Has ceased to drop leaves; defoliation complete upon the most badly infested branches; no leaves dropped on the most vigorous branches; some dropped on nearly all older branches.' At this date (November, 1882), the tree is alive, but seems to be suffering from a severe check, and hardening of the bark. The result on scale was not at all satisfactory in my experiments, but I have since had reason to suspect that the concentrated lye used was not a good article. Mr. Voyle, who has tried apparently the same brand, told me that he suspected there was 'no *potash* in it.' What was substituted he could not say, but it might be some form of caustic soda. I have had it in mind to repeat these experiments with a brand of potash known to be good. Shall I do so? In my experiments Nos. 43, 44, and 45 (see Report, table 5) the trees were in very bad condition, coated with scale. I looked at them the other day, and they seemed to me to be in dying condition. This, however, may be partly due to scale, as the lye did not clear the tree. They have, however, been repeatedly washed, with the other trees in the same grove, during the past summer, the washes used being soap and kerosene emulsions of the strength I have recommended, *i. e.*, 66 per cent oil in emulsion, emulsion diluted nine or ten times. That the present condition of these trees is not attributable to the kerosene is shown by the surrounding trees, many of which were in equally bad condition, but *all* of which show marked improvement.

Improved Formula for Preparing Gelatine Photographic Emulsion.

BY A. L. HENDERSON.

My own, Nelson's or any good photographic gelatine should be used, and must be well washed for twelve hours by soaking in water, occasionally changing the same.

Dissolve thirty grains of the washed gelatine in two ounces of warm water in a wide mouthed jar, then add in the following order:

Bromide of potassium	180 grains.
Iodide of potassium	3 grains.
Ammonia	60 minims.

Allow the solution to cool, then add in a fine stream, constantly stirring, in the dark room, the following solution:

Water	2 ounces.
Nitrate of silver	200 grains.

When these are mixed, add 240 grains of dry gelatine, then place the jar in hot water, 150° Fahr.; allow it to remain until the gelatine is melted. Remove the jar from the water, and allow the emulsion to cool and set. When set, it resembles a stiff jelly, is torn into shreds from the bottom of the jar, and squeezed through an opened meshed canvas bag into another dish. It is then washed; a simple way is to allow a small stream of water to trickle on it all night. The water is drained off, then the jelly-like emulsion is put into a wide mouthed bottle, and remelted or dissolved by immersing the bottle in warm water, the temperature of which must *never exceed* 90° *Fahr.* When dissolved, enough warm water should be added to the emulsion to increase the bulk to eight or ten ounces, after which plates can be coated in the usual manner.

Instead of allowing the emulsion to set as above stated, twelve ounces of warm alcohol, 100° Fahr., may be added, and the whole well agitated. The emulsion will then become flocculent, not adhering to the stirring rod, and in a short time will precipitate to the bottom.

After removing the waste alcohol, the emulsion is then set and washed as previously described. When redissolved, add water to make up from eight to ten ounces, and to every ten ounces of finished emulsion add half an ounce of alcohol, which will make it flow better on the glass. An emulsion made as above stated is rapid working and safe. By increasing the amount of ammonia, the rapidity of the emulsion is increased, but manipulation becomes more difficult, and it is possible, by a great increase of ammonia, to make an emulsion so sensitive that plates coated with it will be fogged where exposed for twenty seconds to a light rendered more actinic by passing through double thicknesses of spectroscopically perfect yellow and deep ruby glass.

The Orbit of the Great Comet of 1882.

Professor Frisby, of the Naval Observatory, Washington, has completed a calculation of the orbit of the great comet of 1882 from observations made on September 19, October 8, and November 24, and finds the orbit to be a very lengthened ellipse having a period of about 793, and probably identical with a very large comet seen 371 B.C., and 363 A.D., just about the time of the death of Constantine. Its perihelion distance is only about 700,000 from the center of the sun, and it extends outward at aphelion to about ninety times the sun's distance from the earth.

Direct Fermentation of Starch.

The investigations of V. Marcano go to show that diastase is a product of the vital process of vibrios. To prove this, the microbes observed in corn (maize) were planted in a cultivating fluid of non gelatinous starch and artificial albumen mixed with water that had not been distilled. These organisms developed remarkably in this fluid. The filtered liquid, after the microbes had been killed by Muntz's process, possessed a diastatic power equal to that of a good malt extract. Koji's diastase was produced in like manner.—*Compt. Rend.*

Isovanilline.

Dr. R. Wegscheider has prepared a substance isomeric with the vanilline of vanilla, by heating opianic acid and dilute hydrochloric acid in closed tubes to 170° C. An aldehyde of protocatechu is also formed. Isovanilline dissolves readily in hot water, from which it crystallizes in prisms melting at 116° to 117°. It dissolves with difficulty in cold water, is easily soluble in alkalies, reduces the ammoniacal silver solution when boiled, and forms with bisulphite of soda a soluble double salt.—*Vienna Acad. Bericht.*

A Brazilian Coffee Plantation.

One of the largest coffee plantations in Brazil is the Fazenda Santa Catharina, 100 miles from Rio Janeiro, belonging to Baron de Monteiro. It covers an area of more than twenty square miles, contains 1,700,000 bearing trees, and employs six hundred slaves, who are subjected to the most rigid discipline, and, in fact, as much like machines as it is possible for human beings to become. They are well taken care of, however, and the Baron maintains a private hospital with a resident physician and assistants for the sick.

A Raid on Telephones in Paris.

The Société Générale des Téléphones has just made a raid in Paris on all persons making and selling telephones, which they assert are infringements of the Edison patent, and has issued a notice warning the public against making, selling, or retaining possession of such telephones unless they have the company's trade mark on them.