

## ANOTHER APPLICATION OF DIALYSIS.

Perhaps some of our readers may not remember the beautiful discovery of dialysis, made a few years since by Dr. Graham, of England. He found that if substances which will crystallize be mingled in solution with others of a jelly-like character, such as gum, starch, dextrin, tannin, gelatin, albumen and caramel, which will not crystallize, and the solution be separated by a porous membrane, such as parchment paper or bladder, from pure water or other solvent, those that will crystallize pass freely through the pores, while the gums are retained. Those that pass through, Mr. Graham calls crystalloids, and those that do not he calls colloids, from the Greek, *kolle* (glue). This discovery affords a new means of separating substances mingled in the same solution, and is therefore called dialysis. At the last meeting of the British Pharmaceutical Conference, held at Bath, the following paper was read by J. Attfield, Ph. D., F. C. S., "On the Application of Dialysis in Determining the Nature of the Crystalline Constituents of Plants":—

Some two years ago (*Pharmaceutical Journal* for March, 1862), I published the results of an examination of the saline efflorescences which are occasionally found on medicinal vegetable extracts. These crystalline out-growths were found to be chloride of potassium or nitrate of potash. The former salt had often been observed, but the latter had not been noticed, although it is of common occurrence. From that examination, it seemed that nitrate of potash was a more frequent constituent of plants than had been suspected, and I then proposed the application of a method whereby the presence of it and of similar salts could be detected in the fresh plant. The suggestion was to dialyze expressed juices, concentrated decoctions or infusions of plants, and then to evaporate the diffusate to a small bulk, when it was to be expected that the nitrate of potash, or any other crystalline salt, would separate out in a solid and recognizable form.

Since that time I have submitted a few plant-juices, the first that came to hand, to the process, and have obtained results which justify me in recommending the method as one likely to be of great service in the study of vegetable physiology. Crystalline salts can be thus obtained which would inevitably be destroyed in burning a plant for its ash. The following are the details of the experiments:—

## SOLANUM TUBEROSUM.

A few pounds of potato tops were collected, and at once crushed and pressed and the juice dialyzed for twenty-four hours. On evaporating the diffusate and cooling, small prismatic crystals separated, having all the physical and chemical characteristics of nitrate of potash. Under the microscope they were found to be six-sided, and to twist a ray of plane polarized light, were not volatile, gave a violet tint to flame, and deflagrated on charcoal; the aqueous solution gave a yellow crystalline precipitate with bichloride of platinum, no odor on heating with caustic alkali, a black color with sulphate of iron and sulphuric acid, and yielded ammonia on heating with potash, zinc and iron. It was deemed desirable to apply all these tests in this and similar examinations, as a pound of vegetables seldom yielded more than a few grains of crystals, a quantity sometimes too small to purify crystallization, and always too small to admit of the production of strongly marked analytical reactions. In the case of potato, however, I went to the trouble of operating upon thirty or forty pounds of the tops, and thus obtained about the same number of grains of nitrate of potash, and the extra labor was rewarded, for the mother-liquor of the niter, after standing aside two or three days, yielded a small crop of beautiful little crystals, of which I can at present say but little more than that they were not nitrate of potash. They were perfect little hexagons, not much longer than broad, with flat heads; I suspect them to be a magnesium salt. Beside these constituents, the juice of potato yielded cubes, hollow pyramids, and prisms of chloride of potassium, much ammonia and sugar, even immediately after expression, and other matters the nature of which was not ascertained.

## ATROPA BELLADONNA.

The leaves and soft parts of the Deadly Nightshade also yielded nitrate of potash by the above process.

But in addition some acicular crystals, single and in tufts, were obtained. These were carefully separated from the niter crystallites, and were recrystallized. They were then found to be prisms, neither deliquescent nor efflorescent, and containing magnesium as the sole inorganic constituent. The nature of the organic matter associated with the magnesium could not be ascertained; apparently it was not any of the ordinary organic acids. The juice of Belladonna also contains ammonia, a matter which reduced copper salts as sugar does, and other bodies not examined.

## PISUM SATIVUM.

Several quarts of peas, in the shell, were similarly treated. The product was a thick sirup of light-brown color, yielding no crystals even after the lapse of several weeks. The ash of a portion of it gave a pure potassium tint to flame, and its solution a slight chlorine reaction. Ammonia was also evolved on heating the diffusate with potash, but no nitric acid could be detected. Apparently, therefore, the fruit of the pea contains no nitrate of potash, and only a minute quantity of any inorganic crystalline salt. The chief organic crystalloid is obviously sugar.

## LACTUCA SATIVA.

Half a dozen large garden lettuces were next submitted to the process. Here, again, the concentrated diffusate yielded nitrate of potash. The crystals were, however, mixed with many perfect tetrahedra, but in quantity insufficient to admit of chemical analysis. The mother-liquor contained sugar and ammonia.

## CUCUMIS SATIVUS.

Several cucumbers were then operated on. They furnished a diffusate, of which the chief constituent was sulphate of lime, but it also gave reactions indicating sugar, and the juice, immediately after expression, and again after dialysis, yielded ammonia on warming with dilute solution of potash.

## BRASSICA OLERACIA.

The juice of three or four cabbages, treated in like manner, also gave a diffusate, from which much sulphate of lime separated on evaporation. It also yielded ammonia when heated with fixed alkali, but beside sulphate of lime no crystals were obtained from it.

## DATURA STRAMONIUM.

This plant, the Bitter Thorn-apple, I found to contain so much nitrate of potash that a dried portion quite deflagrated on being burned in a muffle.

From these few experiments, it is, I think, obvious that this application of Graham's beautiful process of dialysis promises to be of great service in investigating the nature of the crystalline constituents of plants. It may assist you in extending our knowledge of the natural state of combination of the alkaloids and organic acids; it may demonstrate the presence of salts previously unknown, and may show that salts, hitherto only occasionally met with, are of common occurrence. Moreover, by showing the presence or absence or variation in amount of a given crystalline constituent, it will help us in ascertaining the influence which variations in climate and soil have upon vegetables, will doubtless aid in determining more exactly the office of the various parts of plants, and, lastly, may throw light on the changes which go on at different periods of the life of a plant.

## FARMERS' CLUB.

The Farmers' Club of the American Institute held its regular weekly meeting at its Room at the Cooper Institute on Tuesday afternoon, May 23d, the President, N. C. Ely, Esq., in the chair.

## FELTED YARN.

Professor Mapes exhibited a specimen of yarn made by a process of felting instead of twisting, and stated that the process was invented some five years ago in France, but had been improved in this country. The wool is formed into threads by being driven through numerous holes in a plate, by agitating the air above it. Coarse and fine wool are mixed in the same thread, and the process works the coarse wool into the middle of the thread, and distributes the fine upon the outside. It is also claimed that the yarn is stronger than twisted yarn!

## PRESERVING POSTS AND TIMBER.

Mr. Johnson sent a communication asking whether kyanizing posts with coal tar would preserve them from decay.

Professor Mapes replied that coal tar will not kyanize them. The process of John Kyan was to soak the timber in a solution of corrosive sublimate, the effect of which is to coagulate the albumen. The process has been very extensively tried, and with the most satisfactory results. The Amboy Railroad had a number of sleepers prepared by soaking them in the solution for fifteen or twenty days, and these were laid down in alternation with sleepers not treated, and while the unprepared sleepers have been renewed two or three times, those that were kyanized remain sound. Similar experiments were made at Woolwich, in England, and with like results. But corrosive sublimate is expensive, and various other substances have been suggested. The speaker had tried a number—common copperas, sulphate of zinc, and others, with good effects in degree.

The best plan practically for a farmer is to turn his posts with the little end down, charring the portion that goes in the ground.

Various other matters were discussed, but we select these only for our columns.

## WESTERN CORRESPONDENCE.

(For the Scientific American.)

## GREAT RAINS OF THE WEST.

All the Western rivers taking their rise in the Rocky Mountains and the great Valley of the Mississippi, and discharging their waters into the Gulf of Mexico through the various mouths and outlets of that river, inundate their banks about every seventh year, or periodically. These inundations overflow large tracts of river bottom and swamp lands in the States of Missouri, Arkansas, Tennessee, Mississippi and Louisiana, covering an extent of surface which, taken in the aggregate, makes a total equal to an inland sea of several hundred miles square. The evaporation from this immense water surface, stimulated by the tropical heat, is carried northward by the prevailing and usual warm south-west winds blowing from Mexico, until, meeting with the regular evaporation of the great Northern lakes, the atmosphere becomes overcharged with vapor, condensation follows, and the result is, that over a large portion of the Valley of the Mississippi, lying north of the mouth of the Ohio, copious and unseasonable rains prevail. This is the periodical year of the overflow; the season is unusually wet, and unseasonable rains may be looked for until the summer heats, acting on the excessive evaporation, rarifies it to such an extent that they check its descent in the form of rain, and all general overflows of the Mississippi and its tributaries are sure to be accompanied with spring and summer seasons remarkable for their wetness.

## PROSPECTS OF THE CROPS.

The rains, while seriously retarding the planting of oats, spring wheat in Northern Illinois, potatoes, corn and other spring crops, have a beneficial influence on the grasses and winter wheats, and unless they should continue, and rust the wheats when ripening, the crop in Southern Illinois will be a fair average one in quantity, and of an excellent quality. From seeding up to the present time, the wheat crop has had everything to favor it—the fall was favorable for seeding; the winter was uniform; the spring cool, and the seed sown was fully matured by the warm summer of 1864.

Farmers of late years have adopted the pernicious practice of cutting their wheat some ten days before it has fully ripened, being made to believe that this unripe wheat outweighs the ripe, and the millers pay, or pretend to pay, more for such wheat—because it really does make whiter flour, with similar handling—than for that which is fully matured. In this way farmers have been gradually seduced into cutting and selling unripe crops, and of using seed of the same character; and the millers, to suit the vitiated public taste—by giving a fictitious whiteness to their flour—sacrifice from ten to twelve pounds of bread to the barrel of flour, that being the difference in favor of bread when the flour is manufactured from wheat that has been allowed to ripen.

Unless killed by intense cold, fruits, particularly peaches, are usually injured by a few warm days in the month of February causing the fruit buds to swell; this warm weather is always succeeded by cold weather of sufficient severity to put a stop to the further germination of the fruit for that season.

The past winter was of a uniform coldness, without being too severe, and the fruit having thus far escaped the spring frosts, which some seasons fatally assail it, our prospects for an abundant crop are quite promising.

#### METEOROLOGY.

The subject of meteorology is one that should attract more general attention than it does, its laws being comparatively unknown at the present time, and even the most trifling observations, suggestions and experiments made with reference to this important science should be recorded and carefully examined and preserved. We constantly meet with persons of but little general intelligence who can predict almost with certainty some of the approaching changes of wind or weather, by carefully noticing certain indications which are known from their own and the experience of others to be generally correct. Were all the weather philosophy of farmers, sailors, fishermen, hunters, shepherds, stage drivers, and others, collected, it would constitute a volume filled in a great measure with suggestive information; and like the unavailing search after "the philosopher's stone," or fruitless experimenting in the hopes of discovering "perpetual motion," though not resulting in positive success, the very failures and disappointments experienced by the alchemist and the mechanical experimenter have been the means of opening new channels of thought in the minds of others, terminating in the wonderful discoveries of the chemist and the magnificent mechanical contrivances of modern times.

The united historical evidence from the battlefields and naval engagements of Europe since the commencement of the present century, and of our own battle-field during the rebellion, concur in sustaining the meteorological fact that cannonading affects the atmosphere to such an extent that thunder-storms and heavy rains, or rains alone, almost always accompany or succeed where it has been for many hours heavy and continuous. This war has also demonstrated, what is of more importance to us, that heavy and continuous firing affects the atmosphere not only in its own immediate vicinity, but at hundreds of miles west or north of it, by producing within a few hours sudden, and, in most cases, unseasonable changes of the winds, usually accompanied by cloudy weather or rain without thunder-storms; and in no instance at any season for the last three years has a general engagement been immediately succeeded in this latitude by severe cold weather, the cannonading appearing to have complete control over the currents of air producing cold.

If, then, the cannonading of this war, which was confined to certain lines of latitude and longitude, produced rain in their own vicinity, and at points more or less distant, what effect would cannonading from batteries arranged across the continent on different lines of latitude, and connected by telegraph so as to notify of approaching storms, have on the atmospheric currents? Would batteries, taking St. Paul's as the line of latitude, have dispersed the cold storm of January 1, 1864, thereby preserving from destruction so many valuable animals and fruit trees, or the August frost of 1863, which destroyed half the value of the growing crops of the West? or batteries, taking Chicago as the line of latitude, check the spring frosts that so frequently annihilate our fruit and damage our wheat, after they have escaped all the perils of winter? or at what points should batteries be worked this present season for the purpose of suspending for a short period the rains which are now retarding the planting of the staple crops of the West?

Surrounding the coast of Great Britain there is a system of signals warning mariners of approaching storms, the signal stations being connected by telegraph. If cannonading can disperse those storms, how much more advantageous would it be to the seamen and fishermen than to be compelled to remain in port waiting for the storms to disperse themselves.

These are all points of much interest, and are worthy of being experimented on under the supervision and control of an enlightened and unprejudiced meteorologist. Before the removal of the batteries from the vicinity of Richmond and other points it is the duty of the Government to institute a series of experiments bearing on this subject, which, if conducted systematically and honestly, will certainly, in this latitude, go to sustain the rain theory.

#### ROPER'S ENGINE.

Messrs. Butterfield & Haven, of your city have just furnished a printing office here, with one of the largest sized "Roper's Calorics." This beautiful piece of mechanism reflects the highest credit on the accurate workmanship of the builders, there being no tantalizing leaks, binding places or drawbacks to retard its erection or standing, the whole occupying but eight hours; its movement from the beginning being apparently as accurate as that of a well-constructed clock.

By connecting with the exhaust of these machines a hollow shaft, on which are placed at proper distances two sheet-iron disks formed like watch glasses, the concaves opposite each other, and similar in their general arrangements to the exhaust disks used by the "London Atmospheric Railway," it is very probable that a large percentage of power might be added to those calorics, this form of exhaust requiring comparatively but little power to operate it. A similar device might be applied to high-pressure engines with advantage; some of your enterprising mechanics should give this a thorough trial; it is entitled to it. Why not apply these machines especially to the heating of buildings, regardless of their power purposes?

The exhaust of the machine would furnish a large amount of heat, or it could be driven into a supplementary dome, and additional heat added before passing off; or an additional pump worked by the machine could drive air into one or more additional domes. The large amount of fresh air which these machines consume should make them the very best and cheapest appliances for heating that is now before the public.

Springfield, Ill., May 15, 1865.

[We are pleased to give our correspondent a hearing, but do not indorse his views.—Eds.]

#### BOOKS AND PUBLICATIONS.

**BODEMANN AND KERL'S ASSAYING.**—This is a small book of 214 pages, published for the "Berzelius Society," by John Wiley & Son, 535 Broadway, New York. It is translated from the German by W. A. Goodyear, Ph. B., late Assistant in the Sheffield Scientific School, etc. It embraces only that portion of Bodemann's work relating to the assay of lead, copper, silver, gold and mercury. It is intended especially for proficients, and will be regarded by them as indispensable unless they possess the original. The incongruous weights of the German States are not reduced to the French standard, a labor which would have materially increased the value of the translation.

#### Benzoin as an Insecticide.

As our houses and gardens are always more or less infested with vermin, it is satisfactory to know that benzoin, an article well-known as a detergent, is efficacious as an insecticide. Two drops are sufficient to suffocate the most redoubtable pest, be it beetle, cockchafer, spider, slug, caterpillar, or other creeping thing. Even rats and mice decamp from any place sprinkled with a few drops of benzoin. A singular fact connected with this application of benzoin is, that the bodies of the insects killed by it become so rigid that their wings, legs, etc., will break rather than bend, if touched. Next day, however, when the benzoin has evaporated, suppleness is restored.—*Boston Cultivator*.

[This must be benzine; benzoin is a gum.—Eds.]

#### Rate of Emigration.

The whole number of immigrants who arrived at New York City in the first three days of the week ending the 20th of May, was 4,681. Two steamers arrived subsequently, swelling the total to about 6,000. Another ship was expected, and possibly a steamer, which may bring the figures to 7,000. This is at the rate of 28,000 per month, or 336,000 per annum, at a single port, when the season for large arrivals has not commenced. That begins in June, and usually continues to October and November. We have not seen a report of the arrivals at other places; but every European steamer brings fresh intelligence of the swelling exodus on its way hither, comprehending every nation from the Caspian to the North Sea—every occupation, and that physical ability we can measure from experience.



#### Are Copper Cartridges Unreliable in Cold Weather?

MESSRS. EDITORS:—In your issue of May 20, I notice a letter from H. W. S. Cleveland, in which the statement is made that "copper cartridges are unreliable in cold weather." Now, this seems so strange and new to me that I am prompted to give my own experience in the matter. I have used a Wesson rifle nearly four years, and in all kinds of weather peculiar to this latitude. During this time I have used not less than one thousand cartridges—possibly nearly double this number—and they have never missed fire but twice. The first instance was a warm day in September, 1863; and, as it had never missed fire before, I was a little surprised; but on removing the cartridge and turning it around half way, it exploded on the first trial. The second instance was a very cold day in December following. After trying this cartridge till the end was full of indentations, I placed it in my pocket for inspection.

Now, what was the cause of these cartridges missing fire? I attribute the failure of the first to the absence of fulminating powder in the part first struck; but the failure of the second was not caused by cold weather, as a close examination proved. On opening this cartridge, I could discover no trace of fulminating powder! Both of these cartridges were taken from the same box. Now if cold weather destroys, for the time, the fulminate in the cartridge, why does it not also destroy the percussion cap? Before we accept this cold-weather theory, let us hear from others. What say you, riflemen?

L. H. PLAISTED.

Woonsocket, R. I., May 22, 1865.

#### The Trials of a Patentee.

MESSRS. EDITORS:—Not feeling in a very amiable mood, I address you relative to the troubles of a patentee—myself, and others similarly situated. There appears to be an organized band of patent thieves in this place; their *modus operandi* is first to obtain, if possible, power of attorney to sell the patent. If successful the victim had as well engage in other pursuits, for he has given away his patent. If not successful, they try to buy portions of the territory, offering a very small sum, accompanied with the threat that they intend to sell it, with or without your consent, endeavoring to bully a poor fellow to accede to their demand. Both of these methods failing, then some one of the fraternity assumes to be the patentee, who commissions, with power of attorney, the others, and they go forth to victimize unsuspecting parties whenever and wherever they find an opportunity. The difficulty arising from their rascality to the patentee, is his inability to come in contact with persons buying of them, and having to satisfy them that they have been "sold"—to use a slang phrase—which is a serious one sometimes. Now, if there is no mode to bring these gentry to justice there should be. They are irresponsible parties so far as property "comeatable" is concerned.

I hope you will call attention to these pests through your valuable publication, for they are the cause of much of the deep-rooted antipathy to patent venders. I don't care how good a patent a man has to sell, he is looked upon as a swindler—making it a very disagreeable business to persons of sensitive natures. If a law of Congress could be obtained that might reach the offenders more direct, and without such enormous expenses, it would confer great favor upon many honest and poor inventors. A. C. T.

Galesburg, Ill., May 12, 1865.

[We publish our correspondent's letter with the hope that it may lead to the exposure of the characters to whom it refers. If one or two of them could be tried and punished as swindlers, it would speedily break up the practice complained of. Patentees should be very careful not to commission unworthy men to sell their rights. The business of selling patents is just as reputable as any other sanctioned by law, and just as few swindlers are engaged in the business as in any other. There are plenty of rogues in all trades and professions.—Eds.]