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.