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ORGANIC MATTER IN THE AIR.

About a year ago, at the request of the National Board of Health, the well known and very capable chemist, Prof. Ira Remsen, undertook an investigation of the methods employed for the detection and determination of the nature of the organic matter known to exist in air. A preliminary report, giving an outline of the work, but no details in regard to the methods employed, was published in the *Bulletin* of the Board last winter.

In the *Bulletin* for September 11, appears a more extended report, with details of experiments and such results as seem to have been established by them. The importance of the work, in which Mr. Remsen has been assisted by Mr. W. Mager and Mr. T. W. Day, will be appreciated by all who have any knowledge of the grave questions of public and private hygiene which hinge upon the possible influence of organic matter in the air, and the great need of some trustworthy and if possible simpler method of detecting its kind and measuring its quantity.

While air is often contaminated by carbonic acid and other gaseous results of vital, chemical, and industrial processes, the mischievous effects of "impure air," as popularly defined, most probably arise from the presence of refuse organic matters of a nitrogenous character. These, when taken back into the system, are apt to cause serious vital disturbances, and it is probable that they do cause not a few of the maladies which afflict mankind. The great problem is to discover the best method of determining the presence and nature of such impurities in air.

The first to attack the problem seriously was Dr. R. A. Smith, of Manchester, England, as early as 1870. He first endeavored to collect the organic matter in the air of city streets and foul places by washing the air in pure water. In some cases as many as a thousand volumes of air were successively washed with one volume of water, a process which required infinite patience and care, and so much time as to forbid its use as a practical method.

A different and more complicated though less laborious method of washing air, more recently devised by Mr. E. M. Dixon, Chemist of the Sanitary Department of Glasgow, has yielded valuable results, both there and at the Observatory of Montsouris, near Paris.

Something more simple and accurate, however, seemed requisite for general use; and the devising of such a method was accordingly made the first step of Mr. Remsen's investigations. Taking advantage of Chapman's suggestion with regard to the use of finely powdered pumice stone for absorbing nitrogenous organic matter from air, Mr. Remsen made a modification of Chapman's apparatus, which proved at once simple, efficient, and reliable in its results. Before each experiment the coarsely powdered pumice stone was heated to redness in a platinum crucible, then put into carefully cleansed absorbing tubes, and moistened with a little pure water.

To determine the amounts of free and albuminoid ammonia obtainable from the organic matter in the air to be examined, the air was first drawn through the pumice stone absorber by means of an aspirator. From 50 to 100 liters of air were drawn through, according to the amount of impurity. The absorption being completed, the pumice stone was conveyed to a flask perfectly cleaned with pure water; then 500 c.c. of the same water and 5 c.c. of a specially prepared sodium carbonate solution were added. Connection was then made with a clean condenser, and 100 c.c. distilled off (distillate A) and put aside for treatment with Nessler's solution. A second distillate (B) of 100 c.c. was then made, after adding to the contents of the flask 20 c.c. of a specially prepared solution of potassium hydroxide and 50 c.c. of a solution of permanganate of potassium. The first distillate Nesslerized gave the free ammonia, and the second the albuminoid ammonia, in the volume of air drawn through the absorbers.

In the course of the investigations reported upon, to determine the variations produced in the amount of nitrogenous organic matter in air by different causes, experiments were made with air contaminated with decaying meat in various stages of decomposition and dryness, air contaminated by the breath of dogs closely confined, laboratory air, etc.

Hitherto the opinion has been that the nitrogenous organic matters in bad air are the really injurious ones, and that an increase in the two forms of ammonia is sufficient to condemn the air yielding it. Mr. Remsen, however, is inclined to think that the question whether the amounts of ammonia and albuminoid ammonia yielded by air can be regarded as reliable measures of its impurities is still an open one. The main results established by these investigations he sets down as follows:

1. The nitrogenous matter of the air may be thoroughly collected by means of the pumice stone absorber described in this report.

2. The total amounts of ammonia found in experiments performed at the same time with the same specimens of air agree fairly well with one another; so much so as to warrant the use of the method for the examination of the air.

3. When free and albuminoid ammonia are determined, the results obtained do not always agree very closely, but still the agreement is sufficient to enable the experimenter to detect such variations as are likely to occur between pure and impure air.

4. Air contaminated by being drawn through water containing decaying meat does not yield more than the usual quantity of albuminoid ammonia.

5. Air contaminated by being drawn over comparatively dry decaying organic matter yields more than the usual quantity of albuminoid ammonia.

6. Air contaminated by respiration yields more than the usual quantity of albuminoid ammonia.

7. It is necessary in judging of the purity of air to take all the facts known in regard to it into consideration. The simple determination of any one constituent can never be a sufficient basis for the formation of a competent judgment.

8. It would be useless to have examinations of air made by any but the most careful workers. It would be time thrown away to have such analyses made by the average practical chemist.

Among the questions left unanswered an important one is this: Is the air which has been deprived of its nitrogenous matter also deprived of its injurious constituents? Another is this: Does the amount of organic matter in the air vary with different conditions of the air, as, for instance, with its hygrometric state?

The first question must be answered by the physiologist, not by the chemist. The effect of the air on fermentable liquids must be studied, and its effect when breathed by animals. The second question can be answered only by long continued systematic series of examinations of the air, such as are now being made at Glasgow, at Montsouris, and at some places in Germany.

THE PHILADELPHIA SHEEP AND WOOL SHOW.

An international sheep and wool show was held in Philadelphia during the latter part of September, under the auspices of the Pennsylvania State Agricultural Society. A large and interesting collection of sheep, sheep dogs, wool, and woolen manufactures was exhibited. The show of machinery was small. The chief object of the exhibition was to bring together breeders and manufacturers to promote a better understanding of their mutual interests, and to give a greater impetus to the rearing of sheep, in order that the country may grow at home the fifty million pounds of wool now annually imported by our manufacturers.

In furtherance of this object an international convention was held, beginning September 22, to discuss questions relating to sheep breeding, wool growing, and wool manufacturing. The first paper presented was by Mr. A. M. Garland, President of the National Wool Growers' Association, in relation to the breeding of sheep, and the influence of food and climate upon the quality of wool. The work of the Department of Agriculture in collecting and disseminating information with regard to flock products and the demand for them, was described by Commissioner De Luc, and discussed by a number of gentlemen prominently interested in this industry.

At an adjourned meeting the next day the Secretary of the National Wool Growers' Association and President of the New York Association read a paper on the relative advantages of our sheep-breeding States, and the breeds best adapted to them. Mr. John L. Hayes, of the Wool Manufacturers' Association, addressed the convention on the subject of the grades of wool which this country must produce in order to supply the demands of our looms, and how best to produce them.

Among the other subjects discussed were methods of shearing and handling sheep and of packing and grading wool for the market; increasing the production of the mountain lands of the Atlantic States by the systematic extension of sheep husbandry; benefits resulting from the introduction of pure blood into our native flocks; breeds capable of yielding from a given acreage the most profitable returns in mutton and wool taken jointly; management of sheep in summer and winter—of lambs most profitably for market; national registration of herds; recent inventions in wool manufacture and their relative importance; recent discoveries and inventions in the production of dyes and the art of dyeing—their relative importance.

A popular part of the show was the competitive exhibition of the working qualities of sheep dogs.

ORIGIN OF THE MERINO SHEEP.

As the ancient Greeks had no cotton nor silk and very little linen, and as sheep's wool was the principal texture from which their clothes were made, they took peculiar care to cultivate with especial care such breeds of sheep as produced very fine wool. Such breeds were those of the Greek city of Tarentum, situated on the Tarentine Gulf. In order to improve the fine quality of the wool still more, the sheep were covered with clothes in cold weather, as it was found by experience that exposure to cold made the wool coarser. Thus clothing these sheep from generation to generation resulted in a very delicate breed with exceedingly fine wool, according to the law established by Darwin in regard to selection and adaptation to exterior conditions.

This product of Greek industry was transmitted by them to the Romans, whose great agricultural author, Colunella, states that his uncle in Spain crossed the fine Tarentine sheep with rams imported from Africa, and obtained a stronger breed, combining the whiteness of fleece of the father with the fineness of the fleece of the mother, and having obtained such results the race was perpetuated. The absence of other fine textures made these Spanish sheep so valuable that in the beginning of our era they were sold in Rome for $1,000 in gold a head, an enormous price for those times, when money had much more value than now.

When the Barbarians invaded Italy these sheep were all exterminated, while the greater portion of the Roman posses-

sions were laid waste. But in the less accessible mountains of Spain the Moors preserved the breed, and it is to them that modern Spain owes the merino sheep, which are the direct descendants of this cross breed of the Greek and African ancestors referred to. It is a valuable inheritance, too, which that country owes to the combined Greek, Roman, and Moorish civilization, and of which our California wool-growers also earn the advantages, by the prosperity of this breed of sheep, which was there a few years ago.

PROGRESS OF COTTON SEED OIL MANUFACTURE.

The industries of the South have, since the close of our civil war, been extending in different directions, while some peculiar branches have attained a degree of importance never dreamed of in the days of slavery. One of these is the manufacture of the oil of cotton seed and the art of refining the same, hy which it is made as sweet as olive oil, and not only used as such in the United States, but it is now largely exported to Italy to compete with the native olive oil, which is a staple article. It is there used for adulterating the native article, and then it is exported again as genuine olive oil. This has already become a serious matter, as of the six million gallons of cotton seed oil which were exported from the United States during the last year, the greater portion went to Italy. The Italian Government, therefore, in order to check this adulteration, has imposed a heavy duty upon the importation of cotton seed oil from the United States. The exportation, which in 1877 and 1878 was about one and a half million gallons per year, reached in 1879 nearly six millions, and this will be surpassed in 1880. Our home consumption of the article is over two million gallons per year.

Mississippi and Louisiana have each 9 cotton oil mills; Tennessee, 8; Texas, 6; Arkansas, 4; and Missouri, Alabama, and Georgia, 2 each; together, 42. At present 410,000 tons of the seed are now pressed, yielding 35 gallons of oil and 750 pounds of oil cake to the ton of seed. This oil cake has admirable fattening qualities, and is largely used for cattle.

Progress of the Brush Electric Light.

The Brush Electric Light Company, of New York, have opened offices at 860 Broadway, and the officers expect that before the end of October a large numher of lights will be in operation in the vicinity of Madison and Union squares. Negotiations for a building near Madison square, in which to place the engines and other machinery, are about completed. In the district to be illuminated there are many public buildings, restaurants, and stores. It is said that no attempt has been made to subdivide the light for use in private dwellings, but for lighting large areas the Brush system is entirely successful.

The Brush Company of New York is distinct from the general company having its headquarters in Cleveland. The New York company was recently incorporated, and holds the privilege of using the Brush light on Manhattan Island only.

The officers of the new company are: President, W. L. Strong; Vice President, A. D. Juilliard; Secretary and Treasurer, A. A. Hayes, Jr.; General Manager, C. M. Rowley.

Postponement of the Prize.

Mr. Edward Lee Brown, Chicago, Ill., President of the American Humane Association, writes us that the time for receiving models and plans in competition for the prize of five thousand dollars offered by the Association for the most approved cattle car, has been extended until January 1, 1881.

THE UNICORN.

The unicorn is generally regarded as belonging more to the realm of fancy than of fact, yet according to M. A. T. de Rochehrune, of the French Academy of Sciences, a race of animals exists in Africa which resemble the fabulous unicorn more than any other living beast does. It is true that this animal has two other horns like those of a cow, but since there are "mooly" cows having no side horns, there may be similarly unfinished animals among these beasts described hy M. De Rochebrune, in which case they would present all the characteristics of the distinguished unicorn who is popularly supposed to be fighting the British lion for the possession of the crown. M. De Rochebrune says: Naturalists and travelers, for some unknown reason, have kept the most absolute silence as to a race of domestic cattle belonging to Senegambia. Belonging, like the greater part of its African relations, to the group of great zebus (*Bos indicus*, Auct.), it appears to be indigenous to the high plateaus of the Fonta-Djallon, whence the Pouls, a pastoral people, have scattered the animals for commercial purposes along the whole coast, from Cape White to the Point de Galle. The Negroes and Moors use them for beasts of burden under the name of carrier cattle. An eminently exceptional characteristic distinguishes them from other races; this characteristic consists of a genuine horn in the nasal region, identical in its nature and even in its mode of development with the frontal horns. Belonging to the females as well as the males, this horn, sometimes conical but more frequently developed in the form of a four-sided truncated pyramid, reaches a height of 2¼ to 2¾ inches, a width of 2 inches, and a thickness of 1½ inches; its faces are furrowed with vertical furrows and crossed by stratified horizontal ridges from base to summit. Out of a herd of one hundred of these animals about sixty will have this well-defined nasal horn, while the remaining forty will not have it, but will have a nasal hollow in the roof of the mouth, covered with a horny plate, thin and rough. There are some other anatomical peculiarities of this animal, but the chief one is the nasal horn.

INSECTICIDES FOR THE PROTECTION OF COTTON.

BY PROF. C. V. RILEY.

In some remarks at the recent meeting of the A. A. A. S., I gave an account of some of the more recent practical results of the investigation now being carried on by the United States Entomological Commission, to ascertain the best means of controlling the insects affecting the cotton plant. I herewith give you the substance of that portion referring to insecticides.

The experience of the year has so far given us nothing superior to the substances previously tested. We have over five tons of extracts and decoctions of various native plants centered at Selina, made either by Prof. R. W. Jones, of the University of Mississippi, or by Mr. James Roane, agents of the commission. But two or three so far give any promise, and these not much. Yeast ferment or beer mash, which Mr. Hagen so strongly recommended, has proved entirely useless. Of the various arsenical poisons, Paris green still proves the best, so far as efficacy and harmlessness to the plant are concerned, but the use of this and of different preparations of white arsenic is to-day so well understood that they need no further mention.

LONDON PURPLE.

Of this arsenical refuse, which I introduced for this purpose a year ago with a good deal of hope as a cheap substitute for Paris green, it will be well, however, to say a few words.

The testimony in regard to it is very generally favorable the present year, as I anticipated would be the case from the experiments we made in 1879. But some reports are less favorable, and such mostly come from parties who have not understood how properly to mix and use it. Pound for pound it should be made to go twice as far as Paris green; *i. e.*, a pound of the purple is sufficient to eighty, or even one hundred gallons of water, and if used dry, should be in proportion of one to forty parts of the diluent.

It should be borne in mind that great care is necessary in mixing it in water to prevent its forming lumps, and that it acts more slowly than Paris green. To this last fact is due most of the unfavorable experience and judgment. If a rain follow too soon after an application, the purple kills comparatively few worms. Its good effects are fully seen only under favorable circumstances on the second or third day, while the green shows its good effects a few hours after application, and particularly the day following. In the early use of the green the same diversified experience was had, and from defective methods or adulterated material unfavorable results were quite frequent. One source of failure with both these materials in liquid is the lack of provision to keep them stirred up and well suspended; another, in not bearing in mind that the poison has greater specific gravity than the water in which it is carried, so that in poisoning many rows at a time, the finer spray falls on the furthermost rows with little or no poison.

London purple is exceedingly fine and sifts through the slightest crevice. This is an advantage to the planter who uses it on his cotton, but necessitates great care in shipping. The manufacturers have shipped it for the most part in barrels, which have permitted it to leak and stain other goods, as well as the vehicles of transport, thus doing more or less injury and prejudicing freight agents against it. This defect should be remedied.

Experience seems to indicate that it is less dangerous to use than Paris green. We know of two negroes who stole some flour in which it had been mixed in the ordinary proportion for use on cotton, and made biscuits thereof. Both were made sick, but neither seriously, and Prof. Barnard found that the steward on one of the Mississippi steamboats (the decks of which get quite purple from carrying it) has made regular use of the wastage, so easily obtained on every hand, for coloring his pastry and ice cream. That no ill results have followed is no reason for perpetuating the practice. Some of the unfavorable experience with this purple, I am constrained to believe, has resulted from adulteration.

PYRETHRUM.

This powder, of which, since last year's experiments, I have had great hopes, fully warrants them. No other vegetable substance approaches it. Last year, while it was found by Prof. Hilgard, of California, that an alcoholic extract of any part of the plant possessed the insecticide property, I had serious doubts whether it could ever be successfully used in the cotton field because of its cost. The simple powder mixed with flour as a diluent could then be made to go over more ground than the alcoholic extract. The present year we have found that an ordinary fluid extract, made after the usual formula of the Pharmacopœia, will go much farther, and that the extract from a pound kills all young worms when diluted in one hundred and twenty gallons of water. Nay, more, one of the most important discoveries is that it acts equally well or even better when the powder is simply mixed with water, and even one pound to one hundred and fifty gallons is effective, and one pound to two hundred gallons will cause the destruction of most young worms. Its action is really marvelous, but as it kills by contact, its effects are not lasting, as in the case of arsenical poisons, which act through the stomach. It produces convulsions and paralysis, so that all young worms it comes in contact with soon writhe to the ground, from which they rarely recover, even if the pyrethrum fails in the end to kill, for once on the ground and enfeebled, and a host of enemies are always ready to finish the work begun by the powder. This insecticide acts quite differently on different insects, but Aletia is one of the most susceptible to it.

I have not a doubt but that when it is once produced in this country so that the cost of the powder will be nominal, it will be extensively employed by planters, and to this end I have taken steps to have it introduced and cultivated. Its harmlessness to man, the small quantity necessary, and the fact that it may be grown by the planter himself, will offset the greater permanency of the arsenical powders.

OILS.

Nothing is more deadly to the insect in all stages than kerosene, or oils of any kind, and they are the only substances with which we may hope to destroy the eggs. In this connection the difficulty of diluting them, from the fact that they do not mix well with water, has been solved by first combining them with either fresh or spoiled milk to form an emulsion, which is easily effected; while this in turn, like milk alone, may be diluted to any extent so that particles of oil will be held homogeneously in suspension.

Thus the question of applying oils in any desired dilution is settled, and something practicable from them may be looked for.

Fraudulent "American" Cottons.

During a recent tour through Lower Egypt an American correspondent was astonished to find at Rosetta, Damanhour, Zagazig, and especially at the great fair at Tantah, a great quantity of cotton goods offered for sale purporting to be of American manufacture. These goods consisted of a wretched flimsy fabric, filled up with "sizing." A large portion of them bore the word "Mexican" in large English letters and underneath the word "American" in large Arabic letters. The traveler found on consulting the official report of the Director of the Egyptian Statistical Bureau, M. Amici Bey, that no American cotton goods have been entered at the regular Egyptian custom house during the past five years. A small quantity of American cotton goods have entered Egypt by way of Smyrna, where the greater part of the duty was paid; but all such goods were found upon inquiry to have been of uniform excellent quality. The presence of the fraudulent "American" goods is explainable only on the theory that the English manufacturers, who now monopolize the Egyptian market, have found a new way of "spoiling the Egyptian," by palming off upon them their "cheapened" goods as American, and thus momentarily avoiding the consequences of their cheating in the fabric and at the same time doing untold harm to American manufacturers.

Spurious Indian Implements.

A Western journal announces the finding of a fine specimen of the discoidal stone, a kind of stone implement rarely found, and deserving notice on account of the growing interest in American antiquities. The name has been given to this form of stone for reason of its double convex shape. It is said to be made of quartz, very smooth, and it is remarked that its manufacture without the use of metallic tools must have cost the ancient mound builder who made it the labor of many months. Its use cannot be accounted for. We are inclined to believe of such stones what the State Geologist of Indiana, Prof. Cox, said of a similar but elongated specimen exhibited at the late meeting of the American Association for the Advancement of Science, in Boston, found in the Wyandotte Cave, and pretended to have been some kind of tool of the early cave dwellers. Prof. Cox considered it simply as a natural production, a piece of water-worn rock, made smooth by continual rollings; the marks of wear upon its ends he declared to be recent, and formed by collectors of mineral specimens who found it a handy substitute for a hammer to knock off pieces of rock. He said that the tendency to consider every peculiarly-shaped stone as an Indian implement is running wild, that every splinter of quartz is considered an arrow-head, every small bowlder an Indian hammer or ax, etc., and warned collectors only to trust to undoubted marks of human workmanship.

Diamond Cutting in New York.

Among the curious and interesting industrial facts brought to light during the census inquiries not the least is the fact that the recently introduced art of diamond cutting has been so admirably developed here that diamonds cut in Amsterdam are now sent to this city for recutting. Hitherto Amsterdam has monopolized the work of diamond cutting; and the aim there has been to remove in cutting the least possible weight of the gem. The American plan is to cut mathematically, according to recognized laws of light, so as to secure the utmost brilliancy for the finished stone. The greater loss in weight, as compared with the Amsterdam cutting, is thus more than made good by the superior brilliancy of the product. From the inquiries made by chief special census agent, Chas. E. Hill, it appears that the average increase of value given to diamonds by the New York cutting is $5,000 for each person employed for twelve months; also, that our dealers are receiving the best Amsterdam-cut gems from abroad to be recut here and returned.