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Agriculture.—Machines.—Testing Guano.

While our farmers are seeking after and storing up knowledge for their agricultural operations during the next season, we deem it a very appropriate period to direct them to all the sources where genuine, useful, and new information may be obtained. This is one reason why so many new agricultural implements have been illustrated and described in our columns recently, and why our present number contains engravings of two new seed planters, and an improvement in plow harness; and as it is well known that the adulteration of guano is not an uncommon practice, we append some useful information respecting methods to test its qualities.

As guano is very expensive, and as it has come into very general use, some simple method of testing its quality will be of great service to our farmers, because it is not possible to judge correctly of its quality by mere inspection. The following test is taken from the last number of the *Southern Planter* :—

"Pour half an ounce of the guano to be examined into an iron spoon, and place it upon red-hot coals until a white or grayish ash is left, which must be weighed after cooling. The less ash left behind the better is the guano. The best sorts of Peruvian guano yield, from half an ounce, somewhat more than one drachm of ashes (30 to 33 per cent.); whereas the inferior guanos that are now so often offered for sale—for example, Patagonian, African, Saldhanha Bay, and Chili guanos —leave a residue of from 2 1-2 to 3 drachms (60 to 80 per cent.), and those intentionally adulterated a greater quantity of ashes. Of genuine guano, the bad as well as the good, the ash is always white or gray ; a yellow or reddish color indicates an adulteration with loam, sand, earth, etc.

This test is very simple, and at the same time very trustworthy. It rests upon the fact that the nitrogenous combinations existing in guano, and forming, as has been demonstrated, its most valuable ingredients, undergo combustion and volatilization when subjected to heat. Here, too, the difference of odor during the combustion is characteristic. The va pors from the better specimens have a pungent smell, like spirits of hartshorn, with a peculiar piquancy, almost like old decayed Limbourg cheese, whilst those rising from inferior varieties smell like singed horn-shavings or hair.

The combustion may be undertaken on any hearth, or in any parlor stove, without fear in the latter case that a disagreeable odor will be diffused throughout the room. A brick should be firmly thrust down into the fire, and the spoon laid upon it in such a way that the handle rests upon the brick, and the bow with the guano projects free over the fire. A cork should be fixed on to the extremity of the handle, in order that the hand may not be burnt when brought into contact with the heated spoon."

If guano be adulterated with wood dust charred to a brown color, the above test will not answer, because the charcoal will burn and pass off with oxygen as carbonic acid gas, and thus deceive the anaylist with respect to the amount and value of the volatile matter in the guano.

From fifty to about seventy per cent. of good guano will dissolve in a hot solution of caustic potash, (the lye of potash and a little lime,) and give off a strong smell of ammonia. This is a very simple and good test; and if hydrochloric (muriatic) acid be added in slight excess to the filtered caustic solution it should produce a copious brown crystaline precipitate of uric acid.

We have heard some persons interested in the sale of guano contend that it is chiefly valuable according to the amount of phosphates it contains, while we have heard others assert that it is valuable according to the amount of ammoniacal salts contained in it Agricultural chemists of the highest respectability entertain the latter opinion. Lieber's Analytical Chemists Assistant, published by H. C. Baird, Philadelphia, contains a description of various methods of analysing guano ; with these all intelligent farmers can make themselves familiar, and they should do it.

Improving the Ohio River.

This subject is again attracting attention, and many of our Western cotemporaries are discussing the various plans proposed to effect the object. Our constant readers are acquainted with the plan of Charles Ellet, C. E., for maintaining a constant navigable amount of water in the Ohio at all times—by building great dams or reservoirs on the mountainous tributary streams, to supply during the dry months, a sufficient amount of water for navigation. Elwood Morris, C. E., in an article in the January number of the *Franklin Journal*, conceives this to be the most feasible and best plan. He states that the water draining away by the channel of the Ohio river, as measured day by day at Wheeling, Va., by Mr. Ellet, if regulated by reservoirs, is more than adequate to the maintenance of a navigable depth of six feet throughout the year. That six feet depth of navigable water is ample to maintain a permanent steamboat navigation, and also to keep the river clear of stoppage by ice. That by employing receiving and regulating reservoirs of small size, frequently filled and emptied, a navigable depth of five feet could be maintained by means of an outlay of only one million of dollars, and by using six large artificial lakes, a navigable depth of six feet can be permanently maintained by an outlay in reservoirs of twelve millions of dollars. That the reservoirs constructed of imperishable materials will require no repairs, when once properly finished.— The six artificial lakes of the size contemplated, could not fail to exert a material influence in moderating the Ohio river floods.

In regard to *cost*, Mr. Morris arrives at the conclusion, that on the most favorable view of the subject, an outlay of one million of dollars will maintain a current of five feet in the channel of the Ohio; but on the most unfavorable view, a permanent navigation of six feet may be maintained for twelve millions.

Some may object to this method of improving the Ohio river, on account of the magnitude of the works proposed and the cost of keeping them in repair, but this is not the age for tolerating such objections. The simple question that ought to be considered is, "will such improvements pay ?" If they will, the sooner such works are commenced the better for all concerned.

Prize to the Inventor of the Minie Rifle Bullet.

The term *Minie-rifle* has led many persons to conclude that there was some peculiarity of construction belonging to fire-arms which went by this name. The fact, however, is, that every rifle in which an expanding bullet is used is a *Minie rifle* ; the invention is embraced in the character of the bullet, not the rifle. It was always well known that rifles were more deadly and destructive in warfare than plain-bored muskets, but owing to the difficulty of ramming down a bullet in loading a rifle, (because it is made a little larger than the bore, to fill the spiral creases in the barrel,) soldiers could not load and discharge rapid enough in line; this was the principal reason why the old musket kept its place so long as a weapon of human warfare.

To France, certainly, belongs the credit of first rendering rifles capable of being loaded as rapidly as muskets, and of first introducing them into her army, and subsequently into the British and other armies. This was accomplished by the use of the expanding bullet by Lieut. Minie, of the French army, whom we have always supposed was the first inventor ; but recently the British Government has awarded to N. Greener, a mechanic of Birmingham, Eng., £1000 (about $5000) as a prize, for being the first inventor of the Minie bullet. It appears that in 1836 he brought the subject of such bullets before the War Department of that Government ; in 1841, in a letter to the London *Times*, and again in 1842, before the Government ; and yet slow John Bull jogged on, fat, sleepy, and solemn in warfare, neglecting the invention of Mr. Greener, for nearly twenty years, until aroused to open his eyes, by its extensive introduction into the French army.

Useful Knowledge Respecting the Vegetable Food of Man.

During the early part of this winter, the Rev. H. Wood, of Lowell, addressed the distinguished Dr. S. L. Dana, requesting information relating to the cheapest and best kinds of food. The answer of Dr. Dana has been published in the *Medical World* ; it is scientific—as might be expected coming from such high chemical and physiological authority—and it also contains much useful information little known to the community in general. We will endeavor to present the substance of its most important points, because we believe such knowledge should be circulated through every corner of the world, concerning, as it does, the welfare of every human being.

It has been laid down as a law of physiological chemistry that all food serves two distinct purposes : one part for building the body forms the blood out of which comes all the animal tissues ; the other part forms fat, and furnishes the fuel by which the animal heat is kept up through the process of breathing. Food contains flesh, blood, and tissue formers in proportion to their amount of nitrogen. When chemistry, therefore, determines the amount of nitrogen in any kind of food, it expresses the relative value of that food for these purposes. The starch, gum, fat, sugar, and water, and occasionally a portion of woody fiber or grain, rarely ministers to the wants of nutrition. These substances are the fuel formers, out of which fat may be formed, which is as essential as blood. Ten parts of fat are equal to twenty-four parts of starch, grape, and milk sugar in heating power.

Life cannot long be maintained by any food that fulfills only one part of the process of nutrition. A man fed only on that food which forms blood and tissue soon dies of starvation, and so does the man that is only fed on fuel-forming food; and if a man is deprived of certain salts, such as common salt, compounds of sulphur, phosphorus, potash, soda, lime, magnesia, and iron, he cannot long survive. And even if fed on all these three classes of substances, he will die of starvation, unless allowed a certain proportion of ready formed fat, in addition to the fat that may be formed out of the other elements of his food.

Nature has taught us the type of our food, viz., milk. It contains the essentials of four great groups of substances on which nutrition in its widest sense depends. The elements of milk are, 1st. *Curd*, which is a blood former ; it contains all the nitrogen and all the sulphur. 2nd. *Butter*, which is fat. 3rd. *Sugar*, which is a fuel former or heater. 4th. *Salts*—soluble and insoluble—the earth of bones, potash, soda, and phosphoric acid.

Such are the substances which Nature has prepared for our first food—a mixture of four groups of substances. To suit human wants, according to its age, we should imitate this best natural mixture of those substances designed as the food of man.

In vegetable and animal food there are substances representing those contained in milk. Dr. Dana merely alludes to those of fish and flesh, and states (which is something new to most persons) that the flesh of fish contains the same amount of nutrient matter, as the flesh of oxen. Albumen forms gristle, sinews, membrane, muscle, nails, and is found in the nerve tubes. Fat is a lubricant, assists to form cells, and it forms part and parcel of all the chemical changes which the body undergoes, and is required for more purposes than merely heating the body. Sugar never forms part of the animal tissues, but it performs an important office in the changes of all these tissues. It forms lactic acid, and contributes largely to the formation of fat.

The waste of anything essential to life, and all its healthy functions must be supplied by a like substance. Food, therefore, is nutritious just in proportion as it contains the elements, properly mixed, which go to sustain the body and supply its waste. What is the best and cheapest food for this purpose ? This is a great question, and one respecting which much *reliable* information has been wanting.

Wheat, Indian corn, rye, rice, and buckwheat are the principal grains used in our country for food. Wheat holds the highest place in the market, and its finest flour—that which is deprived of most bran—is the dearest, and the most admired. This cherished flour—the costliest—is actually the least valuable for food. The fat and salts of wheat reside chiefly in the bran, and the flour deprived of these, does not contain well mixed nutrient matter.

Dr. Dana places Indian corn and rye above wheat for our food, and he surprises us by giving oatmeal the highest place of all —it contains the greatest amount of albumen, its starch is equal to that of fine wheat flour, and its fat exceeds that of any other cereal grain. Buckwheat and rice are poor articles of food : one pound of beans is equal to three and a half of rice or potatoes. Cabbage contains a great amount of albumen, but no fat, sugar, or salts, but it is excellent for mixing with other substances, such as potatoes, which contain these. Oatmeal cake, bean and pea soup, baked beans, indian meal pudding sweetened with molasses, are the vegetable food, which he esteems to be the best and cheapest for common and general use.

Scientific Examinations in Murder Cases.

Great facilities are afforded by microscopes, chemical tests, and the researches of modern physiology in affirming or disproving circumstantial evidence as to murders. Dr. H. Burdell was found stabbed in his own room in this city on the morning of the 29th ult. There was bad feeling existing between him and his housekeeper, and many circumstances fastened suspicion on her and one of the boarders, but science has removed some of what were at first strong indications of guilt. A dagger was found in her drawer faintly stained with blood ; these stains are proved by chemical analysis, to be rust. A very palpable bloody stain on a blue silk dress, proves to be sugar or fruit preserves, and blood found on various clothing about the house, is traced to other sources by the same agency. A knife from the place of business of the suspected boarder, and a newspaper found in his room, showed stains which responded to the chemical tests for blood, and under the microscope showed the blood disks or red globules to be arterial. This will probably weigh somewhat as evidence against him.

It will be recollected that in the investigation which resulted in convicting Dr. Webster of the murder of Dr. Parkman, in Boston, the microscope applied to blood on the shoe of the former, disproved his explanation that it was from butcher's meat, by showing the globules or blood disks to be round instead of longish or egg-formed, as are those of animals.

Hayward's India Rubber Bill.

In the House of Representatives on the 13th inst., Mr. Chaffee, of the Committee of Patents, presented a report recommending the extension of Hayward's india rubber patent for seven years. He moved the previous question on its passage, but other business was interposed to prevent a vote. Messrs. Paine and Edie made an adverse report, in which they assume that Hayward was not the original inventor ; that the rights of all the persons manufacturing by the process described, since the expiration of the patent in 1853 are not protected in the bill ; and that Hayward has amassed a large amount of wealth by his association with a huge combination.

We are surprised that any member of Congress should have recommended the extension of this patent, it having been public property since 1853, and after all parties interested had such a fair hearing before Mr. Hodges—then Commissioner of Patents—who rejected the application for its extension, and gave his reasons for so doing in a most candid, able and just report. The action of Congress in this case, we hope, will put a complete extinguisher upon this barefaced attempt to impose this monopoly upon the people.

Every pound of cochineal contains 70,000 insects, and from 600,000 to 700,000 pounds are annually exported to Europe for scarlet and crimson dyes. What a destruction of insect life to furnish a coloring material !