NEW BOOKS AND PUBLICATIONS.

The Natural Laws of Husbandry; by Liebig. Published by D. Appleton & Co.

Of all living writers on chemical subjects, Justus von Liebig is the most original and industrious. His published works have led to more close observation, and experiment, and excited more discussion than those of any other chemist. He utters his views with fearlessness, and supports them with a vast amount of research. His work on Agricultural Chemistry, published several years ago, contained what is called the *Mineral Theory;* which holds that the food of plants is obtained from inorganic nature. This theory has been attacked by distinguished chemists, and practical farmers; who have contended that the food of plants consisted of both mineral and organic elements: and that nitrogenous organic manures were the most important. This new work by Liebig will be a treat to our scientific agriculturists. It contains his mature views on agriculture, after sixteen years of experiment and reflection. The fundamental basis of it is still the so-called mineral theory. He is rather severe on practical farmers who have derided the teachings of science. He says:—"I have never yet met with an agriculturist who kept a ledger—as is done in other industrial pursuits—in which the debtor and creditor account of every acre of land is entered. The opinions of practical men seem to be inherited, like some practical disease. Each regards agriculture from his own narrow point of view, and forms his conclusions of the proceedings of others from what he does himself." The whole gist of the mineral theory regarding the food of plants, is summed up as follows:—"Plants contain combustible and incombustible constituents. Of the latter, which compose the ash left by all parts of the plant after combustion, the most essential elements are phosphoric acid, sulphuric acid, silicic acid, potash, soda, lime, magnesia, iron, and chloride of sodium. The combustible constituents are derived from carbonic acid, ammonia, sulphuric acid, and water. By the vital process of vegetation, the body of the plant is formed from these materials, which are therefore called the *food of plants.* All the materials constituting the food of our cultivated plants belong to the mineral kingdom. The gaseous elements are absorbed by the leaves: the fixed elements by the roots; the former, however, being often constituents of the soil, may also reach the plant by the roots as well as by the leaves. The gaseous elements form component parts of the atmosphere; and are, from their nature, in continual motion. The fixed elements are, in the case of land plants, constituents of the soil, and cannot of themselves leave the spot where they are found. The cosmic conditions of vegetable life are heat and sunlight."

We consider this volume of Liebig the most valuable (in a scientific sense) ever contributed to agriculture. The nature of seeds and soils, and the treatment and growth of plants, are discussed at length in different chapters; but the most important information contained in it relates to the different kinds of manures, and their effects on soils in relation to the food of plants. The great object of Liebig seems to be to impress upon his readers the importance of the phosphates as manures; and to show the comparative unimportance of organic manures, such as ammoniacal elements. Experiment upon experiment is multiplied to prove his positions. He contends that it is not the ammonia—as has been generally supposed—but the phosphates in guano, which render it so valuable as a manure. Bone dust, and the excrement of animals, are held to be the most essential manures. Perhaps the most instructive and interesting chapter in the book is in the appendix, on Japanese agriculture, which is practical in every respect. In that country, agriculture has been brought to the very highest state of perfection—not so much in implements, as in the treatment of the soil and the manuring and care of plants.

Japan Husbandry.—We quote as follows from this chapter:—"The educated farmer of the old world, who has insensibly come to look upon England, with its meadows, its enormous fodder production, and immense herds of cattle—and, in spite of these, with its great consumption of guano, ground bones, and rape cake, as the beau ideal, and the only possible type of a truly rational system of husbandry—would certainly think it most surprising to see a country even much better cultivated, without meadows, without fodder production, and even without a single head of cattle: either for draft or fattening; and without the least supply of guano, ground bones, saltpeter, or rape cake. This is Japan. The Japanese peasant holds fast to one indisputable maxim, viz: without continuous manuring, there can be no continuous production."

In Japan the farms are small—about five acres each in extent—and the only manure-producer is man. His excrements are collected with scrupulous care; and in the cottages of the poorest peasants, the excrement cabinets are kept neat and cleanly. Along the highways and footpaths of that country, stoneware receptacles are placed in the ground for the use of travellers. The excrementary matter is mixed with water, and applied in a liquid form; for the Japanese farmer knows no other mode of using it than by top-dressing. With an area, about equal in extent to Great Britain and Ireland, Japan sustains a far larger population, and exports considerable quantities of food to other countries; while England is compelled to import annually many millions of bushels of wheat, and many tuns of beef, butter, pork, and other provisions. In agriculture, therefore, nations which esteem themselves highly civilized may receive instruction from the Japanese, whom they consider barbarians.

Supplement to Ure's Dictionary of Arts, Manufactures, and Mines. Edited by Robert Hunt, F. R. S. Published by Appleton & Co., New York.

No work on the useful arts, manufactures, and mines, is more deservedly popular than this dictionary by Dr. Andrew Ure. The author possessed rare qualifications for such a production: and it is held to be a standard authority. But so rapid is the progress of discovery and invention in this age, that many processes and modes of manufacture are continually becoming obsolete, being superseded by improved methods and new developments. Hence the necessity for frequent editions of, or supplements to, the best standard publications. Dr. Ure being "gathered to his fathers," the preparation of a supplement to his dictionary was committed to Mr. Robert Hunt, who has executed his task with much credit to himself and some of his co-laborers, whose names are given with their contributions to its pages. So varied and extensive are the subjects treated in this large volume, that we can notice but a very few of them.

India Rubber Fabrics.—It is stated that, had Dr. Ure been aware of the practical efforts of Goodyear in America, and Hancock in England, he would have been eulogistic of those inventors. The credit of having discovered the mode of vulcanizing India-rubber (one of the most wonderful and meritorious inventions of any age) is given to the late Mr. Charles Goodyear, of New Haven, Conn. It is thus described:—"The general method is to incorporate sulphur with caoutchouc, and submit it to heat. If any particular form is required, the mixture is placed in moulds, where it takes any delicate design that may be upon them, and if these are submitted to higher degrees of heat, a very hard, horny, and strong substance is produced, called hard India-rubber, or 'Vulcanite.' Mouldings, gun stocks, combs, cabinet work, and hundreds of other articles may be obtained by these curious means. Steam heat is usually employed for vulcanizing in England; but in America, ovens for vulcanizing with dry heat are generally used." We understand that the dry heat produces the best qualities of India-rubber goods. The permanently elastic character of vulcanized India-rubber is thus set forth;—"Mr. Brockedon subjected a piece of vulcanized India rubber, 1½ inches thick, and of 2 inches area, to one of Nasmyth's steam-hammers of 5 tuns. It dropped upon it with a fall of 2 feet, without injury; then the hammer fell upon it from a hight of 4 feet, when the cake was torn, but its elasticity was unimpaired." Vulcanized India-rubber withstands heat up to 300° Fah.

Galvanized Iron.—The method of galvanizing iron with a crystalline surface, is described as follows:—The sheets of iron are immersed in a warm bath of dilute muriatic acid; scoured bright with sand or emery, and then washed. A large wooden tank is then filled with a dilute solution of muriate of tin—two quarts of the muriate being added to 300 gallons of water. A layer of finely-granulated zinc is first laid upon the bottom of the bath; then a cleaned iron plate is laid upon this; then a layer of granulated zinc, then another plate, until the bath is filled. The zinc and the iron constitute a feeble galvanic battery; and the tin in the solution is deposited upon the iron, in a thin skin, after immersion for about two hours. The tinned plates are then lifted, and drawn slowly through a bath of molten zinc, covered with a layer of sal-ammoniac, which becomes pasty. Machinery is used for drawing the plates through the bath. The plates take up a very smooth layer of zinc, which, owing to the presence of tin beneath, assumes its natural crystalline character, giving the plates an appearance resembling that known as the *moiree metallique.*"

The volume is a handsome folio of 1,096 pages, beautifully printed on fine paper, and illustrated with 700 wood cuts.

Tar for Preserving Building Materials.

An interesting communication from Fred Kuhlmann has been published in *Comptes Rendus der' Academie des Sciences*, relating his experience in the application of tar to materials for building. The following extracts are condensed therefrom:—

"Gas-tar has become of very general use in the towns of the north of France, to protect the basements of the houses from the effects of the external damp; but they have not yet been able to prevent the damp from rising in the interior by the effect of the capillarity. In my factory of chemical products I make a more general use of this tar still. I apply it hot upon all the exterior walls of the ovens, for decomposing salts, burning pyrites, concentrating sulphuric acid, &c.; and I impregnate, by immersion in boiling tar, the tiles destined to the covering of roofs, particularly of those where there are any acid vapors produced.

"In England, in the soda factories, where the hydrochloric acid is generally condensed in chimneys, or towers containing coke kept constantly wetted by a stream of water, the flagging which serves as a base to these towers, when it is of a porous nature, is immersed in hot tar before it is laid down. In other circumstances, the tar is used to color tiles made of porous clay for general use.

"I had occasion to examine the rapid progress of decay that was taking place in the porous sandstone of the chapel of St. Eugenie, on the borders of the sea, at Biarritz. The stones of this chapel, whose construction only dates from the year 1858, are profoundly corroded on all the points exposed to the wind, and I observed this peculiarity in the stones, which, before being put in place, were marked with oil color, in black, that the parts covered with the color were protected against alteration, so that the numbers now stand out in relief with great distinctness. These figures in relief, in which the preservation of the stone was secured by the merely superficial application of the greasy or resinous matters, made me think that, in a number of cases, the bitumens and resins might be made to play a very useful part in the preservation of buildings or sculptured decorations, if, instead of applying them to the surface, they were made to penetrate into the interior of the stones without decomposing their surface. I have made numerous essays to assure myself of the possibility of this penetration, by employing pitch derived from the distillation of coal-tar. I cause to be boiled in it, stones, carved and rough; bricks, objects made in clay, simply dried in the open air, without being burnt or varnished. These are boiled in vessels of cast or wrought iron, and I thus obtain a penetration of the pitch to a great depth, and with that a considerable degree of hardness and a perfect impermeability. These properties would render such materials essentially fitted for the construction of the foundations of houses, for the coverings of walls, for hydraulic works, and particularly to those exposed to the sea air. I have also formed with hot tar, and some mineral substances in powder, pastes that are more or less fusible under the effects of heat, according as they may contain in their composition more or less tar; and which are susceptible of being molded, with or without compression, into bricks, tiles, and architectural ornaments of every kind.

The matter whose incorporation has afforded the best results is the oxide of iron resulting from the combustion of the pyrites, and which, when mixed with a quarter of its weight of tar, yields a paste which presents a hardness and a sonority that are very remarkable."

Correspondence

Manufacture of Paper—Injustice to American Inventors

MESSRS. EDITORS.—In the *Prairie Farmer*, of July 18, I notice the letter of "An American on English Agriculture," in which a great ado is made over the fact that Cobbett made paper from corn husks in 1828. He says: "And so Mr. Cobbett, in England, 35 years ago, first made good white printing paper from the husks of his first crop of Indian corn!" And again: "And I, not being his (Cobbett's) malignant calumniator, will hold up the page of his book for all people in their imaginations to see the first white paper ever made from corn husks." And again: "To Cobbett ought to belong the credit of inventing corn paper." And then, to make this discovery appear still more marvelous, he exclaims: "How much was known, even of straw, as a material for the coarsest of wrapping, for paper, in the year 1828?"

Now, sirs, I do not know who this correspondent is; but, from his reference to the International Exhibition, &c., together with the fact of his travelling in that country, I suppose that he must be a person of some consequence—perhaps some agent or delegate, sent over to represent our country abroad; though I hope not, for the credit of our country: for surely a man could not better expose his ignorance of the subject upon which he has been writing, or do greater injustice to his own country, than he has in the above statements. Instead of the credit of that invention belonging to Cobbett, or any foreigner, it belongs to Americans, and was patented in in this country more than a quarter of a century before Cobbett made his experiments! In 1802, a Patent was issued by the U. S. Patent Office to Burgess Allison and John Harkins, of New Jersey, for making paper from corn husks! So you see that it is purely and wholly an American invention. Another patent was issued in this country to Homer Holland, of Westfield, Mass., in 1838, for preparing corn husks for making paper, and many others since.

In his reference to the first use of straw for making paper "Z. K." is still more inaccurate. Instead of being comparatively unknown for that purpose in 1828, it had been used for making paper in Germany as early as 1756! A work was published by Jakob Christian Schoffer, in 1765, on over sixty specimens of paper, all made from different materials and without rags; among which was brown corn, wheat straw, saw-dust, moss, beech, willow, aspen, mulberry, clematite, hornet's nests, pine, hop-vines, peelings of grape vines, hemp, leaves of aloes, lilly of the valley, moth root, barley straw, cabbage stumps, thistle stalks, burdock, Bavairan peat, &c. In a later American work, "Chronology of Paper and Paper Making," by J. Munnsell, Albany, 1857, a list of one hundred and three different articles is given, from which paper has been made. In 1819, Reaumer suggested making it of wood; and paper was made from basswood bark, in France, in 1775; it has also been made of various kinds of wood, in this country, of late years. Not many years since, the New York *Tribune*, for a brief period, was printed on paper made of basswood. Among the most successful and curious efforts of this kind, is the making of paper from the southern cane. The cane is put into an iron cylinder, and steam forced in under great pressure, penetrating and filling the pores of the cane. Suddenly one end of the cylinder is opened, the cane is shot forth as out of a cannon, when the sudden expansion of the steam in the pores bursts the cane into fine fibers, after which it is easily reduced to pulp and converted into paper. The Baltimore *County Advocate* was printed on such paper, made by H. Lowe, of that city, in 1856. It is, however, usually made into wrapping paper.

The first paper-mill in this country, of which we have any account, was owned by William Bradford, at Elizabethtown, N. J., in 1728. A patent (charter) was granted the same year by the general court of Massachusetts, for a paper-mill which went into operation in 1790, and was the first in New England. In 1790, the nearest mill to Albany was at Bennington, Vt., from which the paper was brought on horseback! It was in that year that the wife of a papermaker, in England, accidentally dropped her blueing bag into a vat of pulp, and thus originated the blue paper, which, when taken to London, brought an advance of four shillings a bundle, for the reason that he claimed that it was an improved paper, the consequence of which was, that he presented his wife with a costly cloak on his return!

Paper can be made from all those vegetable fibers which have a corrugated edge, and may be macerated into a pulp with water. It is not because it was not known that paper could be made of straw, wood, husks, &c., that these have not been more generally used; but because it is too difficult and expensive to make it of them. Straw, and other such substances, contain too much silica, and its separation is too difficult; hence its use is not generally profitable. Silica gives to straw its stiffness and brittleness, being of the nature of rock crystal or flint; and hence it is that soils deficient in silica produce straw that is too limber and weak to stand alone—a fact well known to farmers.

The great inventions and improvements in the manufacture of paper have not been and cannot be, so much in the discovery of new materials as in improved processes and machinery for the preparation and manufacture of materials already well known. Formerly the manufacture of paper was almost entirely by hand; and, in 1798, sheets of paper made in France, 12 by 50 feet in size, were considered wonderful. Now nearly the whole process is mechanical, and single sheets have been made, in a few days' time, that would reach around the globe! The greatest of all inventions in paper-making machinery was doubtless the Fourdrinier machine, invented originally by Louis Robert, of France, in 1798, and perfected by Mess Fourdrinier, of London, who, it is said, expended $300,000 upon it, and finally died in want, a few years since. The invention consisted in having the pulp fed upon an endless, revolving wire-gauze belt; and thus made in a continuous sheet of any length. Other mechanism is also used for pressing, sizing, drying and cutting it into sheets of any required size.

The origin of paper made from pulp is not clear; though it is, doubtless, a Chinese invention, and at least 1,800 years old. The manufacture of paper from cotton is supposed to have been introduced by the Arabians, from Tartary, about the year 704. It was made at Mecca in 706, and in Spain, France and England in the eleventh century. Paper was first made from linen about 1,200, A. D.

The consumption of paper in this country, in 1852, equalled that of France and England combined. In 1854, we had, in this country, 750 mills, producing annually, 250,000,000 pounds of paper, worth $25,-000,000. In making this, 405,000,000 lbs. of rags, worth 4 cents per lb., were used. In ordinary times, from half to three-fourths of a million dollars worth of rags are imported annually, mostly from Italy and Austria. Since the rebellion began, the price of paper, and of rags, as well as the importation of the latter has greatly increased.

The amount of paper used by some of our newspaper establishments, is enormous. For instance, the New York *Tribune* consumes 30 tuns a week—making about 570,000 sheets—considerably over half a million! The London *Times* uses 90,000 sheets daily. Rees' "Cyclopaedia," published in Philadelphia in 1822, consumed 30,000 reams, and is said to be the most extensive publication in the English language.

The truth of all these statements, and many others equally interesting, in relation to paper, can be ascertained without going to England.

D. C. W.

Washington, D. C., Aug. 3, 1863.

[The first paper-mill in America was erected in 1714, upon Chester Creek, Delaware, by Mr. Wilcox, and is still in operation, we believe, for manufacturing hand-made paper.—EDS.

The Accident on the Naugatuck.

The *Naugatuck*, United States Steam revenue Cutter, lost her large rifled gun on the 5th instant, under the following circumstances:—It appears that the vessel was got under way for the purpose of giving the gun's crew some exercise in target practice; and, upon reaching the spot designated, the gun was loaded and shotted with the ordinary charge of powder, and the solid shot which is usually fired from that gun. The first discharge was made; and, although the gun was examined according to usage, no symptom of weakness was apparent. It was again loaded, and at the instant of firing, a terrific explosion occurred, prostrating nearly every one on board, blowing one man overboard, and making sad havoc about decks. It was found that the entire breech of the gun had been blown out, and that this heavy mass of iron had been forced through the pilot-house, the smoke-pipe, deck-house, and cabin; and then, going some distance astern, fell into the water. Only five persons were injured to any extent, the others escaping. The gun in use at the time of the accident was an old-fashioned navy 42 pounder, which had been rifled, and a very heavy brass re-enforce shrunk on. In this case the charge and the shot were well "home," the gun was very clean, the elevation was not excessive, and the accident was purely attributable to unforeseen causes. This is the second time that the gun of this vessel has exploded; the first was a 100-pounder rifle gun, which was blown to atoms while the vessel was engaged with the rebels at Fort Darling, on the James River.

Concerning Milk.

A curious custom prevails among the milkmen of Mexico, it is said, of driving their herds about the streets, and milking them to order, "in large or small lots to suit purchasers." The live animals themselves are driven from door to door of the different regular customers, where they are milked, and there is a regular stand where the transient patrons are supplied, by milking into the vessel in which they take it home. Besides a drove of calves, with the cows all muzzled, running and bleating after them, there is a gang of goats and asses driven along, that people may always suit themselves as to quality and price, as also their different tastes—for which there is no accounting. It is impossible to derive the reason or origin of this mode of vending milk; unless it arose from the natural villainy of the people, and their distrust of each other—it being a preventative against adulteration, and of their disposing of a quality of milk inferior to that represented. This plan has at least the merit which attaches to honesty and fair dealing. We should not like to see the cows from which city milk is obtained driven about the streets. Such a sorry lot of lean kine as would be exhibited, would create an unpleasant sensation in the customer. We are credibly informed that the swill milk trade still exists, and that large quantities of it are sold.

FRENCH ARMOR PLATES.—The London *Times* states that 250 tuns of armor plates have been received at the Portsmouth dockyard from France, having been obtained by the British Admiralty from Messrs. Petin, Gaudet & Co., the makers of the armor plates for the frigate *La Gloire*, and other iron-clads in the French Imperial Marine; 100 tuns are of 4½ inches, and have been purchased by the Admiralty at £45 per tun. The remaining 100 tuns are of 5½-inch, the price being £5 per tun. Compared with English plates these have a rough and unfinished appearance; and English manufacturers have complained that the Admiralty would not receive such from them. French armor plates have been received in this city for the Italian frigates now building by Mr. W. H. Webb. They are well finished, and the metal is excellent in quality.

A NEW NARCOTIC.—At a recent meeting of the Royal Society of Tasmania, a quantity of "Pitchery," a narcotic plant brought from the interior of Australia, where it is used by the natives to produce intoxication, was produced by a gentleman, who remarked that on one occasion Mr. King, the explorer, swallowed a small pinch of the powder, the effects of which he described as being almost identical with those produced by a large quantity of spirits.