BARON VON LIEBIG.

A sketch of the life of the illustrious chemist and author, recently deceased at Munich, has already found place in our columns, so that in presenting the accompanying excellent portrait, reproduced from the pages of *La Nature*, we shall allude chiefly to the nature and importance of the discoveries by which his name has been rendered for ever famous.

A single illustration will render clear the fundamental idea which formed the basis of Liebig's labors in agricultural chemistry, and which he has developed through all his works. A field, for example, is cultivated and fertilized over a period of five years, and is required to produce successive crops of potatoes, wheat, clover, wheat again, and, during the last year, oats. The potatoes and wheat are sold; the clover serves to feed an ox, which similarly finds its way to market. Now it is clear that the potatoes and wheat contain phosphates and potash drawn from the soil, and that the ox has formed the constituents of his bones from similar matter in the clover. Consequently this total amount of mineral substance is absolutely withdrawn from the plot of land and not returned. Without doubt, in animal manure, a part of the phosphates in the wheat and oats will be regained if the latter be consumed on the farm; but of only a small fraction of the quantity will restitution be made, and therefore, if such a course be continued, the result will be impoverishment, and in the end sterility of the earth.

Against this system of cultivation, based on the production of manure, Liebig waged systematic war, pointing out in the strongest terms its despoiling nature, and stigmatizing it as "vampire agriculture." Not content merely with giving warning of the evil, he at once indicated a remedy, and first advocated the use, as fertilizers, of bones rich in phosphates. These he found resisted decomposition in the soil, and produced little effect; so he invented a mode of treating them before use with sulphuric acid, thus creating one of the most prosperous agricultural industries, the fabrication of superphosphates. The results at once obtained were marvelous. In England, the turnip crop doubled, and the employment of the new fertilizer became general; then it came into use in France, then Germany, and finally in this country. The consumption of superphosphates, however, increasing, bones failed to afford an adequate supply, and then the geologists, first Nesbitt in England and Delanoy in France, searched for and found new sources in the mineral deposits of the earth.

Liebig was an indefatigable worker, constantly advocating in his letters, his teachings, and his books, the necessity of utilizing the lost riches in sewage and waste refuse. He cited the example of China, which sustains a vast and dense population without importation of any fertilizing material for her land, and also of Holland and Alsace, where, by similar employment of waste, the soil is made to give abundant harvests, comparing both instances with the prodigality of English agriculture, for the sustenance of which vessels constantly are searching the world over for guano and similar materials. Liebig attached much greater importance to the mineral matters in manures than to the nitrogenous constituents, a view which involved him in many long discussions with English and French chemists, in many of which the extreme position, sometimes assumed by him, he found to be untenable.

To the precocity of Liebig's genius we have already alluded. At nineteen years of age he was a doctor of medicine, and at twenty one assumed a professorship in Giessen university. Two years later he founded his celebrated laboratory and school, which have since formed models for similar institutions throughout the world. If the motive which underlaid his writings can be expressed in a single sentence, we should say that it was the desire not only to be useful but to be useful immediately. Hence his works relating to practical agriculture, and hence the instruction written for the people and not for the *savans*. His was not the language of the theorist or student, addressed to his peers in learning, but rather the familiar argument or practical views calculated to interest the indifferent and forcibly enchain the attention of a general public. His attempts to base organic chemistry on the hypothesis of component radicals were not successful, and indeed, as Laurent remarked, seemed to be "the study of bodies which do not exist."

But where few have known the names of Kirchoff, of Bunsen, of Mayer, and of Helmholtz, the world has talked of Liebig; where the grand theories of the former need genius to insure their application, his plain words point the way to ready practice; and even though his labors, great as they are, be exceeded by the greater works of his gifted countrymen, still Justus von Liebig, his writings and his precepts, will be remembered and heeded even so long as man shall seek his sustenance from the bosom of his mother earth.

BARON JUSTUS VON LIEBIG.

PULVERIZED charcoal sprinkled over dressed poultry, after the animal heat is expelled, will preserve it from spoiling for some time in hot weather.

Augmentation of the Induction Spark.

Everybody is acquainted with the experiment which consists in placing in communication the two coatings of a Leyden jar with the two ends of the secondary wire of an induction coil. The length of the spar is reduced considerably, but the brilliancy and noise are, on the contrary, increased.

I wished to see the effect of large insulated metallic surfaces, placed in contact with the two ends of the secondary wire, the two surfaces being separated from each other, so as not to produce the effect of a condenser.

For metallic surfaces I took frames having each about eleven square feet covered with silk, doubled with paper, upon which had been fixed plates of tin. The spark burst between two insulated points, which can be made to approach or recede from each other at will.

So long as one or more plates of tin communicate with one of the poles only, the spark is in no way modified; but so soon as the other pole of the secondary wire is in contact with the plates of tin of the same surface as the first, the brilliancy of the spark increases and its length diminishes. The increase of the surface produces an increase in the brilliancy and the noise of the spark, and a new diminution in its length. If one of the metallic surfaces be greater than the other, the effect does not surpass that which two surfaces equal to the smallest produce.

The effect of the plate becomes more sensible by the drawing near of the points of the excitor, and the spark breaks out into a great number of tracks of fire; but if the distance of the points is reduced to about one and a half inches, the effect of the surface seems to disappear.

When in place of the large metallic plates, metallic wires or ribbons of tinsel are employed, three fourths to one inch in width, well insulated by means of glass supports or silk cords, we then obtain, by the use of equal surfaces, much more intense effects. Fifty-four yards of these metallic ribbons, placed in contact with each end of the secondary wire, making a total of 108 yards, greatly increase the brilliancy and the noise of the spark.

The stronger the induction, the more marked the effect; this is what I have proved lately, by means of a powerful apparatus, which M. Ruhmkorff has been good enough to place at my disposal. It is necessary to be careful, in order to obtain the greatest possible effect, to make the two ends of the metallic ribbon communicate with each point. If the ribbon be too long, it becomes necessary to establish a greater number of similar communications.

In general the effects are the much more intense when the insulated metallic surfaces are greater, more divided, and the different parts are more separated from each other.—*C. M. Guillemin, in Journal de Physique.*

Effects of Air upon the Condensation of Steam.

The conclusions which Professor Osborne Reynolds draws from a series of experiments are as follows:

1. That a small quantity of air in steam does very much retard its condensation upon a cold surface; that, in fact, there is no limit to the rate at which pure steam will condense but the power of the surface to carry off the heat.

2. That the rate of condensation diminishes rapidly, and nearly uniformly as the pressure of air increases from two to ten per cent that of the steam, and then less and less rapidly until thirty per cent is reached, after which the rate of condensation remains nearly constant.

4. That in consequence of this effect of air the necessary size of a surface condenser for a steam engine increases very rapidly with the quantity of air allowed to be present within it.

5. That by mixing air with the steam before it is used, the condensation at the surface of a cylinder may be greatly diminished, and consequently the efficiency of the engine increased.

6. That the maximum effect, or nearly so, will be obtained when the pressure of the air is one tenth that of the steam, or when about two cubic feet of air, at the pressure of the atmosphere and the temperature 60° F., are mixed with each pound of steam.

New Application of Electro-Plating.

Some three years ago, a working electro plater in London discovered a process by which a white metal having tin as its principal ingredient might be deposited by electricity upon iron and steel, as well as upon copper and brass. Most of our readers know that to plate steel and iron even with silver has hitherto been deemed impossible, without the intervention of copper as a coating; and the process of tinning thin sheets of iron so as to make them tin plates is a familiar one. But to cover any metal with tin by the use of the galvanic bath is new. The invention is now in practical operation in Victoria street, Birmingham, where the Electro Stanus Company, who own the process, have their works.

The salammoniac requisite in the making of tin plates, and which increases the disposition of the iron to rust, if only the air can get at it through the tiniest of imperfections, is not called for in this process. If the metal required to be coated should be rusty, it is cleansed in a bath of sulphuric acid very much diluted; and when it has been immersed in a pot of potash and water, it is free from all grease. Now chemically clean, it is fit for the plating vat. Here, hanging by copper wire from the metal bars which connect the battery with the opposite pole, the articles to be plated are hung in the solution, which, while it is not exclusively tin, may be practically regarded as tin. Immediately that galvanic action takes place, the article is filmed with the white metal, and according as it is desired that the coating should be thick or thin, the time during which it is kept in contact with the solution is long or short. The article removed, it is found that it possesses a dull white color that is made to acquire tolerable brightness by the application of the customary metallic brush moistened with a cleansing fluid. If a higher polish is required, then that may be obtained by the ordinary method of burnishing. The process has evidently a wide field of application.—*The Engineer.*

Our readers will find the description of a process analogous to this in the SCIENTIFIC AMERICAN of July 15, 1871.

The American Paper Trade.

During the year 1872 there were in operation in the United States 812 paper mills, owned by 705 firms, and of an estimated value of over $35,000,000. In addition to this actual value of mill property, there is to be added the usual working capital, twenty-two and a half per cent of the value of the mills, thus making the total capital invested in paper making throughout the country about $43,500,000. The mills employ 13,420 male and 7,700 female hands besides 922 children, or a total of 22,042 laborers, whose wages amount yearly to the large sum of nearly $10,000,000 dollars. Their product amounted last year to 317,387 tuns, valued at $66,475,825. The total number of engines running is 3,293, besides 299 Fourdrinier and 689 cylinder machines.—*Paper Trade Journal.*

Forthcoming Exposition in Brooklyn, N. Y.

The success of the fair held, in the very limited space at the disposal of the managers, in Brooklyn last fall has induced a committee of influential men in that city to announce a more extended display, to be held at the rink on Clermont avenue. Adjoining this building is the large armory and drill hall of the 23d regiment, and we understand that negotiations are in progress by which these rooms may be added to the available space.

Especial attention was bestowed last year on the formation of an art gallery, and the result was one of the best collections of paintings ever seen in the neighborhood of New York. It is to be hoped that the fair will be similarly fortunate this year.

It is intended that the exposition shall remain open for one month, commencing September 15.

Full information can be obtained at the offices of the exposition, 39 Fulton street, Brooklyn, N. Y.