of cider; you do not hear much about it. they have their customers, they come and take it and pay all that the man's cider is worth.

There was a time when it was difficult to get the grocery men to take our cider and pay for it. They could buy sulphuric acid cheaper. But when the people came to know the difference between this poisoned stuff and pure cider-vinegar, they were not so slow to choose the latter, and pay what it was worth; and when grocery men refused to buy my cider-vinegar, I sold direct to their customers until they were finally glad to "try a few barrels," and they have been trying my cider-vinegar ever since.

BARON LIEBIG.

(Continued from last No.)

The mysterious cause of the practical failure of Liebig's new system lay in a fundamental error committed by the great chemist bimself. The alkalis and the phosphates are the most essential mineral ingredients of the plants, which, by aid of the manure, must be restored to the soil; they dissolve most readily in water. Therefore, Liebig thought it necessary to melt them together with silicious and argillaceous earth to prevent their being washed off by rain, which he thought would otherwise have been the consequence of their excessive solubility, and to give the roots of the plants time for their gradual absorption.

But whilst we all of us were taking unnecessary pains and trouble to fabricate an insoluble union of alkalis and phosphates, nature herself, in her mysterious and powerful laboratory, had already achieved this task for us. We had failed to perceive and to understand the natural law which makes the arable soil fit to retain, without any further preparation, the nutritive mineral ingredients supplied to it in a soluble state, and to put them into the most favorable condition for absorption.

To be sure, it was no unknown fact that soluble mineral ingredients are partially absorbed by the earth, and experiments had been made which showed that saline solutions, after their filtration through the earth, experience a notable change, and that part of the salt contained in them is absorbed. Yet, as far as the science of agricultural chemistry is concerned, Liebig, after a series of most trying and troublesome investigations, was the first to disrover and to set in regular scientific order the effects of the natural law of absorption.

This discovery at once showed him the cause of his artificial manure's inefficiency. The deep emotion felt by him when he at last had reached the solution of this formi- I nourishment of human and animal organ- I them. On the whole, we can say that

dable and most important problem may best be known from his own words :

" After having discovered the mysterious cause of my manure's inefficiency, I felt like a man who recovers from mortal prostration, and now, seeing and perceiving clearly this most natural law, my previous blindness seems quite inexplicable to me. Indeed, human intelligence is often singularly limited, and fails to perceive the nearest and simplest facts when they do not harmonize with one's preconceived order of thoughts. Having deprived the alkalis of their solubility, and imbedded them, by a melting process, into silicious or argillaceous earth. I had impeded their amalgamation with the soil and done everything in my power to weaken their action. Only then, after so many years, I understood the reason of my failure; every single mineral ingredient supplied to the soil produced its proper effect, but my own science had made them ineffective! Alas! I myself had done everything to impede the acknowledgment and the general propagation of my doctrine; I had been my own worst foe by the erroneous composition of the artificial manure, which otherwise might so much sooner have restored the fertility of the exhausted soil! I had sinned against the supreme wisdom of the Creator, by attempting a needless ameliora-tion of his works. Struck with fatal blindness, I believed that one part of that wonderful system had been forgotten, which, by a constant and uninterrupted series of admirable natural laws, produces and maintains vegetable life on the surface of the carth. Feeble and impotent worm, I had thought in possible to redress an error made by the Creator !"

Often Liebig has been blamed for having changed his mind as to the best method of employing artificial manure; however, these reproaches cannot be considered as well founded. Liebig has simply confessed his former error in the most upright and dignified manner. The change caused in his opinions by the discovery of the original source of his practical failure was only natural.

Liebig'r doctrine concerning the influence of mineral ingredients upon vegetable life (simply called Mineraltheorie," in Germany), has of late begun to conquer another large field of application, being more and more followed in the cultivation of forests, which gradually has been raised to the rank of a veritable science, and, especially in Germany, to a very high degree of perfection. However, as far as the scientific cultivation of forests and the application of Liebig's mineral theory to it are concerned, much is to be done still, and in the pursuit of this great task the sure leading hand and energetic will of the master himself are sadly missed by his pupils.

The influence of Liebig upon the investigation of animal life has in no wise been inferior to his researches into the mysterious processes which form the origin, growth, and decay of vegetable substance; his discoveries concerning the

isms are likewise founded on his extraordinary knowledge of organic chemistry, and, like his "Mineraltheorie," have opened entirely new paths for the progress of science.

Liebig's researches concerning animal life and the nourishment of animal organisms may be divided into two sections, of which the first embraces the mere chemical scrutiny and analysis of organic matter, to which operation the name of Organic Chemistry is generally given : the other, which embraces the science of physiology as well as of chemistry, determines the practical influence of the analyzed materials upon the animal organism.

Justus von Liebig discovered and proclaimed as the fundamental principle of nourishment that the chief ingredients of the blood are already existing in the food of man and animals, and that they experience but a very slight transformation when their original substance-vegetable matter-is changed into flesh and blood.

"The food of men and animals." says Liebig, "consists of two entirely different substances. One of them, which contains nitrogen and albumen, forms the blood and fleshy parts of the body, and consequently they are called plastic elements of nutrition; the other, which contains no nitrogen but fat and so-called hydrates of carbon, is in every respect like ordinary fuel, and maintains the elevated temperature which is remarked in every animal body; it is commonly called 'generator of caloric, or means of respira-tion.' Sugar, starch, and gum, belong to this class; they are nothing but transformed wood fibre, and the progress of chemistry has taught us to reverse the natural order of this chemical transformation, and to make sugar, starch, and gum out of wood fibre. But of all these substances which maintain the warmth of the body through the medium of respiration, fat or grease is predominant, and, as far as the amount of carbonic matter is concerned, nearly equal to the ordinary fossil coal

"We literally heat our bodies with combustible materials, which are nearly identical with those which are employed in heating our stoves, and which differ from wood and coal in no other respect but in the fact that they are soluble in the juices of our body, which the latter are not."

The celebrated experiments made with the respiratory apparatus of our days, have somewhat modified these doctrines : but the modifications can not in any way lessen Liebig's scientific glory; on the contrary, it is only just, thankfully to acknowledge that the enlarged and augmented experience of modern times is due to the impulse and example given by him.

The importance of Liebig's other works concerning the rational improvement of cattle, and of his beneficial inventions of the extract of meat, the milk for infants, etc., is so well known in the whole world, that it is scarcely necessary to mention