

tion and renewal of these external influences that life and motion are maintained."

(Agriculture and Physiology, pp. 389-90.)

When Liebig wrote thus he was perfectly well aware of the artificial production of urea by his fellow investigator, Woehler in 1828, and therefore could not have thought that that discovery was antagonistic to his theory of the influence of the vital principle. Gmelin, the author of the great hand-book of Chemistry, had in 1817 maintained that organic compounds cannot, like in-organic compounds, be artificially built up from their elements, and Berzelius also enforced this distinction, asserting that while in-organic bodies could, organic bodies could not be artificially produced. Woehler's discovery and others of a like nature since, have gone to prove that this was too sweeping an assumption. Many organic bodies have been produced artificially but by means and from substances altogether different from those employed in nature. Take the production of urea by Woehler. He obtained it by heating a solution of cyanale of ammonia. But that substance was produced, by decomposing the potash salt, and the latter from fusing yellow prussiate of potash and caustic potash with red lead. All of these substances are foreign to food and organic life and most of them are of a highly poisonous character. No wonder then that Liebig took no notice of such discoveries as invalidating in the slightest degree his contention that Life modifies and controls chemical affinities. He knew very well that chemists would never be able to produce an organic cell or a starch granule, and we know that, since his time every attempt to produce urea by the oxidation of the albumenoids has failed. And even although it should be found possible in the distant future, to fabricate, let us say, some grains of sugar in a roundabout way from strange artificial materials and with the help of complicated apparatus, would it be reasonable to consider that as equivalent to its production from the carbonic acid of the atmosphere in the tissues of the sugar cane? I trow not. Nevertheless we have chemical authorities of high reputation expressing themselves in the following way. "At the present day the belief in a special vital force has ceased to encumber scientific progress. We now know that the same laws of combination regulate the formation of chemical compounds both in animate and inanimate