

of his life never satisfied himself that the phenomena of life can be mechanically explained: he remained, in the face of much criticism, a Vitalist. So did Wöhler in Germany—so did most of the eminent physiologists in France and in England. The crusade against Vitalism, which was started in Germany, seems to have had little influence on them. In 1854, six years after Du Bois-Reymond's essay on Vital Force, and twelve years after that of Lotze, Huxley<sup>1</sup> could still, in the first of his 'Lay Sermons' "On the educational value of the natural history sciences," express opinions on the difference between living and not-living bodies which were distinctly vitalistic, maintaining, much in the same way as Liebig did in the later editions of his chemical letters, that "the phenomena of life are dependent neither on physical nor on chemical, but on vital forces"; and if, in 1870, he could himself state that he had long since grown out of this view, it is interesting to discover what were the arguments which brought about this remarkable change. I will at once state what seems to me to be the great influence which combated Vitalism in this country, which greatly strengthened the anti-vitalistic or mechanical views in Germany, but which, as little as the mathematical and philosophical criticism of Lotze and Du Bois-Reymond, ever took real hold of biological thought

23.  
Liebig's  
vitalism.

inquiry hitherto entered on. About twenty-five years ago I asked Liebig if he believed that a leaf or a flower could be formed or could grow by chemical forces. He answered, I would more readily believe that a book on chemistry or on botany could grow out of dead matter by chemical processes."

<sup>1</sup> The address referred to was re-

printed in 1870 in the well-known volume, entitled 'Lay Sermons, Addresses, and Reviews,' with a "prefatory letter" to Tyndall, in which the following passage occurs: "The oldest essay of the whole contains a view of the nature of the differences between living and not-living bodies, out of which I have long since grown."