

---

## A TRIBUTE TO PASTEUR.<sup>1</sup>

A FEW weeks ago, one of the foremost scientists of the present century passed into the great beyond. Louis Pasteur, although a master mind in physics and geology, was preeminently a chemist, therefore it behooves our Society to express its regrets at the great loss sustained not only by France, but which the whole civilized world is obliged to bear. Men like Pasteur, whose life was spent in disseminating broad principles of truth, in alleviating pain, in mitigating epidemic diseases and in exterminating parasites whose activity threatened ruin to the agriculturists, cannot be narrowed down as belonging to one country; but on the contrary are veritable cosmopolites, deservedly honored and venerated by every nation.

It is not my intention to give a sketch of the life of Pasteur, but simply to call your attention, in a brief way, to some of his most important contributions to science and the effects produced. The one, that undoubtedly tended towards moulding his thoughts in the direction to which he devoted his best years was to combat the idea of Heterogenesis and it may truthfully be said that he succeeded in making it untenable by incontestable evidence in support of his theory, that: "The living organized ferments spring only from similar organisms likewise endowed with life; and that the germs of these ferments exist in a state of suspension in the air or on the exterior surface of objects." This not only disproved Fremy's Hemi-organism hypothesis but also Liebig's assertion that "The cause of fermentation is the internal molecular motion, which, in the course of decomposition, is communicated to other matter in which the elements are connected by very feeble affinity." Pasteur, by means of most thorough and extensive research, from 1857-61, simply forced the attention of everybody to the physiological side of the subject, and by absolutely unimpeachable evidence, proved that Schwann's views are correct. Of the investigation, both synthetic and analytical, it is impossible to speak otherwise than in terms of the highest admiration. Even the purely critical portion of Pasteur's work would be enough to immortalize his name. His theory, "That the chemical act of fermentation is

<sup>1</sup>Read before the Cincinnati Section, Oct. 15th.

a correlative phenomenon of a vital act, beginning and ending with it," notwithstanding the thousands of experiments since made by him and other investigators remains unshaken and is to-day the firm basis of all ideas respecting fermentation. Pasteur's researches, by their precision, the care taken to avoid all sources of error, and his rigorous exactness, removed every suspicion of the intervention of germs brought from without or pre-existing in the liquid operated on, a difficulty on which all discussions between heterogenists and panspermists had heretofore turned. By means of the organic corpuscles of dust mixed with amorphous ones, obtained by filtering air through a gun-cotton plug and showing that their absence prevented sterilized fluids from fermenting, but their presence would cause it to set in, Pasteur elevated a hitherto merely observed phenomenon to a scientific basis. His experiments with the forty flasks of must, to show that the ferments which cause the fermentation in the vintage tube, must come from the exterior and not the interior of the fruit, as well as those made to discover quantitatively the germs in the air, are famous.

Pasteur's signal success in counteracting the effects of Pebrine which threatened to destroy the silk industry of France and Italy, not only saved thousands from absolute ruin but taught the people that infectious diseases could be combated by a most novel method. Consequently his efforts toward suppressing the ravages produced by chicken cholera and splenic fever met with less popular prejudice. While experimenting on chicken cholera he produced cultures of varying degrees of virulence by permitting sufficiently long intervals to elapse between the impregnation of one culture with the microbe of the preceding. Furthermore, he proved that each culture of attenuated virulence reproduced the virulence of that which had served as the starting point; concluding from these experiments that the oxygen of the air was the possible cause of the attenuation. When fowls had been rendered sufficiently ill by the attenuated virus which the vital resistance arrested in its development, immunity from the original disease arose. Perhaps one of the most brilliant triumphs achieved by Pasteur consisted in taking advantage of the morphological changes taking place in the Anthracoid

microbe. He prevented it from producing corpuscle germs, kept it while in this condition in contact with oxygen, days, weeks, and months, and thus produced a series of attenuated virulences. With this vaccine he practically exterminated the splenic or carbuncular disease throughout France.

To Pasteur we owe nearly all of our knowledge of the relations between the optical activity and crystalline form in tartaric acid. He showed that enantimorphism depended upon hemihedral forms of the rhombic system. His experiments in this direction led to the discovery of physiological asymmetry and paved the way for the study of elective fermentation. He proved that substances chemically and physically the same save in their opposite rotatory power can serve in one case as nutrients to certain organisms and in the other are worthless as such; and that only certain geometrical forms can serve the requirements of the cells. Thus we see Pasteur as one of the pioneers in the field of stereochemistry.

His successful method of counteracting rabies, his untiring labors in the interest of suffering humanity up to the time of his death forcibly recalls Tyndall's letter, written as far back as 1876. "For the first time in the history of science, we are justified in cherishing confidently the hope that, as far as epidemic diseases are concerned, medicine will soon be delivered from empiricism and placed on a real scientific basis; when that great day shall come, humanity will, in my opinion, recognize the fact that the greater part of its gratitude will be due to you."

Believe me ever faithfully yours,

JOHN TYNDALL.

France can well be proud of such sons as Lavoisier and Pasteur. Generations to come will recognize in their labors the possibility of unveiling, by means of conscientious scientific research, nature's most carefully treasured secrets.

Indeed Longfellow must have had such men in mind when he wrote,

"Lives of great men all remind us  
We can make our lives sublime,  
And, departing leave behind us  
Footprints on the sands of time."

ALFRED SPRINGER.

---