

and physics for the purpose of explaining the phenomena of biology and pathology. Thus, on his lines, Robert Mayer has accomplished as much as Charles Darwin in his great books of 1859, 1868, 1871, and 1872 for biology, history, and archaeology. Robert Mayer's name will be immortal on account of what he has achieved, and should not suffer because there are things he left undone, and truths he left unuttered. In regard to the latter he is slightly guilty, perhaps. Indeed, I was present when, in 1869, he delivered an address "On the Necessary Consequences and Inconsistencies of the Mechanical Theory of Heat," in which, possibly overawed by many attacks by the always militant clergy, he postulated that in the world of intellect the laws of the preservation of forces were not necessarily so valid as in the physical organism. Verily, he was a queer example of greatness and mediocrity. He was a medical officer in the Dutch navy, and later a practitioner in a small German town. Under the equator he noticed the altered metabolism of the sailors and the change in the color of the blood during venesection. That was enough to awaken his interest and to lead to results as great as the gravitation theory of Isaac Newton, which is attributed to the falling apple. But he was an indifferent writer. His first publication of 1842 was hardly noticed, only that of 1845, under the title "Organic Motion in its Connection with Metabolism," (*Die Organische Bewegung in ihrem Zusammenhang mit dem Stoffwechsel*) made his name and his theory famous. I found his utterances halting and unimpressive, both in private conversation and in public, and he did not improve even in his fights for priority.

Nearest to him in line and in the results of his thinking came James Prescott Soule (1818-1889) of Salford E, who delivered in the Section for Mathematics and Physics of the British Medical Association, 1843, an address "On the Calorific Effects of Magneto-electricity and the Mechanical Value of Heat," and Hermann von Helmholtz (1821-94). The latter's address on "The Preservation of Force," was delivered, 1847, before the Physical Society of Berlin. Both Mayer and Helmholtz must be credited with the elaboration and the final acceptance by the world of the great teaching. It is true that what they taught had been imagined or even asserted before. Titus Lucretius Carus said nearly 2,000 years ago: "New things will always arise from the disintegration of others." Mariotte has the following. "La nature ne fait rien de rien, et la nature ne se perd point." Leibnitz formulated the doctrine of the preservation of force mathematically in 1686; the Marquise du Chatelet expressed cognate views 1742; and Lavoisier taught the indestructibility of matter. But the world had after all to wait for Mayer and Helmholtz before previous suggestions were generally welcomed and adopted. In connection with all this you might learn one

* Cf. Julius Pagel *Gesch. d. Medicin*, Berlin, 1898.