

facts,¹ and that the then reigning school of natural philosophers in Germany discouraged theoretical deductions, as possibly leading back to the fatal "philosophy of nature," out of which they had only just escaped. Men of the intellectual eminence of Liebig, through whose labours an enormous mass of new facts had been accumulated, and who desired to see the more hidden processes of organic life subjected likewise to rigorous measurements, showed indeed a certain appreciation of the attempted definitions of Mohr and Mayer, struggling as he and they alike were under the still existing confusion in the fundamental conceptions.² And these were not

¹ See Mohr, 'Allgemeine Theorie der Bewegung und der Kraft,' p. 82, &c. Poggendorf did not reply to Mayer's repeated communications and did not return the MS.; the fact that he received it was first established by Zöllner, who in 1877 recovered the MS. from Poggendorf's heirs (Mayer's 'Schriften und Briefe,' ed. Weyrauch, p. 100), and gave a facsimile of it in his 'Wissenschaftliche Abhandlungen' (Leipzig, vol. iv., 1881, p. 672). Helmholtz, who in 1847 had no knowledge of Mayer's writings, did full justice to his claims in his address, 'Ueber die Wechselwirkung der Naturkräfte' (1854), and vindicated them against Tait's criticisms in a letter published by the latter in his 'Sketch of Thermodynamics' (Edinburgh, 1868); see Helmholtz, 'Wissenschaftliche Abhandlungen,' vol. i. p. 71, &c. Helmholtz closes his later comments on the subject ('Vorträge und Reden,' vol. i., 3rd ed., 1884, p. 74) with the following significant remark: "The best ideas run the risk of remaining barren, if not accompanied by that energy which lasts till the convincing proof of

their correctness has been given." This explains the neglect of Mohr and Mayer, and why in England the interest in the energy ideas only became general after Joule's, Thomson's, and Rankine's labours, as Helmholtz himself remarks in 1854 ('Vorträge,' &c., p. 39).

² Helmholtz ("Ueber Mayers Priorität," 'Vorträge,' vol. i. p. 69) says: "That the [*i.e.* Mayer's] dissertation contained really important ideas, that it did not belong to the wide-ranging literature of vague suggestions, such as are annually served up by badly informed amateurs, could at best only be noticed by a reader who had already turned over in his mind similar reflections, and who could recognise them under the somewhat strange vocabulary of the author. Liebig, who, in the same year in which Mayer's dissertation appeared, published his book on animal chemistry, in which he fully discussed the question as to the origin of animal heat, was perhaps such a reader, and was therefore willing to insert the article in his annals." The same remark would refer equally to Mohr's earlier essay. It is now known