

in the examination of dead embryos in various stages of development, and the idea of the division of labour is one flowing from the premises of the Darwinian theory—the facts of variability and overcrowding. The second conception, that of “metabolism,” touches immediately upon the processes of life, and demands special treatment in the present chapter which deals with biological Thought.

The conception of a continuous exchange or circulation of matter and of energy in every living organism, and the study of this elementary typical form of the living process in the morphological unit of all living organisms, in the cell, seems to have originated with Theodor Schwann,¹ and is laid down in his ‘Microscopical Researches,’ published in 1839. On it is based the whole simplification and unification of biological thought which distinguishes the second from the first half of our century. The study of the cell—its

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¹ On the change which came over general physiology about 1840, and the part he himself played, Theodor Schwann has expressed himself in a letter addressed to Du Bois-Reymond, which is given in the notes to the latter’s *Éloge* of Müller, reprinted in the second volume of his ‘*Reden*,’ pp. 143-334. It forms one of the most important historical documents. The *Éloge* itself should be read together with Claude Bernard’s ‘*Rapport*,’ &c., mentioned above (p. 384 n.), which gives the history of the great change from a more exclusively French point of view. In the letter mentioned above, from which also the quotations given in the text are taken, Schwann claims

that the first instance in which an “evidently vital phenomenon was submitted to mathematical, numerical” rule, was his measurement of the carrying power of a muscle in relation to its contraction in 1836. The purely physical view of vital phenomena exhibited in this example was not adopted by Müller, nor yet the quickly following general principle of the cellular theory. Schwann refers to the third section of his ‘*Microscopical Researches*,’ in which he discards “vitalism,” but admits in man (“on account of his freedom”) an immaterial principle, and claims that this assumption divides him distinctly from the materialists.