placed at the summit of the modern theory of energetics by Helm and Ostwald, after earlier writers, such as Zeuner and Mach, had already used it or drawn atten-

"Naturforscherversammlung," held at Vienna in 1894, a committee was appointed to report in 1895 at Lübeck on the "actual position of energetics," and the introduction of the subject was put into the hands of Dr Helm. His address and the discussion which followed have been given in extract in the published 'Verhandlungen' (vol. ii. part 1, p. 28, &c.), and since continued in 'Wiedemann's Annalen,' vols. lvii. *et seqq.* Simultaneously, however, the subject received a much more fundamental or philosophical development through Prof. Ostwald's general address at Lübeck with the somewhat polemical title "Die Ueberwindung des wissenschaftlichen Materialismus." From that moment the mechanical view of nature bore the stigma of materialism, to which the other side replied by attaching to the new or energetic view the stigma of "metaphysical" (see Planck, 'Wied. Ann.,' vol. lvii. p. 77) as being scientifically vague and useless. It cannot be said that the whole matter has yet been fully discussed or fathomed. Prof. Boltzmann, Prof. Carl Neumann, and Dr Helm have treated the questions at stake with much patience, and have made valuable approaches to a mutual understanding. The various contributions are most fully discussed in Helm's latest work, 'Die Energetik' (Leipzig, 1898). Some of those who originally assisted in introducing the energetic treatment have since refused to go the length of Helm's and Ostwald's final generalisations, though they prefer —for the purpose of the treatment of thermo-dynamical and chemical problems — the phenomenological method, admitting at the same time the usefulness of the atomic and mechanical hypotheses, though some do not look upon them as indispensable. This phenomenological view, which deals only with observable and measurable quantities, in contradistinction to the atomic and kinetic views, is largely represented by Prof. Nernst (see his 'Theoretical Chemistry,' translated by Palmer, London, 1895, p. 22), and by Prof. Planck (see his 'Thermodynamik,' Leipzig, 1897), though the latter considers it merely provisional, a stepping-stone in the direction of a mechanical view (p. v, preface). Prof. Boltzmann has summed up the position from a general point of view in his address at Munich in 1899. He there very lucidly defines the mechanical, energetic, and phenomenological positions, admitting the usefulness of all three, but also points out the fundamental difficulties into which a one-sided and exclusive development of any of them unavoidably leads us. Having himself done so much in applying atomic theories, he concludes by saying that "the numerous conquests of the atomic doctrine cannot be won by phenomenology or energetics," and maintains "that a theory which yields something that is independent and not to be got in any other way, for which, moreover, so many physical, chemical, and crystallographic facts speak, must not be combated but further developed" ('Verhandlungen der Versammlung zu München,' 1899, p. 121).