attempts towards a systematic exposition of the fundamental conceptions on which the exact sciences are built up. Especially are we indebted to Prof. Mach for applying his epistemological principles in three important regions of scientific inquiry: in the science of dynamics, which he has to a large extent remodelled; in the analysis of sensations; and lastly, in the theory of heat. Views similar to his have been elaborated in this country, as it appears independently, and in an original manner, by W. K. Clifford, and, more systematically, by Prof. Karl Pearson in his 'Grammar of Science' (1st edition, 1892). In fact, they do not widely differ from opinions already expressed by Herbert Spencer in several of his earlier works, notably in his 'Principles of Psychology' (1st edition, 1855), and his 'First Principles' (1862); they had been popularly explained in his replies to criticisms that appeared in the 'Quarterly Review' (1874) and the 'British Quarterly Review' (1873). These replies are reprinted in the third volume of his 'Collected Essays.'

28. Clifford and K. Pearson.

The rationale and result of all these discussions can be summed up in the thesis: that the whole system of conceptions by which the exact sciences try to describe the observable and known phenomena of nature, and to predict those that are unknown and frequently escape observation, is symbolic, a kind of shorthand, unconsciously invented and perfected for the sake of convenience and for practical use; that the leading principle is that of Economy of Thought.

Through this latter conception Prof. Mach's opinions come into contact with those of Richard

29. Economy of Thought: Mach and Avenarius.