http://geology.19thcenturyscience.org/books/1906-Merz-HistEurThot/README.htm

information that we seem to possess; it resembles the knowledge which an economist may possess of the statistics of a society or of the properties of the 'mean" man. If such be the case, the theory of large numbers and the calculus of probabilities must be applicable and useful in dealing with those phenomena which, through their minuteness and great number, elude our detailed examination.

The first to introduce this conception of treating a very large assemblage of moving things by the method of averages was Joule,[1] who, adopting Daniel Bernoulli's conception, calculated the average velocity which a particle of hydrogen gas must possess in order to explain the total effect which shows itself as a definite gas pressure at a definite temperature. His result was that this average speed must be 6055 feet per second in order to be equal to the pressure of one atmosphere at the zero temperature of the Centigrade scale. The speed of the particles, however, cannot be assumed to be equal, owing to continual encounters; and we are indebted to Clausius and Clerk-Maxwell for introducing the more refined statistical methods of the theory of probabilities. They calculated the mean free path, and showed that former calculations of the average speed were in the main correct. The kinetic theory of gases afforded an opportunity of brilliantly applying the conceptions of averages or means and of the differences of frequencies as the measure of the probability of certain occurrences. In this case—as was first shown by Joule's figures—we

27. Clausius and Clerk Maxwell.

[1] See *supra*, vol. i. p. 434, and vol. ii. p. 110.