

**THE ALGEBRA OF LOGIC.**



**1. Introduction.**—The algebra of logic was founded by GEORGE BOOLE (1815—1864); it was developed and perfected by ERNST SCHRÖDER (1841—1902). The fundamental laws of this calculus were devised to express the principles of reasoning, the “laws of thought”. But this calculus may be considered from the purely formal point of view, which is that of mathematics, as an algebra based upon certain principles arbitrarily laid down. It belongs to the realm of philosophy to decide whether, and in what measure, this calculus corresponds to the actual operations of the mind, and is adapted to translate or even to replace argument; we cannot discuss this point here. The formal value of this calculus and its interest for the mathematician are absolutely independent of the interpretation given it and of the application which can be made of it to logical problems. In short, we shall discuss it not as logic but as algebra.

**2. The Two Interpretations of the Logical Calculus.**—There is one circumstance of particular interest, namely, that the algebra in question, like logic, is susceptible of two distinct interpretations, the parallelism between them being almost perfect, according as the letters represent concepts or propositions. Doubtless we can, with BOOLE and SCHRÖDER, reduce the two interpretations to one, by considering the concepts on the one hand and the propositions on the other as corresponding to *assemblages* or *classes*; since a concept determines the class of objects to which it is applied (and which in logic is called its *extension*), and a proposition determines the class of the instances or moments of time in which it is true (and which by analogy can also be called its *extension*). Accordingly the calculus of con-