SOME ASPECTS OF THE PROBLEM OF MATHEMATICAL RIGOR[1]

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1. **Introduction.** The cue for the title to this address is taken from that of one by Pierpont before the Nashville meeting of this Society several years ago.[2] This is typical of a number of expository treatments of this topic which have been presented to the mathematical public in recent years.[3] In the present paper I shall discuss the same theme in a somewhat different manner. Relying upon these expository addresses for the historical background, I propose to treat certain aspects of the subject which have been rather neglected in them. The discussion is frankly from a single point of view, which is a species of formalism. I shall try, in the first place, to explain the fundamental concepts of formalism, and, in the second place, to add some new suggestions and criticisms in matters of detail.[4]

The problem of mathematical rigor is that of giving an objective definition of a rigorous proof. If you will examine your ideas on this subject I think you will agree that there is something vague and subjective about them. This does not mean, of course, that they are unsatisfactory for the needs of working mathematicians. In daily life, when we say that a piece of cloth is a yard wide, we really mean that its width is a certain legally defined fraction of the distance between two scratches on a metal bar located in Paris; nevertheless we do not rush to Paris when we wish to verify that a piece of cloth has this property. Secondary standards of varying degrees of accuracy suffice for the needs of daily life and of science; but neither science nor business would be possible without exact primary standards. Even so we need a primary standard of rigor in mathematics. The definition of such a standard, and the elaboration of practical secondary standards

[1] An address delivered before the meeting of the Society in New York City on October 26, 1940, by invitation of the Program Committee.

[2] J. Pierpont, *Mathematical rigor, past and present*, this Bulletin, vol. 34 (1928), pp. 23–53.

[3] See for example A. Dresden, *Some philosophical aspects of mathematics*, this Bulletin, vol. 34 (1928), pp. 438–452; G. H. Hardy, *Mathematical proof*, Mind, vol. 38 (1929), pp. 1–25; E. R. Hedrick, *Tendencies in the logic of mathematics*, Science, vol. 77 (1933), pp. 335–343.

[4] For views related to those here presented, see my paper *Remarks on the definition and nature of mathematics*, Journal of Unified Science, vol. 9, pp. 164–169. This is an abstract of an address delivered before the Fifth International Congress of Unified Science at Cambridge, Massachusetts, September 5, 1939.