MATHEMATICS AND THE FUTURE OF SCIENCE

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It is indeed a great honor to be asked to deliver the Gibbs Lecture this year, and one which I have accepted in a humble spirit. The work of Josiah Willard Gibbs comprised a series of achievements in applied mathematics of such beauty and perfection that the most fitting tribute which could be offered to him here would be a scientific paper written in a spirit of emulation. Such a tribute lies beyond my powers. My interests as a mathematician have been directed toward pure mathematics; and I have never entertained the ambition of contributing explicitly to the advancement of applied mathematics or cherished the illusion that I might have such a contribution to make. I have not, however, been one of those mathematicians whose joy in their mathematical achievements is intensified by the belief that these are to remain forever useless and unused outside the happy realm of pure mathematics. On the contrary, the satisfaction which I have derived from working in mathematics has been increased by the knowledge that what I have done could be seen, with few exceptions, to have some bearing upon mathematical physics or upon some other branch of applied mathematics. I have taken much pleasure in acquainting myself with the ways in which the results of pure mathematics could be turned to good account in probing Nature's secrets and rendering them intelligible—and, eventually, useful. My tribute to Gibbs will therefore take the form of an expression of faith in the growing importance of mathematical thought for the future of science. I wish on this occasion to speak of my reasons for believing that the wonderful development of mathematics which we have witnessed in our time holds the seeds of brilliant scientific progress in time to come.

In a sense, all that can be said upon this theme is summed up in a syllogism: science is reasoning; reasoning is mathematics; and, therefore, science is mathematics. Because this simple argument seems to me to express so well the essence of the inescapable connections between science and mathematics, I wish to devote a few words to clarifying and justifying the premises upon which it rests. The minor premiss raises a point which has been at issue between logicians and