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Precision Measurement in Biology

STEPHEN QUAKE, Stanford University and Howard Hughes Medical Institute

Is biology a quantitative science like physics? I will discuss the role of precision measurement in both physics and biology, and argue that in fact both fields can be tied together by the use and consequences of precision measurement. The elementary quanta of biology are twofold: the macromolecule and the cell. Cells are the fundamental unit of life, and macromolecules are the fundamental elements of the cell. I will describe how precision measurements have been used to explore the basic properties of these quanta, and more generally how the quest for higher precision almost inevitably leads to the development of new technologies, which in turn catalyze further scientific discovery. In the 21st century, there are no remaining experimental barriers to biology becoming a truly quantitative and mathematical science.