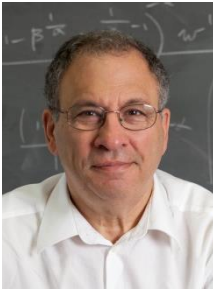


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Simon Levin is George M. Moffett Professor of Biology and Director of the Center for BioComplexity at Princeton University, and was Founding Director of the Princeton Environmental Institute. His research interests are in understanding the emergence and maintenance of macroscopic patterns and processes at the level of ecosystems and the biosphere, in terms of ecological and evolutionary mechanisms that operate primarily at lower levels; in infectious diseases; and in the interface between ecology and socio-economics.

Levin is a Fellow of the American Academy of Arts and Sciences and the American Association for the Advancement of Science, a Member of the National Academy of Sciences and the American Philosophical Society, and a Foreign Member of the Istituto Veneto. He is a Fellow of Resources for the Future, the Beijer Institute of Ecological Economics, the Society for Industrial and Applied Mathematics, and the Ecological Society of America. He chaired the governing Council for the International Institute for Applied Systems Analysis (IIASA), the Science Board of the Santa Fe Institute, and the Board of the Beijer Institute of Ecological Economics, and is Vice-Chair for Mathematics of the Committee of Concerned Scientists. Levin is a former President of the Ecological Society of America and the Society for Mathematical Biology. He won the Ecological Society's MacArthur Award, Distinguished Service Citation, and Eminent Ecologist Award; the Okubo Award of the Society for Mathematical Biology and the Japanese Society for Theoretical Biology; and the Distinguished Scientist Award of the American Institute for Biological Sciences. He was awarded the Dr. A.H. Heineken Prize for Environmental Sciences by the Royal Netherlands Academy of Arts and Sciences the Kyoto Prize in Basic Sciences by the Inamori Foundation, and the Margalef Prize by the Government of Catalonia. Levin has mentored more than 100 graduate students and postdoctoral fellows, and has published widely.

Collective Phenomena, Collective Motion, and Collective Action in Ecological Systems

Fundamental questions in basic and applied ecology alike involve complex adaptive systems, in which localized interactions among individual agents give rise to emergent patterns that feed back to affect individual behavior. In such systems, a central challenge is to scale from the "microscopic" to the "macroscopic" in order to understand the emergence of collective phenomena, the potential for critical transitions, and the ecological and evolutionary conflicts

between levels of organization. This lecture will explore some specific examples, from universality in bacterial pattern formation to collective motion and collective decision-making in animal groups. It also will suggest that studies of emergence, scaling and critical transitions in physical systems can inform the analysis of similar phenomena in ecological systems, while raising new challenges for theory.