



Joel E. Cohen, Ph.D., Dr.P.H.

ABBY ROCKEFELLER MAUZÉ PROFESSOR, LABORATORY OF POPULATIONS

The Laboratory of Populations studies the health of human and non-human populations quantitatively, including births, deaths, and migration; Chagas disease; COVID-19; farms, fisheries, forests, wildlife, food webs, and weather; and cellular and molecular populations. The lab's research uses mathematical, statistical, and computational tools, existing and newly developed, in collaborations that cross disciplinary, institutional, and national boundaries.

The human species is a node in a network of feeding relationships, known as a "food web," with thousands of other species. Species that humans eat are conventionally studied as part of agriculture, agroforestry, or fisheries. Species that eat humans, which are often the agents or vectors of infectious diseases, are studied in epidemiology and human microbiome research. Humans, the species humans eat, and the species that eat humans are nodes in a global food web, studied in ecology. The global food web includes many species not directly linked to humans by feeding and strongly interacts with the physical and chemical environment.

Cohen and his colleagues aim to offer insights that can help manage local and global food webs for the well-being of humans and other species. They combine the perspectives of demography, agriculture, epidemiology, ecology, and environmental sciences. Their work uses concrete problems to develop new concepts for understanding populations and aims to crystallize these concepts into mathematical, statistical, and computational tools applicable to scientific and practical problems.

For example, Cohen and colleagues study Chagas disease (also called American trypanosomiasis), an insect-borne chronic infectious disease that affects children in Latin America and eventually kills many young adults in their prime years of work and family rearing. No vaccine is currently available to prevent infection because the affected people are poor and commercial incentives to develop a vaccine are weak. The drugs available for treatment are toxic. Cohen collaborates with Argentine colleagues who conduct field studies of Chagas disease to understand the ecology of disease transmission in poor rural villages in northwest Argentina. Based on data from these field studies, they develop mathematical models of the relations among humans; domestic animals like dogs, cats, chickens, and goats; the insects that transmit infection; and the trypanosome that causes disease. Their findings lead to specific recommendations of low-technology, low-cost interventions to prevent infection of people at risk.

Cohen's lab also views weather events as a population. Cohen and colleagues showed that severe tornado outbreaks became more common during the last half century. Both the average and variance of tornadoes per outbreak increased, and the variance increased more than four times as fast as the mean. Hence outbreaks with an extreme number of tornadoes have become more likely. The relationship between the average and variance in this case follows a power law known in population ecology as Taylor's law.

This same power-law relation of variance to mean occurs under other names in other fields of science, and has provided insights into many systems. Cohen and colleagues have studied Taylor's law theoretically and empirically in COVID-19, bacteria, trees, fish, voles, humans, and other species, including the insects that transmit Chagas disease, as well as primes, twin primes, and other integer sequences, and are exploring its practical applications to sampling, projection, and management.

EDUCATION

A.B. in applied mathematics, 1965
A.M. in applied mathematics, 1967
Ph.D. in applied mathematics, 1970
M.P.H., 1970
Dr.P.H., 1973
Harvard University

POSITIONS

Assistant Professor, 1971–1972
Associate Professor, 1972–1975
Harvard University
Professor, 1975–
The Rockefeller University
Professor, 1995–
Columbia University

AWARDS

MacArthur Fellow, 1981
Fred L. Soper Award, Pan American Health and Education Foundation, 1997
Tyler Prize, University of Southern California, 1999
Golden Goose Award, American Association for the Advancement of Science, 2015

HONORARY SOCIETIES

National Academy of Sciences
American Academy of Arts and Sciences
American Philosophical Society
Council on Foreign Relations
Fellow, American Association for the Advancement of Science

SELECTED PUBLICATIONS

Wang, Y. et al. Kinetic control of mammalian transcription elongation. *Nat. Struct. Mol. Biol.* 33, 235–244 (2026).
Cohen, J.E. Conjectures about primes and cyclic numbers. *J. Integer Seq.* 28, 25.4.7 (2025).
Gürtler, R.E. et al. Taylor's law and quasi-experimental hunting of invasive wild boar and axis deer in a protected area of northeastern Argentina. *Wildl. Res.* 51, WR23127 (2025).
Villasante, C.M. et al. Nanomechanics of wild-type and mutant dimers of the tip-link protein protocadherin 15. *Proc. Natl. Acad. Sci. U.S.A.* 121, e2404829121 (2024).
Cohen, J.E. (2024). Population and climate change: global overview (2nd ed.). *Routledge Handbook of Climate Change and Society*, (pp. 99–112). Taylor & Francis Group.