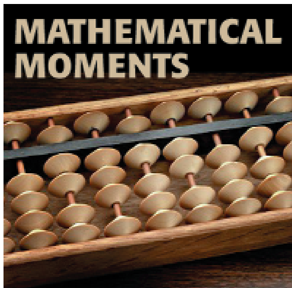


# Defeating Disease

From modeling microscopic genes and proteins to tracing the progression of an epidemic through a country, mathematics plays an important role in combating disease. For example, the basic model used to analyze the dynamics of infectious disease is a system of differential equations. A new field called "data mining", involving statistics and pattern recognition, helps locate significant information in the vast amounts of data collected from studies of diseases in populations. Mathematics also plays a key role in connecting changes in the human genome to specific diseases.

Mathematics has helped recent fights against foot-and-mouth disease in the United Kingdom and against Chagas disease — a disease affecting millions of people in Latin America. Epidemiologists studying the foot-and-mouth epidemic used mathematical models to conclude that early efforts were insufficient to stop what would become a calamitous spread of the disease. The government accepted the conclusions and took a course of action that, although drastic, did indeed arrest the outbreak. In Latin America, mathematicians computationally tested several courses of action against Chagas disease and found a surprisingly simple yet highly effective step (keeping dogs out of the bedroom) to greatly reduce the infection rate. These examples share three important characteristics: a mathematical model of the disease, modern computers to do calculations required by the model, and researchers with the insight to design the former so as to take advantage of the power of the latter.

**For more information**: *Infectious Diseases of Humans: Dynamics and Control*, R. M. Anderson and R. M. May.

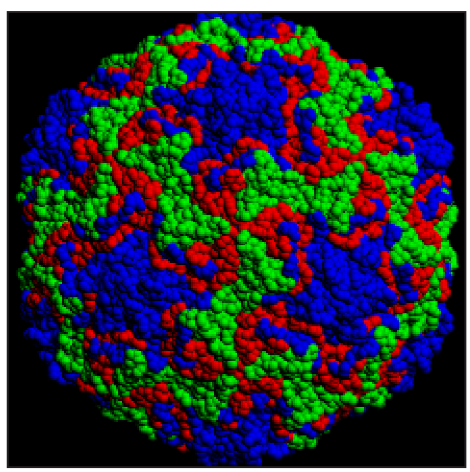

Image courtesy of: Jean-Yves Sgro, University of Wisconsin-Madison. Rhinovirus color-coded by protein, enhances display of icosahedral symmetry. ©1993

AMS
American Mathematical Society

*The **Mathematical Moments** program promotes appreciation and understanding of the role mathematics plays in science, nature, technology, and human culture.*

**www.ams.org/mathmoments**