fer are laid out, and the complicity of environmental factors is addressed.

The need to determine the frequency of various types of exchange in nature, and the likelihood of others, is suggested. One important step toward this difficult goal, missing here, is an outline of the pertinent elementary population genetics. For example, a recombinant's chance of survival with a small fitness advantage, say 10^{-4}, is roughly 10^{-4}. That is the probability of its reaching a "safe" frequency, from which its further rise is virtually certain. But a recombinant that can enter a new niche may be safe almost at the outset. This is critical to risk assessment. Another step is to develop general experimental protocols; efforts in this direction in the wrap-up chapter surprisingly lose sight of non–vector-mediated transfer.

This book is not well edited. Writing errors, silly and serious, abound, as do typos, logical errors, and unpublished data; diagrams are often poorly executed. Summaries occasionally introduce new material and references. But this collective venture contains valuable information of four types: well-developed descriptions of the general mechanism of gene transfer in nature; lists of and citations concerning participating organisms; a mixed bag of analyses and retrospective anecdotes; and a number of experiments, many of which (as the authors often recognize) need to be repeated the right way. It calls for a second edition, tightened and amplified, right now.

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Flow Paths

Percolation. GEOFFREY GRIMMETT. Springer-Verlag, New York, 1989. xii, 296 pp., illus. $49.80.

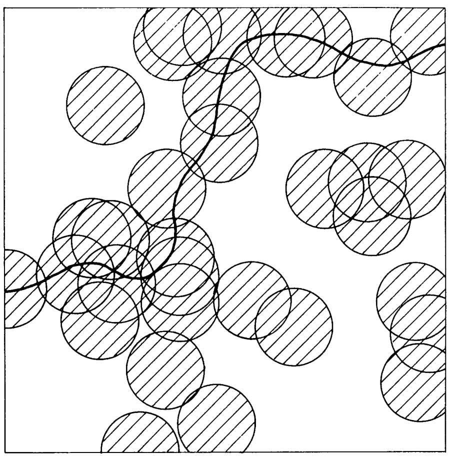
Percolation theory was introduced to model the flow of a fluid or gas through a random medium. The medium is represented by an infinite-lattice graph, in which the edges or vertices are randomly "open" with probability p, where $0 < p < 1$, and "closed" otherwise. The possible movement of the fluid is completely determined by this random medium: fluid may pass through only the open edges or vertices.

Percolation models are relevant to various physical phenomena that involve clustering in a disordered medium. Characteristics of clusters may determine the difference between liquid and solid phases, the presence or absence of spontaneous magnetization in a ferromagnet, or the spread or containment of an epidemic in a population.

The principal object of study in percolation theory is the "open cluster" containing a particular vertex. The open cluster consists of all vertices that can be reached from that vertex by paths of open edges or vertices. Physical scientists are interested in percolation because of the existence of a "critical probability" above which an infinite open cluster exists and below which all open clusters are finite. In the terminology of statistical mechanics, the critical probability is a phase transition point.

Percolation models are popular in the study of disordered media for several reasons. Their predictions are realistic for a variety of applications involving phase transitions and critical phenomena. Their simplicity and ease of description aid in developing intuition and insight. The stochastic independence of the edges or vertices provides more mathematical tractability than alternative models containing interactions, making percolation a proving ground for the development of tools and techniques for dealing with these more complicated interacting particle systems. For mathematicians, the subject is rich in intriguing, and extremely challenging, conjectures. Topics of independent interest, such as subadditive stochastic processes and correlation inequalities, were discovered through the study of percolation models.

Grimmett's *Percolation* concentrates on mathematical percolation theory, a very active research topic in probability theory.



Quandary for a mollusk. "Young lilies inhabit a beautiful large square pond. They grow at a uniform rate. How long need a snail wait beside the pond before it becomes possible for him to traverse the pond without getting his feet [sic] wet? This question may be rephrased in terms of the following classical problem of stochastic geometry: ascertain the minimal density of unit discs in the plane which guarantees the existence of an infinite cluster. It leads to a percolation-type process which has been dubbed the 'Poisson blob model' by the less poetically minded." The thick line indicates a possible route for the snail. [From *Percolation*]

Substantial recent progress, extending the theory to all dimensions, makes the book very timely. Grimmett combines the essential new methods in the disorganized journal literature to provide a coherent development of the subject. The book proceeds from introductory material to recent advances, allowing the uninitiated reader to bypass the previous literature. Yet the material is accessible to nonspecialists: the prerequisites include only a solid probability course at the undergraduate level, with some acquaintance with analysis and graph theory being helpful.

The book may be divided into three principal parts. Chapters 1 through 4 describe the model, applications, problems, and tools, culminating in a readable account of two proofs of the uniqueness of the critical point. The middle third (chapters 5 through 8) deals with the finer behavior of the model in different regimes—below the critical point, above the critical point, and near the critical point—and introduces scaling theory and renormalization near the critical point. The final chapters recast older results for two-dimensional percolation models in light of new methods developed to extend the theory to higher dimensions and survey a variety of modifications and related models, suggesting the diversity of phenomena that it may be possible to explain through the use of percolation theory.

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Antigen-Presenting Cells. Jonathan M. Austyn. IRL (Oxford University Press), New York, 1989. x, 79 pp., illus. Paper, $12.95. In Focus.

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The Armenian Earthquake Disaster. The editors of the Novosti Press Agency. Sphinx, Madison, CT, 1989 (distributor, International Universities Press, Madison, CT). viii, 241 pp., illus. Paper, $19.95. Translated from the Russian by Elliott B. Urdang. 188 pages of pictures, with brief text.

Biotechnology and Food Quality. Shain-Dow Kung, Donald D. Bills, and Ralph Quatrano, Eds. Butterworths, Stoneham, MA, 1989. xii, 354 pp., illus. $59.95. From a symposium, College Park, MD, Oct. 1988.

Birding Around the Year. When to Find Birds in North America. Aileen Lotz. Wiley, New York, 1989. xvi, 240 pp., illus. Paper, $11.95. Wiley Nature Editions.

Birds Asleep. Alexander F. Skutch. University of Texas Press, Austin, 1989. xii, 219 pp., illus. $24.95. Corrie Herring Hooks Series, vol. 14.

The Birth of the Family. An Empirical Inquiry. Jerry M. Lewis. Brunner/Mazel, New York, 1989. xvi, 201 pp. $26.95.