that fractal models imitate many natural phenomena (clouds, clusters of stars, coastlines, and the like). Now they are the subject of a growing new interdisciplinary field. This book is the proceedings of one of the many meetings devoted to the subject in the last few years. It contains 33 papers, 11 accounts of lectures delivered at the meeting and 22 summaries of seminars.

Fractal concepts have been very useful in describing the physics of dilute fractal networks. Different physical properties are determined by different sub-groups of the bonds on such networks, and therefore one needs many fractal dimensionalities (in addition to D) to describe them. The "zoo" of necessary dimensionalities is reviewed in the book by Stanley, and some aspects of percolation theory are described by Stauffer. However, the main purpose of the book is to discuss growth and aggregation processes: in addition to studying the physical properties of an object given its geometrical characterization, the book aims to understand how such geometry is determined by the physical laws that generated the growth of the object.

Although there has been some progress toward a unified picture (all the phenomena listed below are somehow related to Laplace's equation), the field is at a phenomenological stage in which experimental and numerical results are collected and attempts are made to classify them. Such phenomena as flow in porous media, in which fractal "viscous fingers" are sometimes exhibited, dielectric breakdown, colloidal aggregation, dendritic growth, and electrodeposition have been found in diverse experiments to exhibit very similar fractal shapes for some range of length scales. Similar shapes have been produced by computer experiments, using the Diffusion Limited Aggregation (DLA) model of Witten and Sander. In that model, a seed is placed at the origin. A particle is then released at the boundary and performs a random walk until it touches the seed, where it stops. A new particle is then released, and so on. The resulting cluster is a fractal, with $D \simeq 1.7$ at $d = 2$ and $D \simeq 2.5$ at $d = 3$. The book contains many variants of these computer experiments and discusses possible relations between this simple stochastic growth model and the various experiments.

Stanley and Ostrowsky have succeeded in putting together an up-to-date collection of papers by leading researchers. As in any collection of papers, some subjects (such as the DLA model) are discussed repeatedly and others (such as turbulence, chaos, cellular automata and glasses) are not sufficiently discussed. The papers are not all at the same level: some are introductory, to be understood with no background, and some (rather few!) are more technical.

The book is an excellent source of information about ongoing research. Those who want a full unifying understanding of growth patterns will have to wait several more years until the field fully matures. However, for those who want to enter this active, interesting field, the book is a good place to start.

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Transplanted Neurons

Neural Transplantation and Regeneration. GOPAL D. DAS and ROBERT B. WALLACE, Eds. Springer-Verlag, New York, 1986. xiv, 330 pp., illus. $105. Proceedings in Life Sciences. Based on a symposium, Boston, fall 1983.

The chapters in this proceedings volume are based on the work of ten laboratories. Although the chapters are not grouped according to content, they address three main issues. These are the effects of injury and transplantation of neural tissue on nonneuronal cells of the host nervous system, the restoration by neuronal transplants of functions lost in brain-damaged animals, and the influence of transplants on the regenerative response of the host brain.

Bignami, Chi, and Dahl and Smith and Ebner address the responses of astrocytes to injury and transplantation and the possible role these cells have in regeneration and in patterns of axonal growth from transplants. Bignami and co-workers also describe their research on the fibrinolytic system and postulate the role of this system in unsuccessful regeneration in the mature central nervous system. Plasminogen activator appears to play a role in normal embryonic development and regeneration in peripheral nerves but is not activated in injured CNS neuropile. These papers are interesting and enlightening. Rosenstein and Brightman discuss their studies in which peripheral nervous system ganglia are transplanted to the fourth ventricle, which leaves the underlying brain undamaged. Such transplants may provide a means of circumventing the blood-brain barrier, thereby allowing for the introduction of systemically administered substances into the CNS without injury to the brain. Such transplants also exert a neurotropic effect on the underlying brain to cause rearrangement of the neural circuitry. Rosenstein and Brightman's results may lead to therapeutic techniques in the future.

It is now well established that transplants can be used to replace damaged or diseased parts of the central nervous system and restore function. Gage and Björklund and co-workers describe their elegant studies of the use of transplants in models of neurodegenerative diseases. They were able to use intracerebral grafts to reduce age-related functional deficits as well as to replace damaged circuits in animal models of Parkinson's and Huntington's diseases.

Several chapters examine the ability of transplants to permit or promote regeneration of the host nervous system. Berry, Rees, and Sievers, for example, describe the ability of sciatic nerve grafts to support regeneration of mature ganglion cell axons. Grafts of peripheral nerve have proven very effective in demonstrating that mature CNS, long thought incapable of regenerative responses after injury, does have the intrinsic ability to regenerate injured axons.

The long lag between the symposium and the publication of this book makes the work described in the book somewhat out of date. A number of books have recently been published on these topics, and the volume generally duplicates what has been reviewed elsewhere in more detail. The chapters are uneven in quality, and a number of important areas of research are not covered. A general introduction to the main issues examined in the book and a summary of the directions of current research would have greatly improved the book.

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Animal Thought. Stephen Walker. Routledge and Kegan Paul, Boston, 1985. xiv, 437 pp. Paper, $15.95. Reprint, 1983 ed.

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