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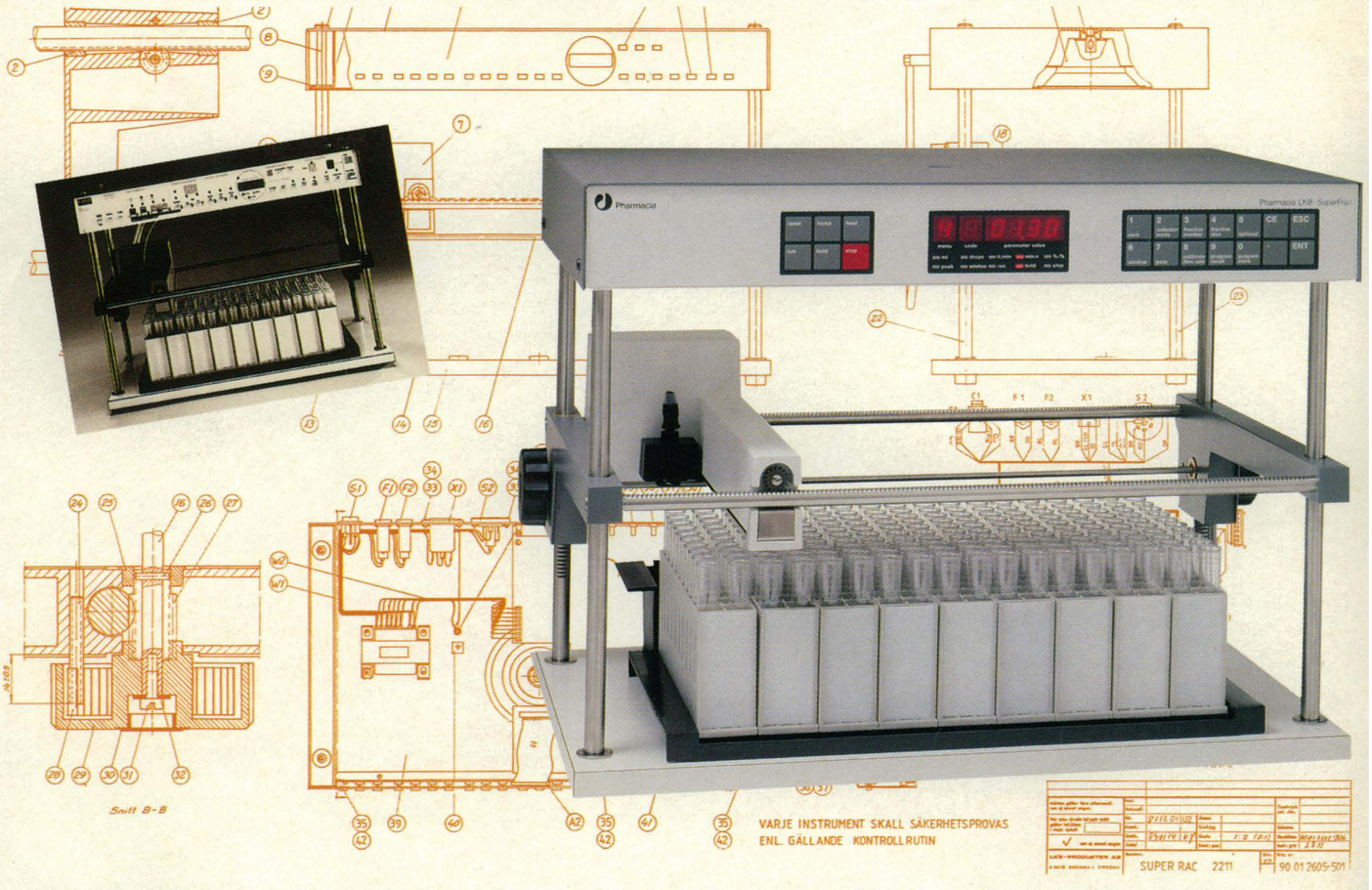

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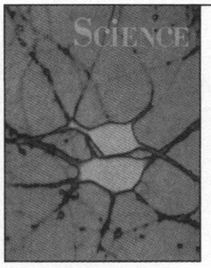


COVER Two hypothalamic neurons that have been stimulated by the neurotransmitter glutamate show an increase in intracellular calcium. The red color indicates calcium visualized with the calcium-sensitive dye fluo-3 and digital video microscopy. See page 1276. [Photograph by Anthony van den Pol]

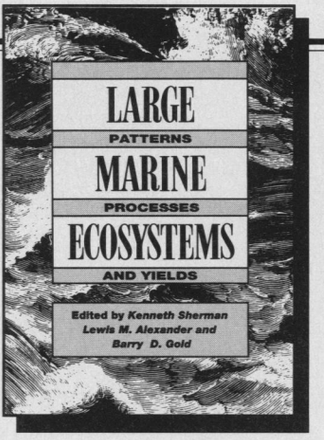
Book Reviews

Just Published!

Large Marine Ecosystems

Patterns, Processes, and Yields

Edited by Kenneth Sherman, Lewis Alexander, and Barry Gold



1990; ca. 250 pp.; softcover
ISBN #0-87168-384-9
indexed and illustrated
#90-30S; *$39.95*
(AAAS members $31.95)

Large marine ecosystems (LMEs) — the relatively narrow ocean zones that produce nearly 95% of the world's useable marine biomass — are becoming increasingly stressed by both natural and anthropogenic changes, arousing major international concern about potentially negative ecologic and economic effects.

This volume, from a AAAS symposium, deals with the projected impacts of global changes on ocean productivity, and provides scientific, geographic, socio-economic, and legal arguments for managing LMEs as multinational units, in order to sustain biomass yields of major coastal regions.

This is an essential book for scientists and students in marine-related fields, and for conservationists, natural resource policymakers, and everyone concerned about the future of the world's marine ecosystems.

Contents are as follows:

Perturbations and Yields of Large Marine Ecosystems

The Weddell Sea: A High Polar Ecosystem — *Gotthilf Hempel*

Environmental Influence on Recruitment and Biomass Yields in the Norwegian Sea Ecosystem — *Bjornar Ellertsen, Petter Fossum, Per Solemdal, Svein Sundby,* and *Snorre Tilseth*

Fluctuation in the Cod Biomass of the West Greenland Sea Ecosystem in Relation to Climate — *Holger Hovgård* and *Erik Buch*

The Caribbean Sea: A Large Marine Ecosystem in Crisis — *William J. Richards* and *James A. Bohnsack*

Productivity and Fisheries Potential of the Banda Sea Ecosystem — *Jenne J. Zijlstra* and *Martien A. Baars*

Biodynamics of Large Marine Ecosystems

Biodynamics of the Sea: Preliminary Observations on High Dimensionality and the Effects of Physics on Predator-Prey Interrelationships — *Brian J. Rothschild* and *Thomas R. Osborn*

Physical-Optical-Biological Scales Relevant to Recruitment in Large Marine Ecosystems — *Thomas D. Dickey*

Direct Simulation of the Effect of Turbulence on Planktonic Contact Rates — *Thomas Osborn, Hidekatsu Yamazaki,* and *Kyle Squires*

Application of Molecular Techniques to the Study of Marine Recruitment Problems — *Dennis A. Powers, Fred W. Allendorf,* and *Thomas T. Chen*

Application of Image Analysis in Demographic Studies of Marine Zooplankton in Large Marine Ecosystems — *Mark S. Berman*

Growth, Survival, and Recruitment in Large Marine Ecosystems — *Geoffrey C. Laurence*

Perspectives on Larval Fish Ecology and Recruitment Processes: Probing the Scales of Relationships — *Christopher T. Taggart* and *Kenneth T. Frank*

Theory and Management of Large Marine Ecosystems

Scaling Pattern and Process in Marine Ecosystems — *Robert E. Ricklefs*

Physical and Biological Scales and the Modelling of Predator-Prey Interactions in Large Marine Ecosystems — *Simon A. Levin*

Biomass Potential of Large Marine Ecosystems: A Systems Approach — *Nicholas J. Bax* and *Taivo Laevastu*

Productivity, Perturbations, and Options for Biomass Yields in Large Marine Ecosystems — *Kenneth Sherman*

Geographic Perspectives in the Management of Large Marine Ecosystems — *Lewis M. Alexander*

Interrelationships of Law in the Management of Large Marine Ecosystems — *Martin H. Belsky*

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American Association for the Advancement of Science

This Week in SCIENCE

Li-Fraumeni gene?

LI-FRAUMENI syndrome, which occurs in families, appears to be under the control of a rare dominant gene. Diverse tumors arise in both young and old family members, and the mortality rate is high. Malkin *et al.* assessed the possibility that the tumor suppressor gene p53 was responsible for this syndrome, because mutations that inactivate the gene have been found in many of the types of tumors that arise in Li-Fraumeni syndrome (page 1233). In five affected families, the p53 gene had germ line mutations, and in two families, the identical mutation was present. An International Working Group on Li-Fraumeni syndrome has identified 100 families with the syndrome; the analysis can therefore be extended to these families and a determination made of the importance of p53 inactivation in occurrence of this syndrome. Marx elaborates on the implications of these findings (page 1209).

Tsunami hazard

THE Cascadia subduction zone stretches more than 1000 kilometers along the Pacific coast of North America. Strain energy may be building up in the zone and could eventually be released in a strong earthquake that could generate potentially destructive tsunamis (tidal waves). Ng *et al.* used mathematical models to examine likely outcomes of a great earthquake (magnitude 8.5) caused by uplift of the sea bottom along the Winona, Explorer, and northern Juan de Fuca segments of the zone (page 1248). The simulations address a number of issues that are vital for determining outcomes: How quickly would waves arrive at Vancouver Island and various locations along the mainland? How would the magnitude of the earthquake affect the size of the tsunami? How large a role would tides play in flooding and erosion? How would wave amplitude diminish as the wave moved toward land? What effects do local topographic features have in wave propagation? And how would the outcomes differ if one, two, or three sections were to rupture?

Plant-insect relations

WHEN beet armyworm caterpillars munch on corn seedlings, a number of volatile terpenoids are released from the injured portion of the plant (page 1251). The smelly terpenoids attract parasitic wasps that then eat the caterpillars. Terpenoids are not released if plant leaves are artificially nicked, unless the nicked site is also coated with regurgitated material from the caterpillar gut. Volatiles placed on a piece of paper can also attract wasps. Turlings *et al.* speculate that the terpenoids may be components of the plant's defense against injury and point out that these or similar compounds might powerfully augment biologic control of plant pests.

Gramicidin channels

GRAMICIDIN molecules form channels that transport monovalent cations from one side of a cell membrane to the other. The membrane-active form is a dimer whose structure is fairly well understood; the mechanism by which gramicidin is inserted into the membrane has been less clear. Studies by O'Connell *et al.* demonstrate that gramicidin monomers, not dimers, are inserted from the aqueous exterior into each monolayer of the membrane's lipid bilayer (page 1256); the monomers do not penetrate far into the membrane but are able to meet and dimerize in the bilayer and form the membrane-spanning channel. Gramicidin channels are fairly simple structures; it should therefore be possible to define the roles of individual amino acid residues in folding and insertion.

Cholesterol control

DIETS rich in cholesterol and saturated fats can induce hypercholesterolemia, a pathologic condition marked by excess blood levels of cholesterol and its carrier low density lipoprotein (LDL). But, if the activity of receptors for LDL on liver cells can be increased, cholesterol-LDL complexes can be cleared rapidly from the circulation. The ameliorative effect of an overexpressed LDL receptor gene was demonstrated in experiments by Yokode *et al.* in which the expression of a human LDL gene in mice was not, like expression of normal mouse LDL receptor genes, tied to cholesterol levels (page 1273). When transgenic mice were fed a high-fat diet—one rich in cholesterol, saturated fats, and bile acids—clearance of complexes was so rapid that an increase in plasma LDL could not be detected; normal mice fed the same diet showed an increase in serum LDL and cholesterol. Manipulation of LDL receptor activity, such as has been done in these mice, could be a promising strategy to explore for dealing with clinical hypercholesterolemia.

Agent of Borna disease

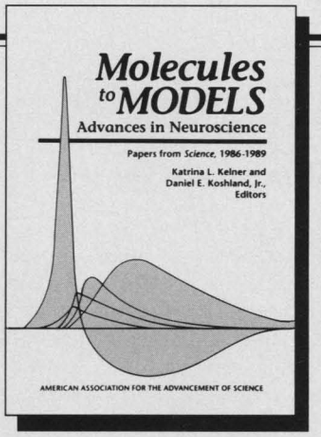
AN infectious agent that is related or identical to the Borna disease virus may be associated with certain human behavioral disorders (page 1278). Borna disease is an unusual neurologic disorder that has an elusive etiologic agent. The disease is endemic in horses and sheep in parts of central Europe; it can be transmitted to other types of animals by injections of homogenates from infected brain tissue. Infected animals display a range of behavioral disorders—aggression, eating disorders, hyperactivity, disrupted social and sexual interactions. Vande-Woude *et al.* report that diseased tissue contains genetic material from an RNA virus, that complementary DNA clones prepared from the tissue can produce viral protein, and that antibody molecules that react with this protein are present in serum of some patients with behavioral disorders but not in healthy individuals. The cloned material provides a needed handle with which to further characterize the Borna disease agent. ■ RUTH LEVY GUYER

New from AAAS

Molecules to Models

Advances in Neuroscience

Edited by Katrina L. Kelner and Daniel E. Koshland, Jr.



This collection of current *Science* magazine articles in the neurosciences provides a comprehensive survey of the entire field. It is especially valuable for graduate students who want to gain a broad understanding of the neurosciences, and for neuroscientists who want to learn more about other areas of these disciplines. Contributors include William A. Catterall, Joseph B. Martin, Corey S. Goodman, Michael I. Posner, Terrence J. Sejnowski, Stephen G. Lisberger, Larry R. Squire, and many other well-known specialists in the field.

1989; 464 pp.; fully indexed and illustrated; color plates
***#89-17S** - softcover; $37.50*
(AAAS members $29.95)

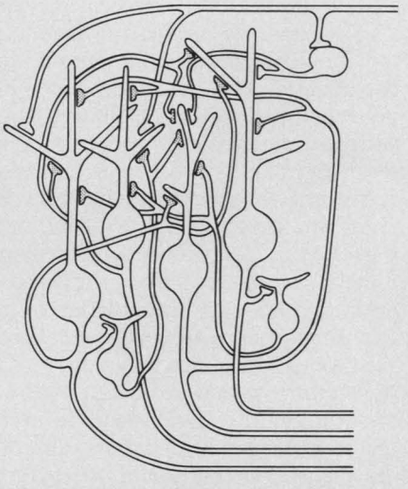
Contents:

I. Ion Channels: Multiple calcium channels and neuronal function; structure and function of voltage-sensitive ion channels; heterologous expression of excitability proteins—route to more specific drugs?; genetic reconstitution of functional acetylcholine receptor channels in mouse fibroblasts; coupling of neurotransmitter receptors to ion channels in the brain; direct activation of mammalian atrial muscarinic potassium channels by GTP regulatory protein G_k; intrinsic electrophysiological properties of mammalian neurons—insights into central nervous system function.

II. Neural Development: Neuronal cytomechanics—the actin-based motility of growth cones; neural cell adhesion molecule (NCAM) as a regulator of cell-cell interactions; growth cone guidance in insects—fasciclin II is a member of the immunoglobulin superfamily; axon guidance and patterning of neuronal projections in vertebrates; specification of cerebral cortical areas; physiological basis for a theory of synapse modification.

III. Learning and Memory: Biochemistry of information storage in the nervous system; long-term synaptic potentiation; the neural basis for learning simple motor skills; neurobiology of learning and memory; mechanisms of memory.

IV. Cortical Function and Behavior: Three-dimensional representation and analysis of brain energy metabolism; behavioral neurophysiology—insights into seeing and grasping; neuronal population coding of movement direction; mental rotation of the neuronal population vector; localization of cognitive operations in the human brain.



"Anatomy" of a simple model neural circuit, from the chapter "Computing with Neural Circuits: A Model," by John J. Hopfield and David W. Tank.

V. Neural Modeling: Computing with neural circuits—a model; dynamic pattern generation in behavioral and neural systems; neural model of adaptive hand-eye coordination for single postures; parallel integration of vision modules; synthesizing a color algorithm from examples; inversion of sensory processing by feedback pathways—a model of visual cognitive functions; computational neuroscience; perspectives on cognitive neuroscience.

VI. Addiction: Neurogenetic adaptive mechanisms in alcoholism; cellular and molecular mechanisms of drug dependence; the biological tangle of drug addiction; breaking the addiction cycle.

VII. Neurological Disease: Molecular genetics—applications to the clinical neurosciences; brain imaging—applications in psychiatry.

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