

Guilfoyle blames the situation on a shortage of information (a pretty safe bet) and, as a substitute, treats us to animal examples. Plant scientists perennially hope to use discoveries made in animal systems as a shortcut to success. There is often a snare in a shortcut, in this case the ease with which it is possible to discover only and exactly what you expect to find. The hard evidence that  $\text{PIP}_2$  cleavage to  $\text{IP}_3$  and DAG takes place at all in plants is scant. If this process weren't so firmly documented in animals I doubt that it would still be pursued at all in plants.

Blowers and Trewavas blame the overwhelming complexity of biochemical interaction within a single cell and encourage us to gape at the range of subtleties of which this multidimensional cybernetic lacework might be capable. The approach can be extended to include all the states of all plant cells: the huge number of different plants, each with its own set of different cells, each cell type responding differently to each of a range of signals, and the pattern of response altering with time or in response to various signals. This versatility is amplified because plant cells are linked together interactively in transputer-type arrays without which responses like root gravitropism, solar tracking, and photoperiodic induction of leaves could not occur. In attempting to deal with signals and responses involved in just the reaction to pathogens, Thomas Boller gives us a glimpse of the bewilderingly rich variety of interaction and gently pokes fun at the inadequacy of the "second messenger" concept to cope with it.

No one can yet rule out the possibility that there exists some yet-to-be-discovered, single universal subroutine for signal transduction in plants, but the evidence collected in this book favors multifarity. So also would the haphazard nature of evolution. To bounce cells between homeostatically buffered, alternative states requires the temporary dislocation of homeostatic control—a miniature catastrophe. In evolution virtually all such catastrophes would be expected to be lethal, like mutations. Most of the non-lethal types would be resolved by the restoration of the original state. Of those few that result in a new order within the cell, only a minority will confer no selective disadvantage on the organism. Features common to more than one example of signal transduction may represent the equivalent of mutational "hot spots." On these grounds, precipitating a calcium crisis, by whatever means, seems to offer a safer dislocation than most.

Much of the evidence we have regarding events triggered by signal reception is based on correlation only. The possibility that many of these events are dead ends renders

such evidence useless. Take, for example, the induction of cell division in cultured soybean cotyledonary cells in response to the plant growth substance cytokinin. The rapidly ensuing stimulation of hydrogen ion extrusion, hyperpolarizing the plasma membrane, and recruitment of ribosomal subunits into polysomes have both been shown to be unrelated to the subsequent cell division (M. Bevan and D. H. Northcote, *Planta* **152**, 24–31 [1981]; A. Parsons, S. Blackford, and D. Sanders, *ibid.* **178**, 215–222 [1989]). To establish the mechanism of signal transduction in plant cells we must have evidence of causal connection between early biochemical events generated by the signal and the eventual physiological or developmental response.

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## Some Other Books of Interest

**Studies of High Temperature Superconductors.** ANANT NARLIKAR, Ed. Nova Science, Commack, NY, 1989. Vol. 1, xiv, 381 pp., illus. \$72. Vol. 2, xviii, 367 pp., illus. \$72. Vol. 3, xviii, 413 pp., illus. \$74.

**Physical Properties of High Temperature Superconductors I.** DONALD M. GINSBERG, Ed. World Scientific, Teaneck, NJ, 1989. x, 516 pp., illus. \$84; paper, \$48. Progress in High Temperature Superconductivity.

These volumes represent ventures to keep an advanced-level readership apprised of developments following on Bednorz and Müller's 1986 discovery of the occurrence of superconductivity at temperatures substantially higher than had previously been known.

First to appear was the *Studies* series, already comprising three volumes, with a fourth imminent. Each of the first volumes contains 15 chapters with a highly international authorship. Volume 1, for instance, opens with chapters on the oxygen hole mechanism of superconductivity by C. N. R. Rao and electronically driven instabilities in high-temperature superconductors by Kazushige Machida and includes chapters on the use of a strong coupling theory by Josef Rammner, twins in  $\text{YBa}_2\text{Cu}_3\text{O}_{7.8}$  superconductors by C. J. Jou and J. Washburn, and the role of Mott-insulation, non-stoichiometry, and altered valence by G. J. Hyland. Each volume includes a subject index, tables of contents of its predecessors, and a list of papers planned for future volumes.

*Physical Properties of High Temperature Superconductors* joins a larger series that has

already included nine volumes, mostly conference proceedings. In the opening chapter of volume 1 Ginsberg gives a history and overview of the field. There follow seven chapters on more specific topics: thermodynamic and macroscopic magnetic properties (Salamon; Malozemoff), neutron scattering studies (Birgenau and Shirane), normal-state transport and elastic properties (Allen *et al.*), rare earth and other substitutions (Markert *et al.*), infrared properties (Timusk and Tanner), and Raman scattering (Thomson and Cardona). A subject index is included. In general, the papers give a bit more in the way of general background to their subjects than do those in the *Studies* series. Specific details of projected future volumes of the *Physical Properties* subseries are not given, but it is expected that some topics omitted from this one, such as nuclear magnetic and quadruple resonance, microstructure, and photoemission, as well as further developments in the topics already treated, will be included.—K.L.

## Books Received

**The Child in the Physical Environment.** The Development of Spatial Knowledge and Cognition. Christopher Spencer, Mark Blades, and Kim Morsley. Wiley, New York, 1989. xiv, 302 pp., illus. \$97.95. NATO Advanced Science Institutes Series A, vol. 164. From a workshop, Keele, U.K., July 1988.

**Cochlear Mechanisms.** Structure, Function, and Models. J. P. Wilson and D. T. Kemp, Eds. Plenum, New York, 1989. xii, 506 pp., illus. \$97.50. NATO Advanced Science Institutes Series A, vol. 164. From a workshop, Keele, U.K., July 1988.

**Computer Simulation and Computer Algebra.** Lectures for Beginners. D. Stauffer *et al.* 2nd ed. Springer-Verlag, New York, 1989. xii, 155 pp. Paper, \$22.

**Drug Treatment of Cancer Pain in a Drug-Oriented Society.** C. Stratton Hill, Jr., and William S. Fields, Eds. Raven, New York, 1989. xx, 380 pp. \$86. Advances in Pain Research and Therapy, vol. 11. From a conference, Houston, TX, March 1988.

**L'Echec des Surrégénérateurs.** Autopsie d'un Grand Programme. Dominique Finon. Presses Universitaires de Grenoble, Grenoble, France, 1989. 327 pp. Paper, F 128.

**Functional Morphology of the Evolving Hand and Foot.** O. J. Lewis. Clarendon (Oxford University Press), New York, 1989. viii, 359 pp., illus. \$125.

**Gene Regulation by Steroid Hormones IV.** A. K. Roy and J. H. Clark, Eds. Springer-Verlag, New York, 1989. xii, 239 pp., illus. \$59. From a conference, Fall 1988.

**Genetics of Kidney Disorders.** Christos S. Bartsocas, Ed. Liss, New York, 1989. xvi, 218 pp., illus. \$58. Progress in Clinical and Biological Research, vol. 305. From a seminar, Rethymno, Greece, Oct. 1988.

**Genetics of Neuromuscular Disorders.** Christos S. Bartsocas, Ed. Liss, New York, 1989. xiv, 216 pp., illus. \$48. Progress in Clinical and Biological Research, vol. 306. From a seminar, Rethymno, Greece, Oct. 1988.

**Intestinal Metabolism of Xenobiotics.** A. Sj. Koster *et al.*, Eds. Fischer, Stuttgart, 1988 (U.S. distributor, VCH, New York). xvi, 338 pp., illus. Paper, \$96.50. Progress in Pharmacology and Clinical Pharmacology, vol. 7, no. 2.

**An Introduction to Metamorphic Petrology.** Bruce W. D. Yardley. Longman Scientific, Harlow, U.K., and Wiley, New York, 1989. xiv, 248 pp., illus. Paper, \$37.95. Longman Earth Science Series.

**Multipoint Magnetospheric Measurements.** C. T. Russell, Ed. Published for the Committee on Space Research by Pergamon Press, Elmsford, NY, 1989. viii, 464 pp., illus. Paper, \$120. Advances in Space Research, vol. 8, nos. 9–10. From a symposium, Espoo, Finland, July 1988.