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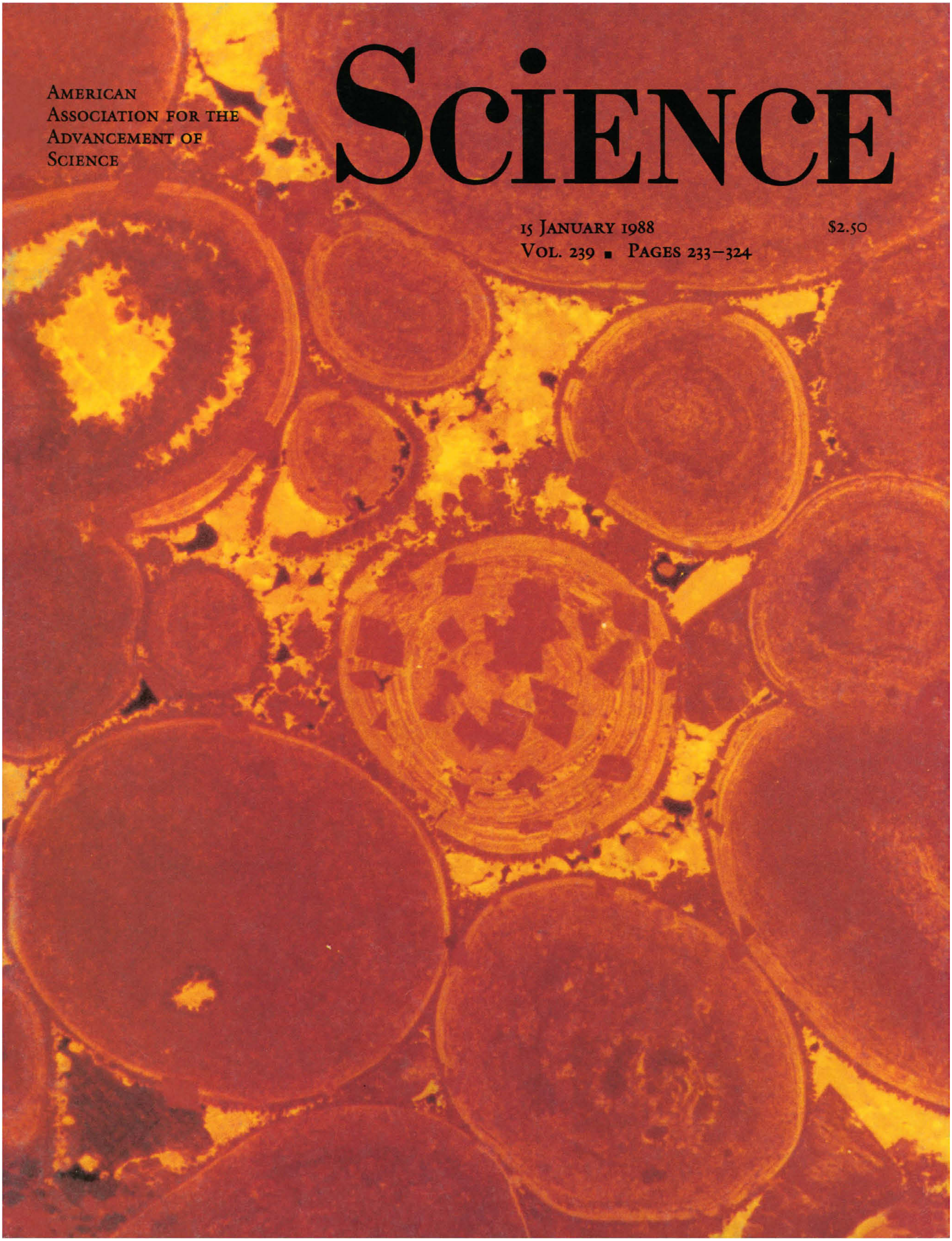

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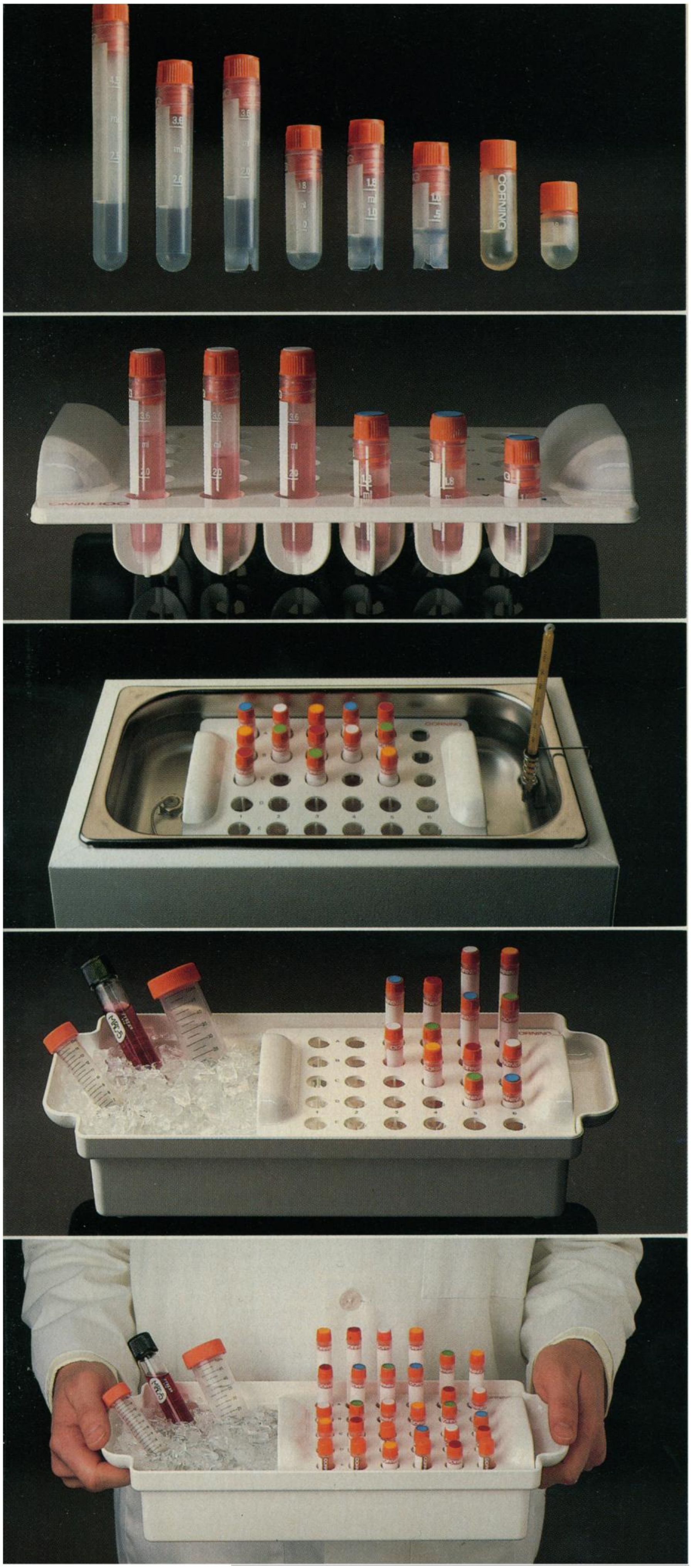

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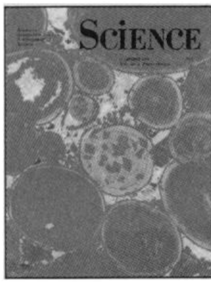

COVER Photomicrograph taken under cathodoluminescent illumination of 30-micrometer-thick slice of limestone from Jurassic Smackover formation, east Texas at 3.2-kilometer depth. Calcite cements (bright yellow and dull orange) fill the pore spaces between round sand-sized ooids. Grain in center is about 0.5 millimeter in diameter. See page 261. [Photo courtesy of Stuart C. Williams, Exxon Production Research Co., Houston, TX 77001]

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This Week in SCIENCE

Anchors and signals

PROTEINS can be held in cell membranes by glycosyl-phosphatidylinositols; these are complex anchors consisting of sugars and phospholipids (page 268). Similar glycosylphosphatidylinositols seem to be important in the transmission of insulin signals through cell membranes in order to induce some of the pleiotropic effects associated with insulin action. Low and Saltiel review recent work on this interesting class of molecules, discussing how these molecules might be precursors for insulin's "second messengers," how they were first identified as self-surface anchors, what variations on the basic structural theme of glycosyl-phosphatidylinositols exist, what is known about the biosynthesis and assembly of such molecules, what naturally occurring enzymes cleave proteins from these anchors, and what types of proteins (about 30 are known so far, and they are associated with diverse cell types) use this strategy for anchoring into cell membranes.

Anchors and bacterial motility

ROTATING flagellae make it possible for bacteria to swim (page 276). In the cell membrane, cell wall, and outer membrane of motile bacteria, numerous proteins make up a motor that drives rotation; proton fluxes power the motor. One protein crucial to the coupling of proton movement with the mechanical work of the motor is MotB. Insight into how MotB might work has been gained through genetic and biochemical manipulations of MotB molecules in *Escherichia coli*. The MotB protein has 308 amino acids; only a small portion of the molecule associates with the cytoplasm on the inside of the cell, a hydrophobic domain is embedded in and spans the membrane, and most of the molecule is situated in the periplasmic space between the cell membrane and cell wall. Several MotB molecules appear to be located around flagellar motors, and thus Chun and Parkinson propose that MotB molecules may serve as structural supports, anchoring the force-generating components of the rotational machinery to the cell wall.

Fungal superglue

A strong new natural glue, spore tip mucilage (STM), has been discovered that, like other bioadhesives, may have applications in such diverse fields as medicine and materials science (page 288). In nature STM glues fungal spores of *Magnaporthe grisea* to leaves and other parts of rice plants that then succumb to rice blast disease, a devastating and costly blight. Hamer *et al.* analyzed glue release and spore attachment by observing these processes on Teflon films which, like the waxy rice plant leaves, are nonsticking wet-resistant surfaces. The glue is apparently stored in dehydrated form in a specialized compartment at the spore's apex. When the spore is hydrated, STM is also hydrated and released; it then effects attachment of the spore to the host plant. STM release occurs before spore germination; later, a germ tube is produced and still later the infection structure of the fungus, the appressorium, develops. The release of STM thus appears to be an important early event in fungal pathogenesis and, if the release process is an inhibitable one, effective control of rice blast disease might be possible.

Immune reactivity in the brain

IMMUNE reactions are uncommon but not unheard of in the central nervous system (CNS); they occur, for example, during development of multiple sclerosis and certain other neurologic diseases (page 290). In a study of how experimental allergic encephalomyelitis, a model for multiple sclerosis, develops in rats, Hickey and Kimura identified perivascular microglial cells as one type of cell that can participate in CNS immune reactions. These cells (which in the experimental system came from a bone marrow transplant and could be identified by histocompatibility molecules) are wrapped around CNS blood vessels and have constant exposure to normal CNS molecules. It is likely that they bind such environmental molecules and act as antigen-presenting cells; when the antigens are recognized by immunocompetent cells, inflammation and other signs of autoimmunity are produced. The seeding of the CNS by these cells is a normal physiologic process. In recipients of bone marrow transplants, the seeding of the CNS by bone marrow antigen-presenting cells from a source that is not "self" may alter antigen recognition in the CNS. Aberrant functioning of antigen-presenting cells is one crucial component in the development of human autoimmune diseases such as multiple sclerosis.

Toxification of corn and bacteria

SOUTHERN Corn Leaf Blight is caused by a fungus that produces a toxin called BmT-toxin (page 293). The susceptibility of certain kinds of corn to this toxin depends on the mitochondrial gene *urf13-T*. Whether *urf13-T* is expressed in mitochondria of the natural corn host or in a bacterial host, it confers toxin sensitivity to host cells. Dewey *et al.* show that, in the presence of the fungal toxin, bacterial (*Escherichia coli*) respiration is inhibited, and spheroplasts of *urf13-T*–containing bacteria swell just as inhibited respiration and swelling occur in *Zea mays* L. mitochondria. Corn and bacteria also respond similarly to an insecticide that can mimic the effects of the toxin. The *urf13-T* gene product is a 13-kilodalton protein that appears to interact with the toxin (or the insecticide), making the cells susceptible to the toxic effects. The *E. coli* system for expressing the *urf13-T* gene product should simplify studies of how this eukaryotic protein interacts with toxin and insecticide, how it inhibits respiration, and what structural features affect its functioning.

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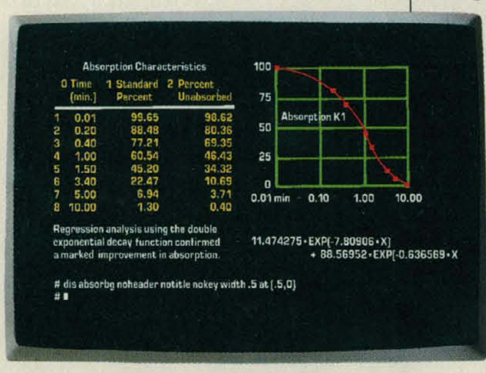

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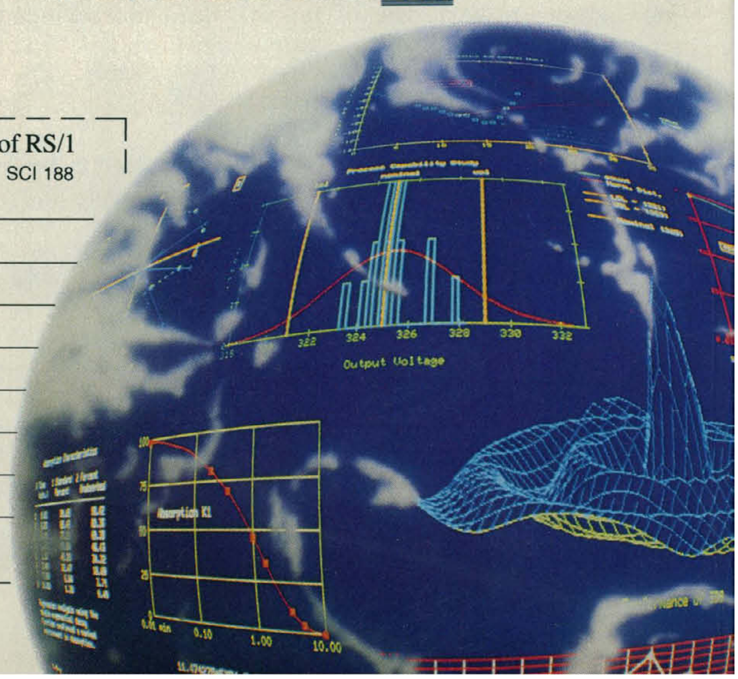

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Balance in *Science*

Science is a low-paying profession. The reason that scientists, who are a fairly intelligent group, put up with this situation is the psychic bonus, the belief that we are conquering difficult problems crucial to the future of mankind. Inevitably this beneficial self-hypnosis leads to some parochialism, which creates problems for an interdisciplinary journal like *Science*. Each group is convinced that the minimal space allocated to its subdiscipline must be the result of chicanery or benign neglect. Even biological scientists, who have a long history of predominance in *Science*, complain that their subspecialties are not adequately represented. Molecular biologists see too many reports on whole animal research, those not involved in AIDS research see too many articles on AIDS, and so on. It seems worthwhile at this time to explain some facts and policies in regard to the selection of research papers for *Science*.

First let me emphasize that manuscripts are always evaluated by individuals in the same discipline. Psychologists review psychology papers, anthropologists anthropology papers, physicists physics papers, et cetera, and in general the reviewers do an excellent job. They may lobby for more of their own discipline in the magazine, but they do not water down their standards in order to add to the number count of their specialty. The percentage of acceptances has remained relatively constant across the major disciplinary lines, and thus the types of papers appearing in *Science* are in general proportional to the manuscripts received. Within subdisciplines, however, there are changes as new discoveries create new frontiers, and some fields "mature." This proportionality, not surprisingly, corresponds roughly to funding levels in the different subdisciplines.

Is there an editorial bias? The answer is, "Yes," but for the general and the innovative, not for one discipline in preference to another. The heavy representation of biology has been true for *Science* since its inception. Nevertheless, there is a commitment on the part of the staff of *Science* and the AAAS to broaden the balance in the magazine. The AAAS has endorsed a policy of adding pages to increase the underrepresented areas without decreasing the strength in biology. Steps have been taken in regard to the social sciences, which are an increasing part of the journal today. Due to the fine work of our deputy editors and a specially recruited staff in the physical sciences, the groundwork for added emphasis on the physical sciences (knowledgeable editing and greater publication speed) is in place.

Occasionally there is a self-fulfilling prophecy situation, in which individuals seeing fewer papers in their area of specialization conclude that the journal is no longer interested in that specialty. But *Science* is interested in the entire range of science, and the transient ebb and flow in one area should not discourage any author who has an appropriate contribution. There is a comfort in numbers, but there is also honor for the lonely pioneer. Others will inevitably follow in his or her footsteps.

Because of the large circulation of *Science* (approximately 10 to 20 times that of most specialty journals), it must remain small in order to be economical. That means that we must continually distill the best from each area to accommodate the added productivity of modern research. The wide circulation of *Science* means that the number of personal subscribers, library copies, and pass-along readers in a subdiscipline is usually as large as the number of readers of specialty journals in that area. It might be argued that there is no need for an interdisciplinary journal, that an assortment of larger specialty journals, each with a limited circulation, is enough. To me the answer is that both are needed. The excellent specialty journals print thousands of pages that will never be feasible for *Science*. At the same time, this is an age of increasing interdisciplinary research and it is not always apparent which contributions in one field will have dramatic importance in another. Nuclear magnetic resonance, lasers, and positron emission are being used by biologists. Social science today considers both nature and nurture. The scientist who is too provincial is liable to miss interdisciplinary applications to his own research.

Science's Research News and This Week in *Science* are attempts to aid in interdisciplinary communication, but research articles at the cutting edge of many disciplines in a single journal are essential for that process. Balance does not mean that percentages are assigned to each subdiscipline, but it does mean that the journal is dedicated to a general balance in which articles from all disciplines are welcome.—DANIEL E. KOSHLAND, JR.

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Organizational Possibilities

New Technology at Work. ARTHUR FRANCIS. Clarendon (Oxford University Press), New York, 1986. viii, 216 pp. $39.95; paper, $13.95.

In a conversation with the American manager of a sheet metal fabrication plant recently returned from a trip to Japan, I asked what impressed him most about the factories he had seen. His immediate, almost gleeful response surprised me. No words of praise for quality control circles or employee dedication or innovative management practice. Instead, he exclaimed, "At five o'clock when they blow the whistle, the last guy out turns off the lights but the *machines are still running*." What impressed him was the ability to produce parts without people, to eliminate one persistent source of uncertainty, anxiety, and conflict. The stars in his eyes told me that, for him at least, microelectronic technology held forth the promise of an industrial heaven on earth.

In *New Technology at Work*, Arthur Francis warns us that that manager is not alone. New technologies—in the form of new generations of machine control systems, computer-aided design and manufacturing, and information systems—can be hammers in the hands of managers seeking to flatten uncertainty, pound out new organizational structures, and renovate work processes. Yet, Francis argues, there is more to be gained from new technology than a vulgar Taylorist heaven on earth. In fact, the pursuit of job fragmentation, deskilling, and an increased segmentation of mental and manual labor—traditional attributes of the American interpretation of mass productionism—may not lead to the most productive use of technological innovations. As Francis points out in a survey of new technologies, there is mounting evidence that even though machine control systems may eliminate unskilled jobs they actually increase the demand for highly skilled maintenance and service workers. Few of the systems truly "run by themselves": committed and attentive operators are essential for smooth operation. Moreover, developments in information technology, from word processors to expert systems, make possible entirely new arrangements of work tasks (for example, enabling the combination of formerly fragmented jobs like typing and accounting). Thus, he suggests, there is no necessary connection between new technology and old management practice. New technology means new possibilities.

Whether new technology will *cause* new work practices, new approaches to management, or new forms of organization is not the issue. Rather, Francis contends, the central question is how new technology will be *used*: its potential uses have to be analyzed and understood in the context of specific situations, since use depends "not just on technology itself, but on the strategy and power of the various interested parties" (p. 8). Framed this way, the book seeks to spotlight the individual, group, and organizational dimensions of technological change as a way for the "interested parties" (workers, unions, managers, and policy-makers)

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WLS-I DATA BASE

The U.S. Environmental Protection Agency announces the availability of data from the National Surface Water Survey—Western Lake Survey*. The Western Lake Survey was a synoptic, autumn survey of 752 lakes in the Western regions of the United States suspected of containing large numbers of low alkalinity lakes. The data base includes lake and watershed physical characteristics, in-situ measurements, and analytical laboratory results. The complete data set is available on a standard 9-track computer tape; a subset of key variables is available on a 1.2 MB PC-DOS 5-¼" floppy disk. A description of the data set, list of available formats, and order forms can be obtained by sending a postcard to:

Dixon H. Landers
U.S. Environmental Protection Agency
Environmental Research Laboratory
200 SW 35th Street
Corvallis, OR 97333

*D.H. Landers, J.M. Eilers, D.F. Brakke, W.S. Overton, P.E. Kellar, M.E. Silverstein, R.D. Schonbrod, R.E. Crowe, R.A. Linthurst, J.M. Omernik, S.A. Teague, and E.P. Meier. 1987. Characteristics of Lakes in the Western United States. Volume I: *Population Descriptions and Physico-Chemical Relationships.* EPA-600/3-86/054a. U.S. Environmental Protection Agency, Washington, D.C.