

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 in-

crease 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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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 5-1/4" floppy disk. A description of the data set, list of available formats, and order forms can be obtained by sending a postcard to:

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U.S. Environmental Protection Agency
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200 SW 35th Street
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*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.

to arrive at a more holistic assessment of the potential applications of new technology.

Francis initiates his case for the range of potential realities by calling into question some of the bold predictions made by economists and sociologists about the consequences of new technology. He points out that even though there has been tremendous attention paid to dire predictions about job loss stemming from new technologies, the evidence is not especially convincing from either the doomsayers or the techno-Pollyannas. The same conclusion applies to predictions of wholesale deskilling for the industrial and clerical labor force: in some case studies Francis surveys, there has been a clear diminution of skill and worker discretion; in others, however, jobs have been enlarged, for example through the addition of programming skills, or enriched through a more explicit connection of workers to the whole of a production activity rather than the parts.

Having established that outcomes do not reside in the technology itself, Francis then explores the forces that can and will shape the organization of work and the enterprises in which it is carried out. He notes, for example, that market forces will play an important role in the selection and implementation of technologies, particularly as some enterprises sharpen their ability to collect data about their environment, process it quickly by means of powerful (but relatively inexpensive) computers, and react to shifts in competition and in investment opportunities. To capture the benefits of information processing and manufacturing flexibility, enterprises may be compelled to abandon the time-honored principle of hierarchy and search for new organizational designs, for example, building strategic alliances with other firms, subcontracting functions rather than vertically integrating them, or creating team models within a matrix organization. Traditional methods of supervision and control may be rendered archaic through the introduction of highly integrated systems of production, inspection and monitoring, and inventory control.

Translating potential uses into reality will, Francis concedes, require active deliberation and negotiation on the part of unionists and policy-makers, in addition to enterprise managers. To that end, he devotes the final chapters of the book to a checklist of issues that ought to be part of technology assessment. Since the preceding chapters argue against technological determinism—and, in the process, underscore the variable uses of new technology—the prescriptive checklist tends to be quite general in nature. It may provide a beginning agenda for discussion, particularly for union leaders and politi-

cians, but it will have to be substantially revised and augmented if those in the trenches (such as lower-level union representatives, middle managers, and engineers) are to be meaningfully engaged. On its own, *New Technology at Work* is unlikely to shake the stars from the eyes of the manager who wants his factory to run by itself.

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Crosscurrents in Cytogenetics

Beyond the Gene. Cytoplasmic Inheritance and the Struggle for Authority in Genetics. JAN SAPP. Oxford University Press, New York, 1987. xvi, 266 pp. \$35. Monographs on the History and Philosophy of Biology.

In *Beyond the Gene*, Jan Sapp has written a book that will inform, delight, and infuriate. It informs because it gives an extended survey of research into cytoplasmic inheritance, an area ignored by the standard histories of genetics and biology. It delights because the printed and archival material Sapp brings to light is lively and provocative. It infuriates because Sapp has in reality written two books, and the second—about authority in science—does not interdigitate well with the first. I will address this last feature at the end of the review.

The first two chapters set the conceptual parameters of the survey. Sapp turns to an array of embryologists and Mendelian geneticists who between 1910 and 1940 expressed dissatisfaction with the contemporary chromosomal explanation of heredity. Some, such as Frank Lillie and Albert Brachet, complained that classical genetics failed to elucidate the processes of development and evolution. Others, such as Carl Correns and Erwin Baur, argued that the cytoplasm also contained hereditary material. Endorsing the second assertion, Jacques Loeb went further to insist that “the cytoplasm of the egg is the future embryo (in the rough)” and that “the Mendelian factors only impress the individual (and variety) characters upon this rough block” (quoted on p. 21). Sapp argues that during this period classical genetics, by designating hereditary events as solely those phenomena that could be studied by the classical hybridization techniques, “constructed” its own, delimiting definition of heredity. In so doing, it left the impression that development was merely an epiphenomenon, and it ignored cytoplasmic bodies that might plausibly serve as structures of transmission. The 20th-century efforts to investigate and pro-

mote these two excluded domains of “heredity” are explored in the subsequent chapters. Although they are different, Sapp designates both as “cytoplasmic inheritance.”

In a chapter devoted to Germany Sapp surveys the ideas of cytoplasmic heredity of Victor Jollos, Hans Winkler, and Fritz von Wettstein, among others. In one way or another these biologists challenged the “monopoly of the nucleus.” Some of the biographical events, such as Jollos’s inability to gain professional recognition when he immigrated to the United States, provide intriguing social history, but the vignettes of German biologists, as a whole, are the weakest part of the book because they fail to place the cytoplasmic ideas into the broader context of German research. Better constructed are the ensuing chapters on Tracy Sonneborn and his discovery of the kappa factor in *Paramecium* and Boris Ephrussi and his production of mutants petites in yeast. In addition to giving a fuller perspective on the life and work of these pivotal figures the same chapters depict George Beadle as the “bastion of Mendelism” and C. D. Darlington and Joshua Lederberg as adding interpretative support to the concept of plasmagenes. Sapp nicely disentangles the neo-Lamarckian backdrop to French biology before presenting the further cytoplasmic research of Philippe L’Héritier, André Lwoff, and Jean Brachet. These central three chapters leave the impression that research into cytoplasmic inheritance represented a vigorous and challenging undertaking even though it appeared not to be in the mainstream of genetics.

Sapp reexamines the Lysenko affair and its impact on Western biology from the perspective of cytoplasmic inheritance. Recently Nils Roll-Hansen has pointed out that T. D. Lysenko’s earliest work on vernalization had been applauded by some Western scientists. It would not have been inappropriate, Sapp intimates, for Western biologists therefore to take his initial hereditary claims seriously. It is valuable to discover how Lysenko’s actions were received by supporters of cytoplasmic inheritance in the West when in the late 1940s he officially suppressed classical genetics and claimed to have demonstrated cytoplasmic and environmental influences in heredity. But Sapp has more in mind. “Did [classical geneticists] use Lysenkoism as a weapon to attack their Western competitors who opposed classical neo-Darwinian doctrines . . . ?” (pp. 167–68). What follows are fascinating accounts of how Sonneborn as president of the Genetics Society of America failed in his attempt to establish a Committee to Counteract Antigenetics Propaganda with power to speak for the entire society and how