Confrontations Close to Home

Contaminated Communities. The Social and Psychological Impacts of Residential Toxic Exposure. MICHAEL R. EDELSTEIN. Westview, Boulder, CO, 1988. xx, 217 pp. $33.

The experience and thoughts of residents of a New Jersey community faced with news that a toxic landfill has contaminated their wells make up the substantive core of *Contaminated Communities*. The findings of the case study, based on and enriched by extensive quotes from interviews, are compared with the findings of case studies of other communities done by Edelstein (usually in the role of consultant to citizens' groups or law firms) and other social scientists.

Edelstein notes that the problem of dealing with toxic exposure, which he analyzes with a model of phases of coping like those used in studies of natural disasters, is compounded by the "technological" nature of the disaster. Among other things, from the outset the "victims" must interact with government officials, who have the unenviable positions of being the bearers of bad news, interpreters of that news, and protectors or remediators of the public against the effects of the bad news. In some situations, as in Legler, New Jersey, the government may also be the cause of the problem. Accordingly, much of the stress and distress people experience comes not from direct exposure to toxic compounds but from direct exposure to government officials and technology experts. The process of encounter may be "disabling" for both sides, and some people may give up or lapse into depression, but it may also be "enabling," prodding citizens to organize and engage in political and legal action. The effectiveness of the latter course is given testimony by the current stalemate in hazardous waste siting in much of the United States.

Accordingly, communities are not impacted so much as they are created by exposure to toxic chemicals. The "enabling" process is one in which private troubles become public issues and whereby a community of the afflicted is created. The boundary of contamination becomes the boundary of a community of shared interests and values that is created in the "enabling" process. This may be therapeutic for some people, in that it offsets the stigmatization and attrition of social support from other networks of relationship that usually follow news of toxic exposure. It is clearly therapeutic in the larger sense, in that community development means greater political pressure on officials and a better chance of cleanup and compensation. However, the formation of a sustainable community does not always happen. As elsewhere in the book, Edelstein tries to address the question of the conditions under which it does or does not happen by comparing the case at hand with other cases and with the findings of other kinds of research (that is, surveys).

The flawed process of communication is also depicted in cognitive terms. There are fundamentally different modes of thought and significance involved in determining acceptable risk. For example, "technocratic" government officials and scientists are likely to see type I errors as "errors of rashness," to be avoided, and type II errors as "errors of caution," and preferable. But "democratic" citizens concerned about their health and that of their children, and about property values, are more likely to see a type I error as the conservative and hence preferable choice: better to err on the side of exaggerating the problem than to risk not seeing the problem that might be there. Edelstein's analyses of the differing paradigms for acceptable risk and of citizen-government interaction are not wholly original, but they provide a useful summary of the literature and background to the problem of risk communications.

Many and diverse are the psychosocial impacts of toxic exposure at Legler (Jackson Township), New Jersey, Love Canal, New York, Times Beach, Missouri and other neighborhoods in which homeowners and families have been forced to confront the problem of hazardous waste disposal in the most immediate and frightening way. The cognitive impacts are particularly dramatic. Those people who accept that the problem exists are forced to reassess the most fundamental assumptions of their culture ("lifescape") about health, the natural environment, the meaning of the home, and the role of government. It is this reassessment, and search for alternatives, that leads many to view grass-roots protests over toxic exposure as the vanguard of a major social movement and potential cultural change of the most fundamental kind. Near the end of the book, the NIMBY ("Not in My Back Yard") phenomenon is discussed in the context of a new social movement (which has taken state and national form) and Lois Gibbs's counter slogan: "Not in Anyone's Back Yard." Edelstein is clearly influenced by Habermas and other critical political theorists and tentatively starts, in the concluding chapter, to articulate a more fundamental analysis of the contradictions in modern industrial society that may make it impossible to resolve hazardous waste problems and protect people from them short of the radical social and cultural change that would be required to lead to substantial source reduction.

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Physical Mineralogy

Structural and Magnetic Phase Transitions in Minerals. S. GHOSE, J. M D. COEY, and E. SALJE, Eds. Springer-Verlag, New York, 1988. xii, 244 pp., illus. $59.50. Advances in Physical Geochemistry, vol. 7. From a symposium, Stanford, CA, July 1986.

Significant changes have been occurring in the geological sciences (now called earth sciences). Suddenly earth scientists are embracing other disciplines, holding meetings with physicists, chemists, and materials scientists, and establishing common ground.

This book illustrates the new togetherness with studies of phase transitions in minerals. The editors have been in the forefront of the earth scientists who are hardly distinguishable from physicists, chemists, and materials scientists and so are admirably suited to produce a book such as this.

The book's 12 chapters come from an international group of scientists of widely differing backgrounds. Topics covered range from the Landau thermodynamic theory of transitions in feldspars to the study of incommensurate phases, where the lattice does not correspond to the true unit cell repeat expected in most crystal structures. Both these subjects have tended to be the province of the physicist, more as curiosities than as of direct applicability to the real world. However, we now know that even a crystalline material as complicated and as abundant as feldspar (which makes up much of the earth's crust) responds to temperature change in a way that can be explained well by relatively simple theoretical physics. That has been, for me, one of the surprises of the new earth sciences. And when incommensurate phases were discovered, who would have thought that they would have any

impact on earth sciences? Far from being esoteric, they occur everywhere, as we now see, even in as common a mineral as quartz.

One of the chapters that interested me particularly deals with the application of quasiharmonic lattice dynamics derived from modified electron gas theory to the mineral $MgSiO_3$. This mineral is probably the most abundant mineral in the earth's lower mantle, and so its study is of prime importance to geophysics. My own interest in the subject stems from work I did long ago on the tilting of oxygen octahedra in perovskites, which include $MgSiO_3$, in order to understand a phase transition in a rather obscure and not very useful material, $NaNbO_3$. I never imagined that this work would have any direct connection with the lower mantle, but again this relationship demonstrates the new closeness between modern earth science and other fields.

Additional chapters are devoted to high- and low-spin magnetic transitions, simulations of molecular dynamics, spin glasses, and polytypism. This is a rich spread of topics that any solid state scientist will recognize.

All in all, the editors have assembled a useful mixture of topics which the new breed of earth scientist, and possibly the old one too, will regard as required reading. I think we are going to see many more books like this in the future.

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Geologic Tubes

Explosion Pipes. VLADIMIR A. MILASHEV. Springer-Verlag, New York, 1988. x, 249 pp. $27. Translated from the Russian edition (Leningrad, 1984) by R. E. Sorkina.

Since the phrase "tubular bodies" is not likely to attract much attention, these geological formations have been lumped into the category of "explosion pipes," even though most researchers now agree that the word "explosion" must be used with many qualifying phrases. *Explosion Pipes* will be valuable to geologically oriented researchers interested in tubular bodies of many origins.

A key to reading this book is recognizing that tubular bodies do have many origins. The author points out that, because of the variety, the scientists who have studied these bodies come from diverse backgrounds. The differences of background and data collected have led not only to diverse conclusions but to severe problems in communication. These communications problems are amplified by the fact that explosion pipes are small, not ubiquitous, and often inaccessible—few researchers have seen more than a small fraction of the pipes in the world.

I recommend reading the conclusion before anything else in this book, even before the summary on the back cover, which might give the erroneous impression that the author considers only magmatic gases. The first sentences in the two-page conclusions section give a much better description: "This book is a synthesis of data on the geostructural setting, morphology, internal structure, mineral composition, and other features of tubular bodies. It deals with many problems relevant to the mechanism and conditions of diatreme formation."

The first half of the book summarizes data and hypotheses about kimberlite pipes. The next section describes nonkimberlite diatremes, and the final section discusses mechanisms and conditions of pipe formation. Here the author spends most of the space reviewing the evolution of concepts and the role of magma and relatively little on the conclusion he supports—that groundwater plays a major role in the formation of the pipes.

I found it difficult to get started with the book because of the author's heavy reliance on data from pipes in the Soviet Union, the many difficult petrologic and chemical terms, the failure of the preface and opening chapter to provide a good overview of the book, and small difficulties in the translation. Aside from these problems, I found the book to be interesting and generally well translated. It is a good summary of data that are difficult to find and of hypotheses about the rise of magma from great depths in the earth and its behavior in the near-surface environment.

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Some Other Books of Interest

Progress and Opportunities in Southern Hemisphere Optical Astronomy. V. M. BLANCO and M. M. PHILLIPS, Eds. Astronomical Society of the Pacific, San Francisco, CA, 1988 (distributor, Brigham Young University Press, Provo, UT). xiv, 427 pp., illus. $32. Astronomical Society of the Pacific Conference Series, vol. 1. From a symposium, La Serena, Chile, Jan. 1988.

In 1988 a symposium was held to celebrate the 25th anniversary of the selection of the site for the Cerro Tololo Inter-American Observatory. In all some 70 astronomers affiliated with institutions in South and North America attended, an effort having been made to invite frequent users of the Cerro Tololo facility. This volume is the proceedings of that symposium, at which contributors were asked not to focus on any preassigned topic but to "emphasize how observations from the southern hemisphere are advancing astronomical knowledge." In part 1 are collected the 18 invited papers delivered at the symposium, beginning with J. A. Graham's "The formation of stars like the sun" and ending with P. S. Osmer's "The space distribution of quasars," the longest papers being O. J. Eggen's "Cepheid variables and associated early type stars," J. E. Hesser's "Globular clusters in the Galaxy and beyond," and a two-part contribution on "Stellar evolution: theory and the real world" by I. Iben, Jr., with Eggen. These papers are preceded by abstracts and followed by brief discussions. Part 2 of the volume consists of summaries of 22 poster presentations from the symposium. In closing remarks Osmer notes some of the advances in astronomy that have occurred since the Inter-American Observatory was first conceived and identifies the strengthening of U.S. astronomy, most immediately through the construction of 8-meter telescopes in Chile and Hawaii, as a challenge for the next 25 years.—**K.L.**

Reviews in Modern Astronomy. Vol. 1, Cosmic Chemistry. GERHARD KLARE, Ed. Springer-Verlag, New York, 1988. viii, 251 pp., illus. $33.10. Based on a meeting, Cologne, F.R.G., May 1988.

This volume inaugurates an annual series sponsored by the Astronomische Gesellschaft and intended to "bring the scientific events of the meetings of the society to the attention of the worldwide astronomical community." The series will include the society's Karl Schwarzschild lectures and sets of papers on particular topics, as in this collection on cosmic chemistry. The volume contains 12 papers, all in English. It opens with a report on the composition of Halley's comet (Geiss), and subsequent papers treat chemical abundances in meteorites (Palme), stars (Gehren), and galaxies (Edmunds). There are also accounts of the chemistry of circumstellar shells (Omont; Goeres *et al.*), interstellar molecular formation (Herbst), nucleosynthesis (Arnould on the theory and Kratz on rapid neutron capture), the solar wind plasma (Schwenn), molecular clouds in the Milky Way as studied in the Columbia-Chile CO survey and with the German KOSMA 3-meter telescope (Ungerechts), and the state of interstellar molecular spectroscopy (Stutzki).—**K.L.**