Approaches to Environmental Regulation

Controlling Chemicals. The Politics of Regulation in Europe and the United States. RONALD BRICKMAN, SHEILA JASANOFF, and THOMAS ILGEN. Cornell University Press, Ithaca, NY, 1985. 344 pp. $34.95.

Loading the Dice. A Five-Country Study of Vinyl Chloride Regulation. JOSEPH L. BADARACCO, JR. Harvard Business School Press, Boston, 1985. viii, 177 pp. $19.95.

Concern about environmental quality has resulted in increased regulation throughout industrialized nations. While the aims of the regulatory actions have been similar, there has been little consensus on the appropriate role of governments in designing and implementing environmental policies. The books reviewed here address this issue by comparing the process of environmental regulation in the United States with that in several other industrialized nations through case studies drawn from the regulation of toxic substances. In *Controlling Chemicals*, the authors examine the regulation of four groups of toxins (food additives, pesticides, chemicals in the workplace, and industrial process chemicals) in four countries: the United States, Great Britain, France, and the Federal Republic of Germany. In *Loading the Dice*, the author examines the regulation of a single chemical, vinyl chloride, in those same countries and Japan.

Though the findings and approach of the books are similar, there are critical differences in their emphasis, objectives, and scope. *Controlling Chemicals* is intended for a scholarly audience. It provides a fount of information on political, legal, and technical aspects of chemical regulation in different countries, and for this reason alone it will be of use to scholars from a broad range of disciplines. The authors exhibit a firm understanding of the interest groups and political institutions that help shape policies in the various countries. Two primary objectives are identified: to explain why different countries adopt different approaches in the control of chemicals (pp. 8–9), and to provide an evaluation of the potential for constructive regulatory reform in the United States (pp. 20–21).

Whether the authors succeed in meeting their objectives is debatable. To explain differences in process, one needs to confront some imposing methodological issues. The general approach taken by the authors is to identify salient dimensions on which the processes appear to differ and then to discuss institutional, cultural, and political factors that could account for the differences. This approach helps capture the complexity and richness of the process of environmental regulation but suffers from a lack of precision in defining the extent to which the various factors account for the observed regulatory outputs.

This problem notwithstanding, a distinct pattern emerges from the study of these nations. The U.S. approach differs from its counterparts in its reliance on complex procedures and formal analytical tools, in the openness of the administrative process to public scrutiny, and in the degree of judicial and legislative oversight. The authors attempt to reconcile this observation concerning differences in approach with the finding that the formal regulations of these countries studied are quite similar in terms of the substances regulated and the standards imposed. The basic conclusion drawn from these two observations is that political institutions may not be very helpful in explaining regulatory outcomes, though they can help explain various aspects of the process of regulation.

In summary, there are major strengths and some notable deficiencies in *Controlling Chemicals*. The task of providing an explicit model of how the regulatory process affects outcomes, and hence the goal of identifying appropriate revisions in the U.S. regulatory process, must await further research.

Loading the Dice is a well-written, penetrating, and persuasive book. In focusing on the regulation of a single chemical the author increases the power of the analysis, given the similarity of conditions facing the industry and policy-makers in each country. The aim of the author is to provide a comparison of the interactions between business and governments. Specifically, how and why do these relations differ and do the observed differences matter? The central thesis is that "institutional arrangements . . . load the dice in favor of cooperation or conflict" (p. 3). In pursuit of this thesis, the author identifies formal and informal networks and hierarchies, identifying important linkages within and across the public sector, labor representatives, and the chemical industry.

The significance of networks in promoting cooperation is emphasized at two distinct levels: institutional and individual. At the institutional level, quangos (quasi-autonomous nongovernment organizations) and cartels are identified. Quangos (in Japan, the Ministry of International Trade and Industry) provide a forum for the constructive exchange of ideas between labor and industry representatives. Networks in Europe and Japan are further strengthened by linkages in the ownership of firms—specifically, the existence of cartels in Europe and keiretsu in Japan. In contrast, the principal forum open to industry and labor representatives in the United States is public hearings, which are frequently adversarial in nature. Moreover, antitrust laws in the United States prohibit cartels and industry-wide linkages.

At the level of individuals, the author suggests that the exalted position of civil servants in some of the nations studied (especially the United Kingdom) leads to a more competent bureaucracy. Furthermore, the more stable executive branch cadre and leadership outside the United States is credited for the existence of well-developed informal networks. These situations account for longer institutional memories and greater familiarity on the part of the policy-makers with the industry and the level of compliance that can be expected.

The observed cooperation extends beyond the development of regulations to their enforcement. The author observes an important difference in the style of enforcement among countries. In the United States, industry inspectors tend to play the role of policemen, issuing citations when a firm is out of compliance. Elsewhere, the inspectors often play an advisory role, conferring with managers on how to help bring plants into compliance.

The closer government-industry ties observed in Europe and Japan have led to a distinct difference in the timing of regulations and compliance in the industry. In the United States, regulations are typically issued before firms have a chance to achieve compliance. In Japan, the final vinyl chloride regulation was enacted only after compliance with the proposed standard had been achieved. This is an important observation, in that it shows that the study of the formal regulation alone, as in *Controlling Chemicals*, is not sufficient in establishing whether a particular process has been "better" in arriving at its intended goal. Information on the extent of compliance and the change in exposure levels is also needed. The conclusions in *Loading the Dice* are more valuable, in part, because they incorporate information about the timing of compliance in the different countries. Admittedly, this information is subject to uncertainty—for example, the absence of citations for violations in Europe does not imply that compliance with the letter of the regulation has

been achieved—but it is extremely useful for evaluating substantive differences in policy.

To conclude, in *Loading the Dice* the author presents an excellent case study in which the central thesis is supported with copious observations and differences in policy outcomes are well documented. The focus on networks within and across organizations is useful in helping to explain different approaches to the regulatory process.

The comparison of regulations across political boundaries is an important vehicle for gaining insight into the politics of the regulatory process. Such comparisons can also serve as guides to building a better regulatory process. It is intriguing to speculate on what this process might look like. The authors of these two books present an interesting argument in support of a cooperative approach. At this point, there is a need to examine carefully how different regulatory approaches to the environment directly affect our well-being—specifically our pocketbooks and the quality of the environment in which we live. With the addition of this knowledge, we will be able to make a more informed assessment about the relative efficacy of the cooperative and adversarial approaches.

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Invertebrate Phylogeny

The Origins and Relationships of Lower Invertebrates. S. CONWAY MORRIS, J. D. GEORGE, R. GIBSON, and H. M. PLATT, Eds. Clarendon (Oxford University Press), New York, 1985. xii, 397 pp., illus. $69. Systematics Association Special Volume 28. From a symposium, London, Sept. 1983.

So far as is now known, all animal phyla began as marine invertebrates, diverging from a common ancestor of late or perhaps middle Proterozoic age. There must be some pattern of branching that describes the pathways of descent of the major animal groups, but evidence to demonstrate these pathways has proven to be elusive. The fossil record, with perhaps 3% or so of marine invertebrate species known, is spotty enough that the pathways have not yet been discovered there; the missing intermediate and ancestral forms appear to include those which would tell us how the branching occurred. Invertebrate relationships, and the general character of the missing intermediates and ancestors, have therefore been inferred chiefly from studies on living organisms. Some progress has been made; many early groupings proved untenable (such as brachiopods with tunicates or mollusks) and have been disbanded; attempts to verify new groupings have been less successful. The field is characterized by an abundance of phylogenetic hypotheses, most of which seem highly invulnerable to disproof. On the other hand, none of the hypotheses is without its important detractors.

The Origins and Relationships of Lower Invertebrates contains 23 papers that consider the relationships among the invertebrate phyla, either comparing phyla or searching within phyla for primitive characteristics to aid in constructing a plausible ancestor. Sponges, cnidarians, ctenophores, platyhelminths and gnathostomulids (six papers), some pseudocoelomates (three papers), annelids, sipunculids, and pogonophorans are covered. There are also contributions on possible phylogenetic clues from reproductive traits and larval lives, a welcome survey of the fossil record of soft-bodied lower invertebrates by Conway Morris, and a concluding overview by Barnes. A special feature of the volume is that many papers incorporate results of a recent round of ultrastructural studies on these organisms; indeed, the authors include some of the leading practitioners of such research. This is the first time the results of the electron microscopists have been synthesized and assessed phylogenetically for a broad spectrum of lower invertebrates so as to be readily accessible to the nonspecialist. Some of the authors have applied formal cladistic methods to evaluate the evidence, and others simply contrast and compare. The emphasis is on morphology; there is little use of biochemical criteria, and molecular systematic approaches that involve estimates of genome similarities are not discussed.

This new evidence and the accompanying analyses form an important contribution; chapter after chapter contains rich food for thought. However, the ultrastructural work has not yet led to any startling reduction in hypotheses or to any consensus concerning relationships. Instead the tendency is for the ultrastructural studies to emphasize the distinctiveness of the phyla and to disband some common groupings. For example, Harbison indicates that ctenophores, which lack nematocysts but possess colloblasts and have mesodermal tissues, are significantly more distinct from cnidarians than systematists have assumed. Rieger finds considerable heterogeneity in parenchymal tissues among the acoelomate phyla. He interprets this to suggest a possible convergent evolution from coelomate ancestors during body size reduction associated with an ecological shift, perhaps through progenesis. If this is the case the primitive bilaterian may have been coelomate. However, Smith and Tyler produce evidence that turbellarians are not reduced coelomates, and some authors (Ax, Mettam) continue to employ an acoelomate as a primitive bilaterian. Land and Nørrevang show that priapulids lack peritoneum and not only are not coelomates but do not seem closely allied to any living pseudocoelomate clade either, and Clément suggests that some pseudocoelomate alliances have arisen from markedly different ancestors and are only distantly related.

These studies indicate that many of the major characters (such as type of mesoderm or body cavity) that have usually been keyed into schemes of metazoan phylogenetics either are not homologous across phyla or, if homologous, have commonly undergone such changes, reaching back into early development, as to make them difficult to use as guides to evolutionary pathways. Perhaps workers have consistently overinterpreted evidence of homology, or perhaps evolution has involved more developmental repatterning than has been supposed. In any event, ultrastructural and developmental evidence is telling us something important about the evolution of the major metazoan grades and ground plans, and here is an excellent introduction to the evidence for the lower invertebrates.

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A Biological System

The Sea Urchin Embryo. A Developmental Biological System. GIOVANNI GIUDICE. Springer-Verlag, New York, 1986. viii, 246 pp., illus. $49.

This book was written as a sequel to, rather than as a new edition of, the author's *Developmental Biology of the Sea Urchin Embryo* (Academic Press, 1973). The advantages of this are the avoidance of repetition of accounts of the older literature, except in a few instances where it is necessary to provide a frame of reference, and the opportunity to present a concise overview of the most recent work. These aims have been admirably accomplished.

The book is divided into two sections. Part 1, Development, includes chapters on fertilization, morphogenesis, and energy metabolism. Research on the last of these subjects has declined, but the first two have been vigorously pursued. Part 2, Nucleic Acids and Proteins, includes chapters on DNA, RNA, protein synthesis, and mito-