

Warnings

Read the Label. Reducing Risk by Providing Information. SUSAN G. HADDEN. Published in cooperation with the American Association for the Advancement of Science by Westview, Boulder, CO, 1986. xviii, 275 pp., illus. \$27.50.

Though self-interest in the form of desire for steady sales provides an incentive for purveyors of dangerous products to present them in safe forms or with instructions concerning proper use, the market provides only a porous defense against the extremes of ignorance and greed. Hence, government responds to political demands by imposing restrictions in the case of products that pose truly significant hazards. But governmental prohibitions and prescriptions, often enacted in emotional reaction to real or imagined catastrophes, frequently sweep too broadly, imposing unnecessary and costly restrictions on the safe as well as appropriate restrictions on the unsafe. Consequently, as Susan Hadden explains in her informative book, American government often has adopted a less intrusive regulatory strategy. Rather than flatly prohibiting substances or uses, the law directs producers to furnish risk-related information through standardized descriptions and warning labels so that consumers can make their own risk assessments based on their particular circumstances and skills and can strike their own tradeoffs between risk and utility or expense. Cigarette manufacturers are instructed to remind consumers, on each package, that the contents pose a significant hazard, and, for smokers who wish to pick the level of their poison, to recite the brand's tar and nicotine content. Instead of mandating fixed quality standards for used cars, the Wisconsin legislature requires used-car dealers to disclose, on a prescribed form, defects in each vehicle's brakes, lights, and other systems.

The big question raised and discussed in *Read the Label* is how well mandatory label disclosures and warnings work. Given the well-known difficulties most people have in paying attention to and comprehending information about remote hazards, in what circumstances are information-providing strategies adequate? Or, given the scientific uncertainties surrounding the risks posed by many substances under varied conditions of use, can mandatory warnings be designed that avoid oversimplification that makes them meaningless (or excessively frightening) without being so detailed that they are ignored or misunderstood? (A Minnesota

bank reportedly sent to 115,000 customers a federally required 4500-word booklet about its electronic funds transfer services; inserted in its midst was an offer of \$10 to any customer who would write "Regulation E" on a postcard and send it in. No one did.)

Read the Label does not resolve all these difficult questions, but it does provide a valuable overview and analysis of current federal mandatory disclosure programs. Successive chapters present concise but comprehensive histories of federal regulation of drugs, consumer products, occupational risks, food products, and pesticides. In each, Hadden carefully describes the interplay between outright prohibition (for example, a ban on the use of the pesticide endrin in cotton fields east of Interstate 35), prescription of safety standards (for example, limitation of its use to state-certified professional applicators), and mandatory labeling (the "label" specifying appropriate use of endrin is a booklet whose content was negotiated between the manufacturer and EPA over a period of three years).

Hadden concludes that because of the fragmented way in which regulatory policy is made, the current "system" for labeling requirements is "internally inconsistent, dominated by attention to short-term hazards, and poor in providing risk information." Warnings, she feels, sometimes are used when stricter regulatory controls would be better. Labels rarely set forth the frequency of damage (as opposed to the existence of a hazard) or the potential severity of the consequences; the lack of such information limits consumers' ability to make rational choices about whether to run the risks involved.

It is not clear, however, just how important these defects are. Probably because little research has been done on the question, *Read the Label* is disappointingly thin in data about the actual effects of mandatory disclosure programs. Hadden is able to cite few studies describing the impact of specific disclosure programs on consumer behavior, manufacturing practices, or injury and illness rates. She does note survey evidence that most consumers do not really understand the vitamin-content information on food packages and that physicians and pharmacists fail to give most patients precautionary instructions concerning prescribed drugs. But Hadden's exposition of these and other "failures" and "confusions" is not rooted in data showing that they have serious consequences.

Assessing the importance of "weaknesses" in our labeling systems is a difficult matter. For example, notwithstanding gaps in labeling regulations, to what extent does contemporary liability law, with its threat of huge damage judgments, serve to induce manufacturers of dangerous products to provide appropriate warnings and safeguards? And how perfect must warning systems be in order to have an impact? The Wisconsin used-car disclosure law, according to one study, induced many dealers to inspect for and repair defects even though buyers often didn't read the disclosure statement. Why? Because even if disclosures affect only a minority of consumers, sellers sensitive to marginal losses in market share may feel compelled to reduce the riskiness of their offerings. But how substantial must that attentive minority be? Finally, the testing, measuring, and checking entailed in implementing increasingly sophisticated labeling programs is far from costless; hence we need to predict whether the added costs of reducing "weaknesses" in disclosure systems actually will produce commensurate gains in public health.

Hadden is probably on the right track in pressing for improvements in our methods for communicating what consumers and workers really need to know about the substances they encounter. More research on the effects of disclosure programs would help that project along a great deal.

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Neurochemistry

Chemical Neurobiology. An Introduction to Neurochemistry. H. F. BRADFORD. Freeman, New York, 1986. xvi, 507 pp., illus. \$36.95.

For more than a hundred years biochemists have been grinding up brains and analyzing their chemical components. Following the lead of Johann Thudichum, the "father of neurochemistry," whose pioneering labors in Victorian London generated an impressive catalog of substances extracted with organic solvents from masses of brain tissue, neurochemists have exhaustively documented the biochemical properties of nervous tissue. They have explored its chemical composition, traced the metabolic relationships among its constituents, elucidated its bioenergetics, and probed the membranes that are essential for its functions. Like the traditional disciplines of neuroanatomy, neurophysiology, neuropharmacology, and

psychology, neurochemistry has taught us much about "the brain" at one level or from one point of view. But none of these disciplines can tell us how the brain works or account for or encapsulate the excitement and successes of contemporary neuroscience.

The modern era in neuroscience began in the 1950's when, inspired by visionaries like the late Stephen Kuffler, cellular neurophysiologists joined forces with neurochemists and morphologists for truly multidisciplinary explorations of neural function, development, and disease. Equipped with powerful new techniques such as intracellular recording, ultracentrifugal tissue fractionation, electron microscopy, radioisotopic tracer methods, and microanalytical chemical procedures, these "neurobiologists" sought cellular and molecular mechanisms. They charted an approach that has been fruitful and clearly fostered the subsequent explosive growth and flourishing of neurobiology.

Thus it is in a multidisciplinary, neurobiological context that neurochemistry makes its important contributions to understanding of the nervous system. For this reason, introduction of the subject to students or to investigators from other fields is perhaps best done by integrating biochemical and molecular biological reasoning and findings with those of cell biology, physiology, and anatomy.

In *Chemical Neurobiology* Bradford follows a purer neurochemical tradition, presenting a topical, detailed account of neurochemistry as a branch of biochemistry. His book offers lots of information about brain metabolism, neurotransmitters and their receptors, neuropeptides, and membranes. An excellent chapter on synaptosomes stands out as timely and informative. Overall, however, the book fails because it does not deal with neurochemistry as one of the powerful approaches to an understanding of mechanisms of neural function and development. I fear that students, who want to learn how the nervous system works and how investigators combine experimental tools to answer mechanistic questions, will find Bradford's treatment unsatisfying.

Most important neurochemical topics are included, but not with equal effectiveness. For example, although more balanced than the accounts given in some other contemporary textbooks, Bradford's discussion of vesicular and nonvesicular release of neurotransmitters is confusing. Students not familiar with the physiology of release may not appreciate the functional implications of the findings Bradford describes. In sections dealing with amino acid neurotransmitters, glutamate and aspartate are classified (at the

level of section headings) as excitatory and GABA and glycine as inhibitory transmitters. This presentation seems to endow the neurotransmitter itself with excitatory or inhibitory character and is likely to be misleading to students who do not already know that the receptor mechanisms (and not the transmitters themselves) determine whether a transmitter mediates synaptic excitation or inhibition and that a given transmitter may be excitatory or inhibitory at different synapses.

Even for a textbook of modest dimensions, Bradford's book has some serious gaps, as illustrated by three examples. First, much historically and currently important work on invertebrates is not mentioned. Thus, the discovery that GABA is a neurotransmitter and much important work on its metabolism, inactivation, and synaptic mechanisms, all accomplished in Crustacea, are omitted. And important studies of cholinergic receptors and voltage-sensitive ion channels in *Drosophila* and other insects are not included. Second, the discussion of second-messenger systems is not up-to-date and neglects or fails to clarify the likely roles of those systems in synaptic mechanisms. Finally, the advances enabled recently by recombinant DNA and molecular genetic technology, immunological procedures such as hybridoma methodology, and in vitro cell culture techniques get scant attention if any. These shortcomings are sure to disappoint readers and dissuade many instructors from adopting this textbook.

The successes of modern neurobiology have stimulated much interest in the field and attracted talented students with varied scientific backgrounds. To meet their needs, courses and training programs have been mounted, stimulating the production of numerous introductory and advanced textbooks and monographs. All this activity notwithstanding, certain key areas have been left inadequately covered. None has been more seriously neglected in textbooks than that encompassing traditional neurochemistry and modern molecular neurobiology, and we sorely need an authoritative, coherent, functionally oriented, and up-to-date basic textbook presenting this important material. Bradford has given us a useful book that is a welcome addition to the introductory literature of neuroscience, but it does not fill the greater need. Perhaps even more than a good five-cent cigar, what the world needs is a really good "neurochemistry" textbook.

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Edentates

The Evolution and Ecology of Armadillos, Sloths, and Vermilinguas. G. GENE MONTGOMERY, Ed. Smithsonian Institution Press, Washington, DC, 1985. xii, 451 pp., illus. Paper, \$45. From a symposium, 1979.

Armadillos (Cingulata) and sloths and anteaters (Pilosa) are living representatives of an early radiation of placental mammals that took place in isolation in South America. These living groups and their fossil relatives belong to the order Edentata, which is sometimes also called Paratheria or, as in this book, Xenarthra. The word "edentate" is of course technically a misnomer for all but the anteaters, which now lack teeth, but the name has long been in use and is likely to stick. Like the Marsupialia, edentates display enough anatomical diversity to warrant creation of several mammalian orders to receive them, but till now authors dealing with edentates have resisted such taxonomic inflation.

As a natural taxonomic group, the Edentata are held together by shared-derived characters, such as possession of extra articulations of the lumbar vertebrae (xenarthry), development of a synsacrum, and possession (later lost in some forms) of dermal ossicles. Edentates also retain some primitive characters, such as the shape of the stapes bone in the auditory apparatus and in some forms retention of a poorly differentiated uterus and vagina. Within the Edentata, anteaters and sloths share additional derived characters and therefore for more than 100 years have been merged as the taxon Pilosa, sister group of the Cingulata.

The origin of edentates as a major division of placental mammals is shrouded in mystery, but, on anatomical as well as biochemical grounds, their last genetic connection with other placentals is considered remote. This view is confirmed by a long and isolated edentate fossil record in South America, known to reach well down into the Paleocene. Recent discoveries by Bonaparte in Argentina suggest that the edentate record may even extend further, to the Campanian Stage of the Late Cretaceous. How the edentates got to South America originally is unknown, but both Africa and North America seem to have had some kind of land connection with South America in at least part of the Late Cretaceous. Details are still murky. However, the present Panamanian isthmus was almost certainly not involved, because reconstructions of the Caribbean area suggest that Central America in Cretaceous times was situated well to the northwest of South America. Possibly, there was some sort of stepping-stone route between North and South America in the eastern