Poisonous odds

Alastair Hay

Calculated Risks: The Toxicity and Human Health Risks of Chemicals in Our Environment. By Joseph V. Rodricks. *Cambridge University Press*: 1992. Pp. 256. £17.95, \$22.95.

AT first glance, bookmakers and toxicologists seem strange bedfellows and, when off duty, perhaps they are. But in a more professional sense they have much in common. Both are concerned with odds.

For the bookie, knowledge of a horse's form, its record in the past few races, the jockey and the weather forecast assemble themselves into a simple ratio that most of us understand. We know that if the odds are short, the horse has a good chance of winning and that any bet will net only a small return. A win on longer odds is certain to be more handsome, but much less likely, which is why the bookie is prepared to take our money, usually for keeps.

The odds in regulatory toxicology are much too long to satisfy either bookies or their punters. But students of the genre, keen to learn about form in both laboratory and regulatory aspects of toxicology, will find much of what they need in *Calculated Risks*. This is a highly readable, lucid and informative account of what risk assessment is about.

Joseph Rodricks begins his account with explanations about chemicals, natural and synthetic, and the importance of structure when investigating the toxicity of compounds. Chapters dealing with exposure to chemicals and their entry into the body preface more fundamental sections on toxic risk and fast and slow poisons. On the way, the author discusses the value of epidemiology and its limitations, as well as protocols for laboratory tests, both in animals and *in vitro*, and their advantages and drawbacks.

A chapter on carcinogens, followed by one on mechanisms, provides the last of the ground work for sections that will be of more than passing interest to regulators. These deal with dose-response relationships, the assessment of risks and management decisions by government agencies.

As Rodricks points out, his examples of regulatory decisions are all taken from the United States. To the outsider, the process in that country is hugely complex, but at least it is more open and accessible than in, for example, the United Kingdom. Added to this complexity is the fact that agencies differ in their regulatory approaches to worker safety, environmental protection, food additives and drugs, to name but a few. Rodricks accepts that each law or set of regulatory

precedents has its own history, but "the total picture concerning environmental chemicals and their regulation is almost impossible for anyone but the dedicated scholar to discern". Obviously irritated by the plethora of rules and decisions on environmental chemicals, Rodricks professes to have no immediate solution for making the process simpler, but he does believe that policy-makers should start thinking about one.

Few of the chemicals to which we are exposed have been evaluated for their toxic properties. And for most chemicals that have been investigated, all too often much of the information available does not help in assessing the risks to humans. Increasingly, toxicologists are recognizing that with limited funds it is neither practical nor desirable endlessly to screen chemicals. More emphasis needs to be placed on understanding mechanisms of action and on how species diversity affects the way in which chemicals are metabolized. Rodricks is of the same opinion and persuasively argues his case for more mechanistic studies.

Throughout, Rodricks selects chemicals or regulatory decisions to underline his arguments. These are mainly well chosen and suitably illustrative. Carbon monoxide (CO) is selected to illustrate

the well-established dose-response relationship between carboxyhaemoglobin (COHb) formed when CO occupies oxygen binding sites on haemoglobin, and symptoms of acute poisoning. But Rodricks is wrong when he says: "Except for death and possibly damage to the heart, these effects are reversible when the CO source is removed, because COHb eventually dissociates and releases CO to the lungs, where it can be excreted". One of the most devastating effects of CO poisoning is brain damage, because the gas deprives the brain of oxygen. The risk increases the longer the victim is unconscious, but brain damage (poorer memory, confusion, altered personality) also occurs in victims of CO poisoning who remain conscious. Psychological tests to assess brain function are needed to detect the changes.

In a book with as wide a sweep as *Calculated Risks*, the author can be forgiven the occasional error. Rodricks has written a book with a wealth of technical material that is so easy to read and follow, and which will be a gift to the students and fellow professionals he hopes will use it. □

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Seeing the wood for the trees

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World Forests for the Future. Edited by Kiliparti Ramakrishna and George M. Woodwell. *Yale University Press*: 1993. Pp. 156. £14.95, \$20.

LAST year's Rio 'Earth Summit' tried to establish a substantial agreement on global forests as a harbinger to a full-blown convention along the lines of those for climate and biodiversity. Alas, the summit produced nothing better than a "non-legally binding authoritative statement of principles for a global consensus of the management, conservation and sustainable development of all types of forests". There was an informal agreement to talk further about the agreement, accompanied by some angry rhetoric from both North and South on the scope of such further talk. In the event, there has been little progress owing to the intense political interest of the issues.

Fortunately, both sides agree that there is need for a convention. Forests continue to decline: tropical forests are being depleted at a rate of more than one per cent a year, boreal forests at perhaps 0.5 per cent; and both rates may double during the 1990s.

We know little of what we are losing. Forests constitute huge carbon stocks and

therefore have a prime role in the global biogeochemical cycle. But our estimates of the amount of carbon involved feature egregious confidence limits. Forests also control large reservoirs of methane, a greenhouse gas far more potent than carbon dioxide; but again we have only a hazy idea of how much methane forests govern and how the controls work. We know that tropical forests are vital to the world's biodiversity, but we do not know whether they contain 50 or 90 per cent of Earth's species, nor do we know, except roughly, how fast species are being eliminated through deforestation.

An Independent Commission on Forests and Sustainable Development has been proposed to tackle these and other scientific lacunae in our understanding of forests' contributions to the biosphere. The commission, to be established under the United Nations, would examine policy options for forestry writ large, with emphasis on environmental, economic and technological questions. The first planning session took place nearly two years ago; further deliberations may soon lead to the commission's establishment.

Yet there is much political argument about the commission's mandate. All forests fall within the sovereign jurisdiction of individual nations, which tend to