LETTERS

(Continued from page 1272)

are at a loss as to what "unduly exposed" means. Evidence that students were not being exposed at all would be much more encouraging.

The safe, lawful disposal of carcinogens referred to consists of burial in a class I disposal site (*2*). We believe that disposal of carcinogenic materials by landfill is not suitable. Instead, the carcinogen must be degraded, deactivated, or incinerated.

This report (*1*) suggests that it is likely that very large quantities of chemical carcinogens (and not only those regulated by federal and state occupational safety and health acts) are present in schools (and elsewhere) throughout the country. Moreover, it is certain that these materials are often used without knowledge of their dangerous properties, without establishing safe handling procedures, with no thought given to emergency planning, and with insufficient consideration of methods of disposal.

Although we are encouraged at one state's recognition of the problem and indications of their willingness to grapple with it, we deplore the situation and strongly recommend that a mechanism for informing the users of such materials of the potential hazards associated with them be developed. Appropriate labels and data sheets provided by the manufacturer or supplier might be a worthwhile step in this direction.

E. B. SANSONE
W. LIJINSKY

Frederick Cancer Research Center, Frederick, Maryland 21701

References

1. *Occup. Saf. Health Rep.* **6**, 501 (23 September 1976).
2. *Law, Regulations and Guidelines for the Handling of Hazardous Waste* (California Department of Health, Sacramento, February 1975), pp. 66–67, 69; *Disposal Site Design and Operation Information* (California State Water Resources Control Board, Sacramento, March 1976), p. 27.

Origins of an Ecological Theory

In his review of *Biochemical Interaction between Plants and Insects* (*1*) Lawrence Gilbert (28 Jan., p. 387) infers that the highly similar theories of Feeny (*2*) and of Rhoades and Cates (*3*) relating type of chemical defense by plants to the likelihood of discovery of plants or individual plant tissues by enemies were arrived at by induction from the observed patterns in the former case and by deduction from evolutionary ecological theory in the latter. If true this would suggest that ecological theory has now reached a stage at which it can successfully compete with empiricism in describing natural patterns. Undoubtedly ecological and evolutionary ideas contributed importantly to both theories, but before we congratulate ourselves on the predictive power of "selectionist thinking" a note of caution is in order.

At the outset of a study of plant-herbivore interactions in desert ecosystems Orians *et al.* (*4*) made predictions concerning defensive chemistry in plants and the expected grazing patterns of animals that feed on these plants, largely from evolutionary theory and with a limited a priori knowledge of phytochemical patterns. Gilbert suggests that it was testing these predictions that led to the theory presented by Rhoades and Cates, but in fact most were not tested in any depth. A major prediction that was so tested, namely that herbivores that feed on annual and early-successional plants should be more generalized in their diets than those that feed on more predictable plants, such as woody perennials and late-successional species, was confirmed in the desert system, though, as Gilbert points out, this finding may have no general applicability, since most data from other environments run counter to the result. In hindsight, it appears that five or six of the predictions made by Orians *et al.* are probably right and five or six are probably wrong.

The research that was most fruitful with respect to the final theory was a comparison of within-plant distribution of defensive chemicals in the two dominant perennials creosote bush and mesquite, studies that were not initiated from the original predictive scheme. From these studies our theory was developed largely by inductive processes, with a liberal infusion of the ideas of Orians and Schultz. Similarly, Feeny arrived at his conclusions by generalizing from his studies of between-plant distribution of defensive substances, using evolutionary arguments. Thus the difference was not so much in philosophical approach as in type of data collected.

DAVID F. RHOADES

Department of Zoology, University of Washington, Seattle 98195

References

1. *Biochemical Interaction between Plants and Insects*, J. W. Wallace and R. L. Mansell, Eds. (Plenum, New York, 1976).
2. P. P. Feeny, in *ibid.*, pp. 1–40.
3. D. F. Rhoades and R. G. Cates, in *ibid.*, pp. 168–213.
4. G. H. Orians, R. G. Cates, J. C. Schultz, D. F. Rhoades, proposal to the National Science Foundation (1971); grant GB 11193.