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INTRODUCTORY REMARKS

That some insects can defend themselves against their natural enemies by organic chemical means is well known. The generality and variety of organic chemical defense mechanisms among animals, however, may not be fully appreciated by many chemists. Animals interact not only with members of their own species, but also with members of other animal species, and with plants. Many of these interactions are chemical, and one important set of them is concerned with the protection of an animal against potential predators. The subject of this Symposium, then, is the organic chemistry of animal defenses.

Among insects, defensive chemicals may be as simple as hydrogen cyanide or formic acid, or as complex as cardiotonic steroids or polycyclic alkaloids. While insects are certainly highly skilled organic chemists, however, they have no monopoly on chemical weaponry. Among marine invertebrates, there is a wealth of natural products, including a large array of halogenated acetogenins and of complex terpenoids, which serve defensive roles. The skunk provides a striking example of a terrestrial vertebrate with an effective chemical defense.

What can be hoped for from the study of this area of chemical ecology? What kinds of questions are worth asking, and what ultimate rewards can be anticipated? From an organic chemist's viewpoint, once it has been established that a given animal *has* a chemical defense mechanism, the first task is to isolate the active component(s). Such isolation must necessarily be coupled with some sort of appropriate bioassay. Once pure, bio-active compounds are obtained, the next questions concern the structures and stereochemistry of the defensive materials. Synthesis then becomes important, since many of these biologically active natural products are obtainable from Nature in only very small quantities, so that any further exploration requires a good, synthetic source. Beyond this, many fascinating questions still remain. How does an animal *acquire* its toxin or repellent? Is the compound in question synthesized by the animal? How do animals allocate resources among their defensive needs and other vital functions? How do defensive chemicals function? Do animals manage to avoid suffering from the effects of their own chemical weapons, and if so, how?

It is, of course, of interest to consider whether *we* might be able to use some of these defensive compounds to control or repel some of *our own* enemies (i.e. disease carrying ticks, mosquitoes, sharks, bears, etc.). Perhaps some of the substances are of potential use in medicine (see the use of microbiological secondary metabolites), or in some other context. Perhaps an intimate knowledge of a pest's chemical defenses would help us to penetrate those defenses. While the human exploitation of an animal's defensive chemistry is not usually the primary objective of research in this field, it is certainly always a possibility to be borne in mind.

The thirteen papers which constitute this Symposium treat many of the most exciting aspects of contemporary research dealing with animal chemical defenses. If they serve to stimulate interest in an area of organic chemistry where Nature has displayed a wonderful degree of inventiveness, the participants will have done their job well.

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