Methods in Chemical Ecology, Volume 2—Bioassay Methods


Both volumes of this pair of books deal with chemical ecology, but despite this common topic, the methods they describe are vastly different. Volume 1 dealt almost exclusively with advanced instrumental analysis, with ample advice on how to gain extra performance from these machines and methods. Volume 2 describes apparatus that is fabricated in the laboratory with the simplest materials. However, this simple construction belies the ingenuity of the methods described. Here, the considerable challenge is to devise experimental designs and apparatus that will yield unambiguous results. Indeed, quite often ambiguity is unavoidable and conclusions only result from “weight of evidence” after a series of experiments. Both volumes illustrate science and scientists at their best, unraveling complex and abstract phenomenon. The methods in Volume 2 appeal most to me because in them, the scientist interacts directly with the organisms, and machine performance is not an issue. Indeed, the instrumental methods are of no value in chemical ecology unless supported by bioassay evidence of response.

The chapters in Volume 2 are organized by types of organisms, and in general the complexity of the current level of understanding increases throughout the book. The first chapter deals with chemical ecology among marine microorganisms. The observation that has created much of the interest is that the surface of marine macroorganisms are relatively free of infection, despite living in the marine “microbial soup.” This is suggestive of antibiotic chemicals. Behavioral bioassays are included, with the study arena prepared on the surface of microscope slides. The second and longest chapter deals with both marine and freshwater macroorganisms. Here the issues related to determining the relative roles of visual and chemical cues are discussed. Typical experimental arrangements to investigate predator response to prey would involve five treatments: visual and chemical signals, visual signals only, chemical signals only, no signals, or no prey. Methods to establish gradients as opposed to constant concentrations are described. Venn diagrams are used repeatedly but never defined, a drawback for the new profession.

The Angry Genie: One Man’s Walk through the Nuclear Age


Karl Morgan was teaching physics and conducting cosmic-ray research at a small university college, when he was mysteriously summoned to Chicago. It was a few month’s after Enrico Fermi’s famous “squash-court experiment” at the University of Chicago, where controlled self-sustaining nuclear fission was first achieved. In the race to produce an atom bomb before Germany, a huge new facility to manufacture fissionable material was being constructed at Oak Ridge, Tennessee. This facility would operate piles or nuclear reactors that would emit ionizing radiation at levels millions of times greater than present anywhere else in the world, whose total inventory of radium-226 extracted from uranium ores was, at that time, only about two pounds. Morgan was summoned because the Chicago group perceived a serious problem that they believed was best handled by physicists, namely, protection of laboratory workers from the effects of radiation. They had coined the term health physicist for the new profession.

At that time, almost nothing was known about the biological effects of radiation, especially internal doses from ingested or inhaled radionuclides. The role of Morgan’s small group was to set radiation protection standards for internal and external doses of all types of ionizing radiation, to develop instruments