This bulletin contains 28 articles classified into 4 sections as follows: Bioclimatic Chambers; Room-Size Units; Quarantine Facilities; and Large-Scale Facilities. The articles were solicited from individuals previously publishing on insect rearing facilities or cabinets or known to be directly involved in insect rearing. Additionally, articles were solicited by placing advertisements in entomological journals and newsletters. Nevertheless, some important rearing facilities are not described in this bulletin, e.g., the Trichogramma species rearing at the Cotton Insects Research Laboratory in College Station, Tex. and the scale parasite rearing by Fillmore Citrus Protective District, Fillmore, Calif. Such omissions are, however, offset by the inclusion of a comprehensive bibliography containing 236 selected references that lists additional facilities, associated insect-rearing methods and equipment, and several reviews and symposia. The editors assume that the reader will pursue a particular interest by seeking the relevant literature and modifying a published system by contacting an appropriate expert or by simply adopting one of those described.

The articles are short (2-3 pages long), but data and illustrations are provided. They are generally well-written, and the editors are to be congratulated on production of a virtually error-free bulletin.

The design of the equipment and facilities ranges from uncomplicated to complex. Therefore the bulletin should be a valuable reference source for those involved in maintenance or study of small insect colonies as well as for those involved in large-scale insect rearing. The editors hope it will be of particular use in planning future construction or renovation, assisting entomologists who are constrained by limited resources, and supporting scientists who lack construction experience.

Sections 1, 2, and 4 reflect the natural flow in rearing magnitude from small bioclimatic chambers to large-scale facilities. Section 3 is a description of 5 of the larger quarantine facilities in the U.S. These facilities are typically designed for containment, not insect rearing, though they also have unique methods of maintaining small colonies. Certainly the description of these 5 facilities in the publication enhances its value.

The equipment and facilities discussed in the various articles have been in use for several years, and procedures are well established. However, the “Media-Preparation and Brood-Colony Facility” described on p. 72-75 was undergoing construction at time of preparation of the manuscript, and certain of the rooms are not now being utilized as shown in Fig. 4-9. Also, the actual operating procedures identified in the article “Modified Facility for Host and Parasitoid Rearing” differed from those given.

I can recommend this bulletin to anyone involved in insect rearing. This should include most entomologists since the ability to rear insects under controlled conditions is fundamental to most entomological endeavors.

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Professor H. E. Jaques’ popular little manual for identifying the major orders and families of insects has lately undergone a spectacular metamorphosis—one that leaves little but the basic spiral-bound format of the original unchanged. In nearly all respects, the current edition of How To Know the Insects is greatly improved: the pages are larger, the keys are more detailed and cover many additional families, the biological descriptions are more complete and factual, and the illustrations are larger and, for the most part, more useful. Lost, however, are the abundant enthusiasm, humor, and eccentricity of the late Professor Jaques’ original narrative.

The plan of the book is simple and effective. Excellent concise chapters on collecting, preserving, mounting, operating, and rearing insects are followed by a brief summary of morphology and development. The volume, dealing with the classification and identification of North American insects north of Mexico, is organized by major orders and follows a rough phylogenetic sequence from primitive to specialized taxa. Each order is introduced by a brief discussion of the general appearance, behavior, and life history of its typical constituents: of special value here is a current world-wide estimate of the number of described species in the taxon. A key to the most common families of the order is then given, with accompanying illustrations of crucial anatomical features. Finally, the natural history of each family is summarized, and several of the most abundant species within each are described and illustrated in sufficient detail to permit identification. For some of the larger families of Coleoptera, Lepidoptera, Orthoptera, and Hymenoptera—e.g., Scarabaeidae, Cerambycidae, Chrysomelidae, Curculionidae, Saturniidae, Arctiidae, Pyralidae, Acrididae, Gryllidae, Tettigonidae, Formicidae, Vespidae, and Sphecidae—major subfamilies are also enumerated and described. A general key to the orders precedes the main body of the manual. An extensive index and lists of many general and specific references are also included.

The strength of the work is, as it should be, the clarity and accuracy of its keys. Several untrained students used the keys very effectively to identify a wide range of insects from the Univ. of Connecticut’s research collection, finding few errors or inconsistencies; all chose the book as the easiest to use of several well-known and much more expensive references, including Borrer, DeLong, and Triplehorn’s An Introduction to the Study of Insects (Holt, Rinehart, and Winston, 1976). Another asset of the manual is its use of the more widely accepted higher classification of insects, in which, for example, Orthoptera is restricted to the saltatorial exopterygotes and Homoptera and Heteroptera are recognized as suborders of Hemiptera. However, I am disappointed that Protura, Collembola, and Diplura are not given higher status as Classes within Hexapoda, since to recognize these groups as orders of Apterygota is incorrectly to suggest close relationship between them and the true insects (including “Thysanura”). I also feel that the book could have benefited from a summary of the higher classification of each order, based on the most recent or convincing phylogenetic studies: in this regard, Borrer et al. is more complete. These criticisms are minor, pertaining as they do to concepts of insect evolution that have nothing to do with the effectiveness of the book as an identi-
Thus for some problems of great extent and duration, manipulative modeling is a needed, effective approach. But many environmental impact studies address smaller issues where funds are more modest and the time frame in which a decision must be reached shorter. Under these circumstances the value of manipulative modeling is considerably reduced.

Knowing how fast or slow to focus an impact study down to particular points is thus a key feature in doing quality environmental impact assessment work. It is this aspect that Ms. Ward treats too briefly and does not explicitly identify as an important step in the process. The reader is left with the impression that manipulative modeling is always appropriate regardless of the size or duration of the study. Correcting this misplaced emphasis, adding photographs, and reducing the repetition of general ecological and statistical theory would do much to improve the quality of the book.


In this book Ms. Ward develops her ideas on how best to conduct environmental impact studies. Her method—manipulative modeling—is contrasted to other current approaches such as "the busy taxonomist" and "the information broker." Ms. Ward's thesis is that to correctly assess potential environmental impacts requires more than merely surveying the existing fauna and flora at the site, i.e., "the busy taxonomist" approach, or searching library records to compile existing studies on similar areas, i.e., the "information broker" approach. The author advocates methods well known in ecology and in insect pest management, i.e., building models to describe systems and then conducting field and laboratory experiments to assess the accuracy and reality of the models.

With the book's basic thesis there is no argument. However, the actual writing leaves much to be desired. Overall, the style is dense and abstract. Although short, the book attempts to recapitulate a great deal of ecological theory, sampling methodology, and statistics—most of which is covered at greater length, more effectively, elsewhere. The book is under-illustrated in that it makes no use of photographs. Careful use of photographs could have lightened the text considerably and contributed toward easier, more rapid absorption of the content by readers. Chapter 6, in which actual case histories are discussed, would have been more effective if placed after Chapter 1 rather than near the end of the book.

Besides the style problem discussed above, the book fails to achieve a balance in one other important area. Ms. Ward stresses the desirability of manipulative modeling, but fails to put her method into perspective relative to the time and money available to conduct any given study. Variation in funding and available time will strongly influence the usefulness of manipulative modeling as a study method. The problem is not unlike what Ray Smith has called "The IPM dilemma in developing countries" (Can. Entomol. Bull. 10, p. 86–94, 1979) in which complex IPM systems are found to be inappropriate to the agricultural pest control resources actually available in many poorer countries.

With a few exceptions these chapters are well and authoritatively written. Unfortunately, the material presented is often much more physiological or chemical in nature than it is biochemical. For the most part, this is a reflection of the state of the art in those areas. Several of the authors have lamented the paucity of biochemical information. Hopefully, calling attention to this situation...