Introduction to the Symposium on IPM in Urban Entomology[1]

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The science of urban entomology has made great strides since 1935 when John J. Davis attended the Third Convention of Exterminators and Fumigators. Davis has been credited with establishing the first visible liaison between professional entomology and the urban pest management profession. Ten years later, publication of the *Handbook of Pest Control* by Mallis set the tone for a generation of entomologists with interest in the urban habitat. This relationship steadily gained momentum through the last half of the 20th Century as universities began adding urban entomologists to their faculties. At the dawn of this new century, the important role of urban entomology is achieving recognition because, for the first time in human existence, the world's population in urban areas exceeds that of rural areas.

Scheduled application of pesticides was, even 20 years ago, considered the most efficacious form of urban insect pest management. Problems with pesticide exposure, pest resistance, and pest resurgence are a few of the factors that have resulted in attempts to implement Integrated Pest Management (IPM) in the urban setting. IPM is a concept developed in agricultural entomology that has taken on many guises since conceptualized in the 1959 *Hilgardia* paper by Stern, Smith, van den Bosch and Hagen.

At the core of most definitions, IPM is the intelligent use of information on pest biology to implement interventions that limit pest populations. An intervention is defined as any action taken to reduce a pest population or, more importantly, the potential for pest population growth. In the urban setting, interventions include, but are not limited to, tactics such as habitat modification, sanitation, use of biological agents, or pesticide applications. The need for intervention, termed the action threshold, is decided by perceived, aesthetic, medical, or personal property damage caused by insect pests. Insect pest management interventions can be performed by builders, landscape managers, architects, property owners, government agencies, or pest management professionals to name a few of the diverse players who should be involved in urban IPM. The goal of Urban IPM should be sustainable reductions in insect pest populations with minimal interventions.

Despite the appeal of sustainable and environmentally compatible insect pest management, implementation of IPM in the urban habitat has been slow. A variety of reasons can be listed including: technical—lack of simple, effective monitoring de-

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vices and methods; public perception—the need to alleviate pest problems immediately; conceptual—the lack of workable IPM models with reasonable action thresholds; economic—increased labor costs and lack of short-term profit; educational—practitioner training and clientele information transfer and a lack of funding; and research—lack of interdisciplinary collaboration and funding. Ultimately adoption of IPM in the urban setting should involve entomologists, medical professionals, economists, architects, builders, landscapers, property owners, and pest management professionals. Educating the practitioner and property owner that urban insect pest management is a process must be the foundation of this development. The scientific information gained in the last 40 yrs by urban entomologists should form the basis of that educational effort. However, the liaison initiated over half a century ago by J. J. Davis must be expanded to include all of the aforementioned professions. Only then can the development and implementation of IPM programs that are sound, financial enterprises represented by value-added services and products become a reality.

The following 5 articles in this issue of *The Journal of Entomological Science* and to which I address this introduction were part of a Symposium on IPM in Urban Entomology convened at the 2001 Entomological Society of America Annual Meeting in San Diego, CA. The goal of this symposium was not to define or re-define Urban IPM but rather to provide information on research advances made in the past decade relative to selected Urban IPM programs. The presentations by leading U.S. entomologists focused on 5 of the major household and structural insect pest groups.

Although it has been argued that most urban insect pests can be categorized as occasional invaders, A. G. Appel discussed how research on groups of minor economic or medical importance and 'occasional pest' status offer opportunities to demonstrate the feasibility of employing what should be the cornerstone of any Urban IPM program—habitat modification. Furthermore, the management of pest ants, historically, has been inconsistent and complicated by a myriad of concerns, not the least of which is overcoming (or perhaps using) their social organization to assist in providing population reductions. Thus, M. K. Rust, D. A. Reierson and J. H. Klotz reviewed the literature on Argentine ant control, concentrating on bait formulations as the best solution for an environmentally compatible approach. B. M. Drees and R. E. Gold discussed the development of fire ant control tactics and the success of area-wide management programs using insecticidal baits while illuminating how current research efforts emphasize biological control. The final 2 papers published herein address the difficulties and advances in managing cryptic structural pests. V. R. Lewis's presentation of drywood termite control includes the topics of public perception, detection technology, and legislative regulation of the industry as well as how these factors may affect management options to the same degree as pest biology. Lastly, B. M. Kard discussed standard termiticide testing methodologies and addressed alternative treatments, such as stainless steel barriers, for subterranean termite control.

It is our hope that the information contained in these papers will stimulate an interdisciplinary dialog toward development and implementation of practical Urban IPM.