

Introduction

The previous time I was tasked with writing a foreword was back in 2016 (Zalucki 2016). I observed that, as nobody read the introductions, I could proffer some observations, opinions, and reflections on the *Annual Review of Entomology* (ARE). I want to return to some of those reflections and add a few more. Besides, I managed to shamelessly self-cite a foreword!

When I first joined the Editorial Committee as a Guest Member to plan Volume 55, I was privileged to work with an amazing group of eight entomologists led by then Editor May Berenbaum. I was the person at the Editorial Committee meeting not based in the United States. The gender balance (I hesitate to say sex ratio) was 0.25 (work it out). For those involved in the planning of this current volume, the gender balance is 0.375 ($n = 8$), and 0.25 are based in somewhere other than the United States. The needle has moved. I can foreshadow more movement for Volume 70; the relevant ratios are 0.50 for both gender and origin/location outside of the United States!

In 2016, I lamented the creep in the number of authors per article that had become part of publishing. Over the years, the number of authors per review had increased: from a mean (median, mode) of 1.7 (2, 1) in 1996 to 3.2 (3, 2) in 2016. In the current volume, the value is 2.6 (3, 3): We have stabilized, more or less. The Editorial Committee has been active in discouraging reviews with 11 authors. The nominal cap is four, and we require strong justification for an increase. As I pointed out in 2016, the number of authors does not appear to be a predictor of “success” either; citations per year was not related to the number of authors.

Reflecting the preeminent position of ARE as the authoritative reviewing journal in entomology, one would expect the selection of authors and their origins to reflect the global nature of the science. In this volume, authors come from 16 countries, compared to 18 in the 2016 volume. What has changed is the geographical locations of authors. In 2016, of the 82 authors, approximately 34% were based in the United States, and approximately 73% were male. In 2022, approximately 27% of the 59 authors are based in the United States, and approximately 64% are male. Again, things are changing.

Each ARE volume has something for everyone. ARE prides itself on its coverage of entomology. This volume is no exception: with topics ranging from the earliest origins of Insecta (Conrad C. Labandeira and Torsten Wappler) to “Iron Homeostasis in Insects” (Maureen J. Gorman). Insect–plant interactions have understandably been the focus of many research labs, with most concentrating on the intricate minutiae of these interactions in the “here and now” (see “Molecular Mechanisms Underlying Host Plant Specificity in Aphids” by Po-Yuan Shih, Akiko Sugi, and Jean-Christophe Simon, as well as James H. Tumlinson on the “Complex and Beautiful: Unraveling the Intricate Communication Systems Among Plants and Insects”), but it is always useful to put these into

an evolutionary context. Conrad C. Labandeira and Torsten Wappler do just that in their review “Arthropod and Pathogen Damage on Fossil and Modern Plants: Exploring the Origins and Evolution of Herbivory on Land,” a must read in my opinion.

Due in part to their apparent decline and crucial role in pollination, there has been increasing research on bees. This volume has two offerings: one on “Stingless Bee (Apidae: Apinae: Meliponini) Ecology” by David W. Roubik (it is not all European honey bees and bumble bees) and the other on “The Resilience of Plant–Pollinator Networks” by Jordi Bascompte and Marten Scheffer. The importance of insect–flowering plant interactions extends beyond pollination to another key ecosystem service—biological control; Stefano Colazza, Ezio Peri, and Antonino Cusumano review the “Chemical Ecology of Floral Resources in Conservation Biological Control.” Trophic interactions in real ecosystems are complex, and even the good guys have their own natural enemies; see Minghui Fei, Rieta Gols, and Jeffrey A. Harvey on “The Biology and Ecology of Parasitoid Wasps of Predatory Arthropods.” Continuing with the evolution of intricate interactions, Owen D. Seeman and David Evans Walter review “Phoresy and Mites: More Than Just a Free Ride.”

Management of our insect charges is front and center in entomology, and genetically modified crops have had a huge impact. Aaron J. Gassmann and Dominic D. Reisig in “Management of Insect Pests with Bt Crops in the United States” review the lessons in the United States. On a different note, bed bugs have become a global problem reflecting global connectedness. Although travel may have abated due to a certain pandemic, it is back on the agenda, and control of these insects will be essential; see “Historical and Contemporary Control Options Against Bed Bugs, *Cimex* spp.” by Stephen L. Doggett and Chow-Yang Lee. So-called “invasive insects” that breach quarantine, establish, cause an outbreak, and spread, devastating agricultural production in their invaded range, have become commonplace. Two case studies are reviewed in this volume, the fall armyworm (“*Spodoptera frugiperda*: Ecology, Evolution, and Management Options of an Invasive Species” by Wee Tek Tay, Robert L. Meagher Jr., Cecilia Czapak, and Astrid T. Groot) and spotted lanternfly [Julie M. Urban and Heather Leach on the “Biology and Management of the Spotted Lanternfly, *Lycorma delicatula* (Hemiptera: Fulgoridae), in the United States”]. If only quarantine had worked!

Natural and managed forests have been particularly vulnerable to species breaching quarantine; one only needs to mention the emerald ash borer, for example. “Forest Insect Biosecurity: Processes, Patterns, Predictions, Pitfalls” by Helen F. Nahrung, Andrew M. Liebhold, Eckehard G. Brockerhoff, and Davide Rassati proffers valuable insights into the challenges. Early detection is the key to cost-effective eradication, as highlighted by the review of promising technologies, “Early Monitoring of Forest Wood-Boring Pests with Remote Sensing” by Youqing Luo, Huaguo Huang, and Alain Roques.

The remaining reviews are at the whole-animal, evolutionary, behavioral, and physiological levels. Again putting the Insecta into proper evolutionary context, Jakub Prokop, André Nel, and Michael S. Engel review “Diversity, Form, and Postembryonic Development of Paleozoic Insects.” Diana Pérez-Staples and Solana Abraham document “Postcopulatory Behavior of Tephritid Flies,” and Monika Hilker, Hassan Salem, and Nina E. Fatouros review the “Adaptive Plasticity of Insect Eggs in Response to Environmental Challenges.” Sound-based signaling in insect behavior is being increasingly listened to, and the “Functional Diversity of Vibrational Signaling Systems in Insects”

is recognized in the review by Meta Virant-Doberlet, Nataša Stritih-Peljhan, Alenka Žunič-Kosi, and Jernej Polajnar.

Silkworms have been a model system for many aspects of entomology, in part because we have kept them in culture, so to speak, for a long, long time. Zhaoyang Hu, Feifei Zhu, and Keping Chen review “The Mechanisms of Silkworm Resistance to the Baculovirus and Antiviral Breeding,” which provides insights into the insect immune system.

Attaining a proper understanding of the effects of a changing and variable thermal environment on the population dynamics and ecology of insects requires a deeper appreciation at the whole-animal level. But climate change is not all about temperature increase; moisture effects need to be carefully considered, as in the review by Joshua B. Benoit, Kevin E. McCluney, Matthew J. DeGennaro, and Julian A.T. Dow on “Dehydration Dynamics in Terrestrial Arthropods: From Water Sensing to Trophic Interactions.” Nicholas M. Teets, Katie E. Marshall, and Julie A. Reynolds do a deep dive into “Molecular Mechanisms of Winter Survival,” and Hideharu Numata and Yoshinori Shintani review “Diapause in Univoltine and Semivoltine Life Cycles.” Those purporting to model insect responses to climate change would do well to be cognizant of the intricacies of diapause—it is not all about low temperatures.

I hope you enjoy the volume.

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Co-Editor

LITERATURE CITED

Zalucki M. 2016. Foreword. *Annu. Rev. Entomol.* 61:v–viii