frontiers | Frontiers in Ecology and Evolution

TYPE Editorial
PUBLISHED 06 August 2024
DOI 10.3389/fevo.2024.1468337

OPEN ACCESS

EDITED AND REVIEWED BY
Jordi Figuerola,
Spanish National Research Council (CSIC), Spain

*CORRESPONDENCE
Philip T. Starks
philip.starks@tufts.edu

RECEIVED 21 July 2024
ACCEPTED 23 July 2024
PUBLISHED 06 August 2024

CITATION
Starks PT, Bonoan RE and McCreery HF (2024) Editorial: Insect conservation behavior. *Front. Ecol. Evol.* 12:1468337. doi: 10.3389/fevo.2024.1468337

Editorial: Insect conservation behavior

Philip T. Starks[1]*, Rachael E. Bonoan[2] and Helen F. McCreery[1]

[1]Biology Department, Tufts University, Medford, MA, United States, [2]Biology Department, Providence College, Providence, RI, United States

KEYWORDS

insect, conservation, behavior, global change, climate change

Editorial on the Research Topic
Insect conservation behavior

Introduction

In today's era of rapid global climate change, conservation biology has become an essential field (Sage, 2020). Its primary goal is to protect ecosystems and preserve species diversity. At its core, conservation biology seeks to understand and safeguard the intricate web of life that sustains our planet. Achieving these objectives requires a thorough understanding of the behavior of organisms within their ecological contexts (Buchholz, 2007).

The articles in this Research Topic take us on an insightful journey through the world of conservation biology, advocating for a detailed exploration of behavior as a key strategy to achieve conservation goals. Specifically, we argue that insects, often overlooked (Miličić et al., 2021), provide exceptional insights into the mechanisms driving biodiversity dynamics.

Focusing on insects is crucial because they occupy a unique position in ecology, significantly influencing ecosystem functioning and species interactions (Verma et al., 2023). As primary pollinators, decomposers, herbivores, and predators, their roles are diverse and irreplaceable. Additionally, insects display a wide variety of behavior, from intricate communication systems to complex social interactions (Cordoba-Aguilar et al., 2018).

Insects also offer an attractive opportunity for scientific research due to their relative ease of study. Their abundance, rapid reproductive rates, and often observable behavior facilitate empirical investigations into fundamental ecological and evolutionary questions. Insects frequently serve as model organisms, providing insights with broad relevance across various taxa. By studying insect behavior, we can gain valuable lessons applicable to diverse conservation scenarios.

Behavior is the means through which animals interact with their environment and with each other. As such, behavior must be central to conservation efforts. Despite this, conservation behavior is often under-discussed, even in situations where the natural history of a species is well understood (see, e.g., Berger-Tal et al., 2011, 2016). Although critical to ecosystems, insects have lagged behind other groups within the conservation literature.

This Research Topic aims to begin to address this gap and emphasize the importance of insect behavior in conservation. By highlighting the significant roles insects play and the insights gained from studying their behavior, we hope to inspire further research and action in this vital area of conservation biology.

Objectives of the research topic

Our goals for this Research Topic were twofold. First, we aimed to present the latest in insect behavior research and how such research could be applied to conservation. Second, we hoped to promote a diverse set of authors from diverse geographic locations. The target audience for this Research Topic includes conservation biologists, behavioral ecologists, and nature enthusiasts.

In this Research Topic, we present a collection of 10 papers, comprising two reviews and eight original research papers, that collectively offer valuable insights into the conservation of insects through the lens of behavior.

Review articles

1. Productivity-Richness Relationships Framework
   Wang et al. introduce a new framework for understanding productivity-richness relationships (PRR) in ecosystems. Their review examines the diverse shapes of PRR and the processes underlying these patterns, offering a predictive tool for ecosystem functions.
2. Bioluminescent Insects and Light Pollution
   Owens et al. explore the threats to bioluminescent insects from artificial light pollution. Their comprehensive review provides insights into the ecological impacts of light pollution and offers recommendations for mitigating these threats to preserve these fascinating creatures.

Original research papers

1. Thermal Tolerance and Foraging Behavior in Stingless Bees
   Robinson & Baudier explore how age and size differences among *Tetragonisca angustula* bees influence their thermal tolerance and foraging behavior amidst climate change. Their study reveals that foragers experience greater thermal stress, which may affect bee activity and pollination efficiency, underscoring the broader implications of climate change on these crucial pollinators.
2. Nutrient Enrichment and Bumble Bee Queens
   Thuma et al. review the impact of nutrient enrichment and rainfall changes on plant phenology and resource availability for bumble bee queens. Their study highlights the interconnectedness of plant and pollinator conservation and the need for integrated approaches to manage these systems effectively.
3. Honey Bee Thermoregulation Behavior
   Weinberg et al. explore honey bee thermoregulation behavior, such as altering comb arrangement under heat stress. Their findings support the idea that such behavior are crucial for colony survival amidst climate change, offering insights into the resilience of honey bee colonies and the future of our agricultural system in the face of climate change.
4. Roosting Behavior of Endangered Damselflies
   Mahdjoub et al. investigate the roosting behavior and microhabitat selection of the endangered damselfly *Calopteryx exul* in Algeria. The study highlights the critical importance of bank vegetation for roosting, emphasizing habitat protection for effective conservation strategies and showing how roosting behavior influences lifespan.
5. Impact of Human Activities on Odonata
   Rocha et al. evaluate how human impacts on streams in the eastern Amazon affect the functional traits and reproductive behavior of Odonata. Their research indicates that altered environments favor larger, heliothermic, exophytic species, while preserved areas support smaller, specialized species, highlighting the resilience and adaptability of these insects to changing habitats.
6. Butterfly Behavior and Grazing Strategies
   Bussan & Schultz examine the effects of different cattle grazing strategies on butterfly behavior. They find that conservation grazing via rotating stock and deferment periods can support butterfly habitats by promoting diverse plant communities, suggesting that such strategies can be beneficial for butterfly conservation.
7. Bat Predation and Moth Development
   Zhang et al. investigate how bat predation risks influence the growth, development, reproduction, and hormone levels of *Spodoptera litura* moths. This study highlights adaptive responses that could be leveraged for biological control strategies.
8. Cannibalism in Stink Bugs
   Wu et al. discover that female *Arma custos* stink bugs, a common biocontrol agent, cannibalize more eggs than males, a behavior that does not impact their biocontrol efficacy. This research provides a nuanced understanding of biocontrol agents' behavior and their implications for pest management.

Conclusion

Working on this Research Topic has been a delightful experience. We hope this Research Topic underscores the significance of insects in conservation-based behavioral research and acts as a catalyst for future studies. The intricate connections between behavior, environment, and conservation strategies are highlighted throughout these articles, demonstrating the crucial role of behavior in conservation efforts.

Understanding insect conservation behavior is essential for understanding the resilience of ecosystems in a rapidly changing global environment. We urge the scientific community and nature enthusiasts alike to explore these studies and apply the insights gained to broader conservation initiatives. Through collaborative and informed action, we can strive to preserve the biodiversity that is vital to the health of our planet.

Author contributions

PS: Conceptualization, Supervision, Writing – original draft, Writing – review & editing. RB: Conceptualization, Writing – original draft, Writing – review & editing. HM: Writing – original draft, Writing – review & editing.

Acknowledgments

We extend our gratitude to the authors, reviewers, and editors who played significant roles in the creation of this Research Topic. Their dedication and expertise have been instrumental in bringing this Research Topic to fruition.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

References

Berger-Tal, O., Blumstein, D. T., Carroll, S., Fisher, R. N., Mesnick, S. L., Owen, M. A., et al. (2016). A systematic survey of the integration of animal behavior into conservation. *Conserv. Biol.* 30, 744–753. doi: 10.1111/cobi.12654

Berger-Tal, O., Polak, T., Oron, A., Lubin, Y., Kotler, B. P., and Saltz, D. (2011). Integrating animal behavior and conservation biology: a conceptual framework. *Behav. Ecol.* 22, 236–239. doi: 10.1093/beheco/arq224

Buchholz, R. (2007). Behavioural biology: an effective and relevant conservation tool. *Trends Ecol. Evol.* 22, 401–407. doi: 10.1016/j.tree.2007.06.002

Cordoba-Aguilar, A., Gonzalez-Tokman, D., and Gonzalez-Santoyo, I. (Eds.) (2018). *Insect Behavior: From Mechanisms to Ecological and Evolutionary Consequences* (United Kingdom: Oxford University Press).

Miličić, M., Popov, S., Branco, V. V., and Pedro Cardoso, P. (2021). Insect threats and conservation through the lens of global experts. *Conserv. Lett.* 14. doi: 10.1111/conl.12814

Sage, R. F. (2020). Global change biology: A primer. *Global Change Biol.* 26, 3–30. doi: 10.1111/gcb.14893

Verma, R. C., Waseem, M. A., Sharma, N., Bharathi, K., Singh, S., Rashwin, A., et al. (2023). The role of insects in ecosystems, an in-depth review of entomological research. *Int. J. Environ. Climate Change* 13, 4340–4348. doi: 10.9734/ijecc/2023/v13i103110