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Role of a Niemann-Pick type C2 transcript (Vd40090) in Varroa-honey bee interaction

Authors: Nganso Beatrice

Abstract: Chemical cues are well-known to play a crucial role in the interactions between the honeybee and its most devastating parasite, the invasive ecto-parasitic Varroa destructor mite. However, the chemosensory machinery that mediates this interaction remains unknown. Recently, via transcriptomic and proteomic analyses, we identified twelve putative soluble carrier and membrane-bound chemosensory proteins. Specifically, three transcripts were found to be foreleg-specific, while the other two transcripts were expressed in both the forelegs and gnathosoma. Silencing highly expressed and foreleg-specific transcript (Vd40090), which encodes a Niemann-Pick disease protein type C2 (NPC2) protein using RNA interference caused significant behavioral and physiological changes. Silencing effectively disrupted Varroa host selection, acceptance and feeding as well as significantly impaired the expression of reproduction-related genes leading to reduced mite reproduction within worker brood cells. Overall, our results clearly indicate the crucial role of this putative odorant carrier protein in Varroa-honeybee interaction.

Beyond Scientific Journals: Broadening the societal impact of entomological science discoveries

Authors: Ngumbi Esther, University of Illinois at Urbana-Champaign, United States

Abstract: Science continues to provide answers to the most persistent challenges our global societies face, including climate change, public health, and food insecurity. Yet, many of these novel scientific solutions, including those arising from entomological research, are only meaningful to the science community. Approximately 3 million scientific articles are published every year. Yet, on average, only ten people read a given scientific article in its entirety, so clearly, the public is not being reached. Considering this disconnect, it is crucial for graduate students, post-docs, early career, and seasoned scientists to learn the art of sharing their research findings beyond the scientific journals. In this talk, I will explore other avenues researchers can use to disseminate their findings widely and outline the art of writing and pitching impact-full science-related opinion pieces. By widely spreading our scientific results, we can build bridges between entomological research and society and allow communities, activists, private industries, and policymakers to build on our findings and discoveries.

How honest signaling and co-evolution between bees and their hornet predators has shaped bee communication

Authors: Nieh James, UCSD, United States

Abstract: Predators have shaped the evolution of multiple bee signals and how bees can detect signals. These adaptations include alarm communication, stop signals, and olfactory eavesdropping. I present recent work by my collaborators and myself on how predators affect the signaling of different honey bee species (Apis cerana, Apis florea, and Apis dorsata) to understand how important selective pressures, predation and peril, have shaped the evolution of honey bee communication.

Use of vibratory signals as mating disruption strategy for pest control

Authors: Nieri Rachele[3], Berardo Alice[2], Pugno Nicola M.[3], Mazzoni Valerio[1], [1]Fondazione Edmund Mach Center for Research & Innovation, Italy, [2]University of Padua, [3]University of Trento

Abstract: Mating disruption is normally associated with pheromones and for this reason it is considered a typical chemical ecology strategy. However, recent progresses in the field of biotremology are conveying research in the use of mechanical stimuli (i.e., semiophysicals) for pest manipulation. Vibrational inputs are less impacting on the environment than pesticides and for this reason they are suitable for organic and integrated pest management. Since 2017, a 1 ha vineyard of Cabernet Franc is managed with vibrational signals to disrupt the mating behavior of two noxious leafhoppers, Scaphoideus titanus Ball and Empoasca vitis Göthe. The 24h/day transmission of vibrations with frequency pattern overlapping the two pests' mating signals, by means of special electromagnetic transducers, caused a significant reduction (30-50%) of both populations in the treated area, in comparison with an adjacent control vineyard. Similarly, the leaf damage was much lower in the treated area compared to the control. On the contrary, no negative effects were observed on predators (e.g. spiders and lacewings). A numerical approach on the mechanics of the problem has indicated the optimal trellis system setup (i.e., poles and wires characteristics) to maximize the signal transmission along the row and thus reduce the overall costs (i.e., to increase the active space and thus to reduce the number of transducers per row). This is the first demonstration of the efficacy of the vibrational mating disruption method in the field. In future, we aim at extending the experimental area to other European vine regions, in order to further validate the method.