



Royal Netherlands Academy of Arts and Sciences (KNAW) KONINKLIJKE NEDERLANDSE AKADEMIE VAN WETENSCHAPPEN

Odours released by bacteria affect the foraging behaviour of primary and secondary parasitoids differently

Goelen, Tim; Sobhy, Islam S.; Vanderaa, Christophe; de Boer, Jetske G.; Delvigne, Frank; Francis, Frédéric; Wäckers, Felix; Rediers, Hans; Verstrepen, Kevin J.; Wenseleers, Tom; Jacquemyn, Hans; Lievens, Bart

2019

document version

Publisher's PDF, also known as Version of record

[Link to publication in KNAW Research Portal](#)

citation for published version (APA)

Goelen, T., Sobhy, I. S., Vanderaa, C., de Boer, J. G., Delvigne, F., Francis, F., Wäckers, F., Rediers, H., Verstrepen, K. J., Wenseleers, T., Jacquemyn, H., & Lievens, B. (2019). *Odours released by bacteria affect the foraging behaviour of primary and secondary parasitoids differently: Plain Language Summary*. (Functional Ecology). <https://besjournals.onlinelibrary.wiley.com/action/downloadSupplement?doi=10.1111%2F1365-2435.13503&file=fec13503-sup-0001-Summary.pdf>

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the KNAW public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain.
- You may freely distribute the URL identifying the publication in the KNAW public portal.

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

E-mail address:

pure@knaw.nl

Odours released by bacteria affect the foraging behaviour of primary and secondary parasitoids differently

Tim Goelen, Islam S. Sobhy, Christophe Vanderaa, Jetske G. de Boer, Frank Delvigne, Frédéric Francis, Felix Wäckers, Hans Rediers, Kevin J. Verstrepen, Tom Wenseleers, Hans Jacquemyn and Bart Lievens

Insects rely to a large extent on odours while searching for resources such as food, hosts or mates. While most researchers have focused on odours derived from plants and insects, there is mounting evidence that indicates that also microbial odours may play an important role in insect behaviour. Microorganisms, such as fungi and bacteria, are present virtually everywhere in nature, and they are known to produce a wide variety of odours. However, to date only very little is known about whether and how microbial odours influence insect behaviour.

In this study, we investigated how primary and secondary parasitoids respond to the odours from a variety of bacteria occurring in the parasitoids' habitat. Experiments were performed using the primary parasitoid *Aphidius colemani*, which is often used to biologically control economically important aphids, and one of its secondary parasitoids, *Dendrocerus aphidum*. Parasitoids are insects whose larvae develop in or on the bodies of other arthropods (mostly other insects), eventually killing them. While primary parasitoids are of tremendous importance in biological pest control worldwide, secondary parasitoids are considered unwanted guests, as they represent important enemies of the primary parasitoids, thereby reducing their efficacy. Our results indicated that both insect species strongly responded to bacterial odours, ranging from attraction to repellence. Additionally, we found that the primary parasitoid responded differently to the bacterial odours compared to the



*The primary parasitoid *Aphidius colemani* searching for aphid hosts. Photograph credit: Tim Goelen*

secondary parasitoid, indicating that these two parasitoid species exploit different odours while foraging for food or hosts. Our study indicates that bacterial odours may have an important impact on the foraging behaviour of insects, and should therefore be considered as an additional, but often overlooked, factor in studying multitrophic interactions between plants and insects.

Our results are not only interesting from an ecological point of view, but are also important from an applied perspective as these bacterial odours may be exploited to develop novel eco-friendly strategies to manage pest insects and secondary parasitoids.