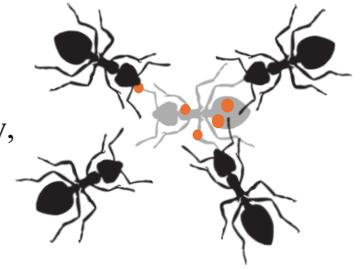


# Aryel Camero Goes

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## I. Education

**The Ohio State University, Columbus, OH, United States of America** 2023-Present

PhD Candidate in Evolution, Ecology and Organismal Biology

Advisor: Rachelle M. M. Adams

Committee: Meg Daly, Jason Slot, Sophie Armitage, Jennifer Hellmann

Candidacy exam passed on: May 2025

Thesis title: *Does a social parasite ant help its host ant against diseases?*

**Sao Paulo State University, Rio Claro, SP, Brazil** 2021-2023

Master of Science in Applied Biology (Cellular, Molecular and Microbiology)

Advisors: Andre Rodrigues and Pepijn W. Kooij

Thesis title: *A multidimensional approach investigating immunological memory in a fungus-growing superorganism*

**Sao Paulo State University, Rio Claro, SP, Brazil** 2016-2021

Bachelor of Science in Biology

Advisors: Andre Rodrigues and Odair Correa Bueno

Thesis title: *How do leaf-cutting ants recognize antagonistic fungi in their fungal crops?*

## II. Peer-reviewed publications

1. **Goes, A.C.**, and Adams, R.M.M. (2025) Gardening strategies of termite farmers. *Science* 389, 6767. (*Perspective/Commentary paper; no peer-review required*)  
DOI: <https://doi.org/10.1126/science.aeb.5715>
2. **Goes, A.C.** (2025) A memória imunológica composta por formigas (*in Portuguese*). In *book: As Colônias de Formigas são Conscientes?* (Eds. Fonseca, A., and Cichoski, L.P.), Editora Fi (Porto Alegre: Brazil), p. 115-145.  
DOI: <https://doi.org/10.22350/9786552721280>
3. da Silva, L.H.B., **Goes, A.C.**, Rodrigues, A., Fourcassie, V., McMahon D., and Haifig, I. (2025) Social immune response reflects infection progression in a soldierless termite. *Behavioral Ecology and Sociobiology*, 79, 11.  
DOI: <https://doi.org/10.1007/s00265-024-03556-2>
4. **Goes, A.C.**, Kooij, P.W., Haifig, I., Bueno, O.C., and Rodrigues, A. (2024) Exploring immune memory traits in the social immunity of a fungus-growing ant. *Proceedings of the Royal Society B*, 291, 20241097.  
DOI: <https://doi.org/10.1098/rspb.2024.1097>
5. de Oliveira, K.B., **Goes, A.C.**, Silva, A.D., Vieira, P.C., and Rodrigues, A. (2024) Fungal Cultivars of Higher Attine Ants Promote *Escovopsis* Chemotropism. *Current Microbiology*, 81, 37.  
DOI: <https://doi.org/10.1007/s00284-023-03552-1>
6. **Goes, A.C.**, Kooij, P.W., Culot, L., Bueno, O.C., and Rodrigues, A. (2022) Distinct and enhanced hygienic responses of a leaf-cutting ant toward repeated fungi exposures. *Ecology and Evolution*, 12: e9112.

DOI: <https://doi.org/10.1002/ece3.9112>

7. Jimenez-Gomez, I., Barcoto, M.O., Montoya, Q.V., **Goes, A.C.**, Monteiro, L.S., Bueno, O.C., Rodrigues, A. (2021). Host susceptibility modulates *Escovopsis* pathogenic potential in the fungiculture of higher attine ants. *Frontiers in Microbiology*, 12:67344. DOI: <https://doi.org/10.3389/fmicb.2021.673444>
8. **Goes, A.C.**, Barcoto, M.O., Kooij, P.W., Bueno, O.C., and Rodrigues, A. (2020) How Do Leaf-Cutting Ants Recognize Antagonistic Microbes in Their Fungal Crops? *Frontiers in Ecology and Evolution*, 8: 14887. DOI: <http://doi.org/10.3389/fevo.2020.00095>

### III. Other publications (in preparation or under review)

1. **Goes, A.C.**, Hellmann, J., Labiner, A., and Adams, R.M.M. Social immune plasticity. (Review paper, for submission to *Biology Letters*).
2. **Goes, A.C.**, Coelho, G.R., Sozanski, K., Glauvitz, E., Geisse, A., Bringham, B.S., and Adams, R.M.M. An ant social parasite helps its fungus-growing ant host with nest hygiene. (Research paper, for submission to *Science*).
3. Cole, E.L., **Goes, A.C.**, Haifig, I., McMahon, D., and Poulsen, M. A new narrative for social immunity research in termites. (Review paper, for submission to *Trends in Ecology and Evolution*).
4. Silva, R.A.P., Oliveira, A.A., **Goes, A.C.**, Assis, D.S., Bueno, O.C., Rodrigues, A. *Syncephalastrum* fungi as an opportunistic pathogen of leaf-cutting ant colonies. (Research paper, for submission to *Pest Management Science*).

### IV. Conference abstracts

1. Adams, R.M.M., Bringham, B., Geisse, A., **Goes, A.C.**, and Martínez, A.R. (2026) Guest and farmer ant symbiotic species network: Establishment, maintenance, and the threat of breakdown. *2026 North Central Branch Meeting of the Entomological Society of America*.
2. **Goes, A.C.**, Coelho, G.R., Glauvitz, E., and Adams, R.M.M. (2025) Parasitic cleaners: do social parasite ants improve hygiene for their fungus-growing ant hosts? *XXVII Simposio de Mirmecologia: An International Ant Meeting*, Recife, PE, Brazil. (Oral Presentation).
3. da Silva, R.A.P., de Oliveira, A.P., **Goes, A.C.**, Assis, D.S., Bueno, O.C., and Rodrigues, A. (2025) Atratividade de operárias da saúva-limão aos filtrados de cultivo do fungo *Syncephalastrum* sp. *XXVII Simposio de Mirmecologia: An International Ant Meeting*, Recife, PE, Brazil.
4. Pennachioni, G.G.P., Marin, V.R., **Goes, A.C.**, Sass, D.C., Ferreira, H., and Rodrigues, A. (2025) Ação Antimicrobiana de Actinobactérias Associadas às Formigas Atíneas Frente a Microrganismos Fitopatogênicos. *XXXVII Congresso de Iniciação Científica da UNESP – IB/Rio Claro*, Rio Claro, SP, Brazil.
5. **Goes, A.C.**, Pepijn, P.W., Culot, L., Bueno, O.C., and Rodrigues, A. (2021) Differential and increased hygienic responses of *Atta sexdens* after successive exposure to fungus-garden and ant antagonistic fungi. *Insetos Sociais em Rede (online meeting)*. (Oral Presentation).
6. **Goes, A.C.**, Culot, L., Bueno, O.C., and Rodrigues, A. (2021) Especificidade e aprendizado na defesa contra fungos antagonistas em colônias de saúva-limão (*Atta sexdens*). *XXXI Congresso de Iniciação Científica da UNESP – IB/Rio Claro*, Rio Claro, SP, Brazil. (Oral Presentation).

### V. Invited lecture and courses

1. **Goes, A.C.** (2019) Minicurso – Introdução à escrita e divulgação científica. UNESP, Rio Claro, SP, Brazil. (Responsible for giving lectures and small practical activities to undergraduate students).
2. **Goes, A.C.** (2019) A formiga saúva-limão aprende a reconhecer fungos antagonistas? UNESP, Rio Claro, SP, Brazil. (Responsible for giving a talk).
3. **Goes, A.C.** (2018) Formigas cortadeiras: aspectos da biologia, ecologia e manejo de um superorganismo. UNESP, Rio Claro, SP, Brazil. (Responsible for giving lectures and small practical activities to undergraduate students).

## VI. Grants, awards, and funding

Presidential Fellowship, The Ohio State University ( <b>\$38,088</b> )	2025
University Fellowship, The Ohio State University ( <b>\$30,420</b> )	2023
FAPESP Award, #2021/04112-4 ( <b>R\$55,594</b> )	2021
FAPESP Award, #2019/03087-6 ( <b>R\$16,070</b> )	2019
VUNESP/UNESP Award, #SEE-SP 5881/000/2013 ( <b>R\$16,200</b> )	2016

## VII. Teaching experience and research assistantship

<b>The Ohio State University</b>	Columbus, OH, USA
Teaching Assistant: BIO 4901 Biology Capstone	2026
Teaching Assistant: EEOB 3270 Disease Ecology and Evolution	2025
Teaching Assistant: BIO 3401 Applied Biology	2025
Research Assistant: GRA appointment, The Adams Lab	2025
Research Assistant: GRA appointment, The Adams Lab	2024
<b>Sao Paulo State University</b>	Rio Claro, SP, Brazil
Teaching Assistant: Microbiology	2022-2023
• Taught three classes and supervised students during laboratory practices	
Teaching Assistant: Microbiology	2017-2018
• Supervised students during laboratory practices	

## VIII. Mentored students

Emma Glauvitz, Undergraduate, The Ohio State University	2024-2025
Raquel Lima de Souza, Undergraduate, Sao Paulo State University	2022

## IX. Community leadership experience

<b>Graduate Evolution &amp; Ecology Student Organization</b>	Columbus, OH, USA
Undergraduate Research Committee	2025-Present
DEIJ Committee	2024-2025

## X. Educational activities

Scientific communication and activities about ants	2025
<i>WestFest 2025</i> , The Ohio State University	
Scientific communication about fire ants and invasive species	2025
<i>Latin America Day</i> , The Ohio State University.	
Scientific communication about ants and The Adams Lab	2023
<i>Columbus City School Exceptional Science Fair</i> , Columbus, OH, USA	
Scientific communication about ants	2023

Put-In-Bay island, Lake Erie, OH, USA

## XI. Professional societies

International Union for the Study of Social Insects, NA Section 2024-Present

## XII. Additional education (courses)

R Programming, Johns Hopkins University, JHU (30 hours) 2021

Fundamental Statistics, Federal University of Goiás, UFG (60 hours) 2020

## XIII. Techniques

**Key Software:** Geneious, R, RStudio, ImageJ, MS Office, Adobe Photoshop, Inkscape.

**Wet and Dry Lab:** DNA tissue extractions, polymerase chain reaction, gel electrophoresis, light microscopy, microbiological skills for microbe plating (bacteria and fungi), GC-MS sample preparation and machine use, maintenance of living social insects' colonies (ants and termites), preparation of solutions for laboratory use, and behavioral assessment.

**Field Experience:** Gamboa, Panama (collection of *Sericomyrmex amabilis* colonies and use of Smithsonian Tropical Research Institute workplace, 2024-2025); Itirapira Ecological Station, SP, Brazil (collection of *Atta sexdens* colonies, 2022).

## XIV. Professional references

### **Dr. Rachelle M. M. Adams**

Department of Evolution, Ecology, and Organismal Biology, The Ohio State University  
[adams.1970@osu.edu](mailto:adams.1970@osu.edu)

### **Dr. Andre Rodrigues**

Department of General and Applied Biology, Sao Paulo State University  
[andre.rodrigues@unesp.br](mailto:andre.rodrigues@unesp.br)

### **Dr. Pepijn W. Kooij**

Department of General and Applied Biology, Sao Paulo State University  
[p.kooij@unesp.br](mailto:p.kooij@unesp.br)

### **Dr. Sophie A. O. Armitage**

Institute of Biology, Freie Universität Berlin  
[sophie.armitage@fu-berlin.de](mailto:sophie.armitage@fu-berlin.de)

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