

# MAXIME DAHIREL

(he/they)

My researches are mostly split along two linked axes:

- **urban biodiversity, ecology and evolution**, with a focus on the role of trait variation in explaining species' ability (or inability) to persist in cities
- **dispersal** as a key trait bridging ecological and evolutionary dynamics.

I develop these research themes using a combination of lab and outdoor experiments, monitoring in naturalistic contexts and individual-based models. A key aspect of my work is the use of advanced statistical and data science methods that accurately reflect the complexity of the natural systems I study.

To go directly to the list of publications [click here](#)

## Most recent position

### Postdoctoral researcher (Marie Skłodowska-Curie Fellow)

📅 2021 - 2023 🌐 Ghent, Belgium

Ghent University, Terrestrial Ecology unit

Evolutionary ecology in cities (HELICITY project)

## Previous positions

### Postdoctoral researcher

📅 2019 - 2021 🌐 Sophia-Antipolis, France

INRAE (formerly INRA), Institut Sophia Agrobiotech

Evolutionary ecology of range expansions

### ATER (fixed-term research and teaching associate)

📅 2016 - 2018 🌐 Rennes, France

University of Rennes 1, ECOBIO research unit

Evolutionary ecology in cities, dispersal ecology and evolution

### Postdoctoral researcher

📅 2015 - 2016 🌐 Ghent, Belgium

Ghent University, Terrestrial Ecology unit

Behavioural changes in response to urbanisation

### Research assistant (PhD student/candidate in Biology)

📅 2011 - 2014 🌐 Rennes, France

University of Rennes 1, ECOBIO research unit

PhD thesis on land snail dispersal, available [here](#).

## Info

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## Key skills

### 🌿 Invertebrate zoology

(primarily land snails and spiders)

**Rearing**

**Trait measurements**

**Behavioural observations**

**Field sampling methods**

**Species ID** (Western Europe)

### 💬 Languages

**French:** first language

**English:** fluent

**German:** 'false beginner'

### 🔗 Programming languages

**R** (incl. tidyverse)

**Julia**

### 📊 Data science and statistics

**Version control with Git & GitHub**

**Quarto/RMarkdown**

**Shiny apps** (offline)

**Bayesian & frequentist statistics**

Linear models and extensions (Any and all combinations of generalized, mixed/hierarchical, additive, non-linear, or multivariate)

Ordination and classification methods

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**Advanced data visualisation**

**Spatial data science & GIS**

**Individual-based modelling**

### 💻 Other software

**QGIS**

**Clip Studio, Krita, Inkscape**

**Netlogo**

**ImageJ**

## Teaching experience

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### ATER (fixed-term research and teaching associate)

📅 2016 - 2018 🌐 Rennes, France

University of Rennes 1, ECOBIO research unit

### 'Moniteur' (teaching assistant)

📅 2011 - 2012 🌐 Rennes, France

University of Rennes 1, ECOBIO research unit

### Courses taught or co-taught in these positions include:

#### Statistics and data science (lectures and practical)

Advanced R for data analysis (1st year of MSc) ~ 20h

Statistical tools and experimental design (2nd year of BSc to 1st year of MSc) ~ 230h

#### Ecology (lab and field)

General ecology (1st year of BSc) ~ 80h

Community ecology (3rd year of BSc and 1st year of MSc) ~ 42h

Spatial ecology (movement ecology; 1st year of MSc) ~ 4h

Ecological bases of vegetal production (3rd year of BSc) ~ 12h

Initiation to GIS (2nd year of BSc) ~ 4h

#### Zoology (lab and field)

Introduction to the diversity of life (1st year of BSc) ~ 30h

Entomology (3rd year of BSc) ~ 40h

Physiology of nutrition, development, growth (3rd year of BSc) ~ 6h

## Mentoring experience

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### Co-supervision of 1 PhD student

📅 2020 - present

- Experimental evolution
- Data synthesis and individual-based modelling

### Supervision of 13 MSc students (1st or 2nd year) and 5 BSc students (1 to 6 months projects)

📅 2012 - present

- Field and lab studies of dispersal and behaviour
- Data synthesis and individual-based modelling

See list of students for current year [here](#)

## Research funding

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### Marie Skłodowska-Curie Individual Fellowship (MSCA-IF)

📅 2021 - 2023 | €166 320

**Project:** HELICITY (Evolution of correlated traits in response to city life: helioid snails as windows on the consequences of urban history)

### Research grant from the Observatoire des Sciences de l'Univers de Rennes

📅 2018 | €1 500

**Project:** Dispersal syndrome evolution and habitat fragmentation

### Fyssen Foundation postdoctoral grant

📅 2015 - 2016 | €24 600

**Project:** Behavioural changes in response to urbanisation

## Selected science communication

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### Invited speaker, Ateliers À propos

📅 2022

Online science workshop (targeted to 6-12 year olds): invited for a session on snail biology, urban ecology (in French)

### Contributor to the Life in the City : Evolution in an Urbanizing World blog

📅 since 2018

Discussions of current topics and articles in urban ecology and evolution

📺 Research I have participated in has also been featured by various press outlets including the RTBF, De Standaard, Scientific American, Le Temps, as well as local journals and television channels.

## Service

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### Referee for various journals and outlets

including *Proceedings of the Royal Society B*, *Functional Ecology*, *Journal of Animal Ecology*, *Oikos*, *PCI Ecology*, *Animal Behaviour*...

### Member of the Grant Review College of the British Ecological Society

Reviewing Research and Outreach Grant applications (typically 4 to 6 / year)

### PhD students representative to the Advisory Board of the research unit

📅 2012-2014

University of Rennes 1, ECOBIO research unit

## Publications

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### Preprints (3)

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#### Shifts in colour morph frequencies along an urbanisation gradient in the ground beetle *Pterostichus madidus*

*bioRxiv preprint*

**Dahirel M.**, Audusseau H., Croci S.

#### Individual variation in dispersal, and its sources, shape the fate of pushed vs. pulled range expansions

*bioRxiv preprint*

**Dahirel M.**, Guicharnaud C., Vercken E.

#### Individual heterogeneity and its importance for metapopulation dynamics

*bioRxiv preprint*

Masier S., **Dahirel M.**, Mortier F., Bonte D.

## Peer-reviewed publications (29)

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### 2023

#### Urbanization impacts short- but not long-distance natal dispersal in a common orb web spider

*Oikos*, accepted

Bonte D., Rose C., Bastiaensen T., Bechsgaard J., Bilde T., **Dahirel M.**, De Wolf K., Thylys H., Uytterchaut T., Vanthournout B.

#### Life-history traits, pace of life and dispersal among and within five species of *Trichogramma* wasps: a comparative analysis

*Peer Community Journal*, 3: e57

Guicharnaud C., Groussier G., Beranger E., Lamy L., Vercken E., **Dahirel M.**

#### Land snails can trap trematode cercariae in their shell: encapsulation as a general response against parasites?

*Parasite*, 30:1

Gérard C., De Tombeur Y., **Dahirel M.**, Ansart A.

#### Dispersal syndrome and landscape fragmentation in the salt-marsh specialist spider *Erigone longipalpis*

*Current Zoology*, 69(1): 21-31

**Dahirel M.**, Wullschleger M., Berry T., Croci S., Pétillon J.

### 2022

#### Dispersal syndromes in challenging environments: a cross-species experiment

*Ecology Letters*, 25(12): 2675-2687

Cote J., **Dahirel M.**, Schtickzelle N., Altermatt F., Ansart A., Blanchet S., Chaine A., De Laender F., De Raedt J., Haegeman B., Jacob S., Kaltz O., Laurent E., Little C., Madec L., Manzi F., Masier S., Pellerin F., Pennekamp F., Therry L., Vong A., Winandy L., Bonte D., Fronhofer E., Legrand, D.

#### Morph-dependent nematode infection and its association with host movement in the land snail *Cepaea nemoralis* (Mollusca, Gastropoda)

*Journal of Zoology*, 318(3): 191-192

**Dahirel M.**, Proux M., Gérard C., Ansart A.

#### Global urban environmental change drives adaptation in white clover

*Science*, 375(6586): 1275-1281

Santangelo J. S. **et al.** (the Global Urban Evolution project, 287 authors)

2021

**Landscape connectivity alters the evolution of density-dependent dispersal during pushed range expansions**

*bioRxiv preprint, peer-reviewed and recommended by Peer Community In Evolutionary Biology*

**Dahirel M.**, Bertin A., Calcagno V., Duraj C., Fellous S., Groussier G., Lombaert E., Mailleret L., Marchand A., Vercken E.

**Boldness and exploration are linked to shell morph but not environmental contexts in the snail *Cepaea nemoralis***

*Ethology*, 127(4):321-333

**Dahirel M.**, Gaudu V., Ansart A.

**Shifts from pulled to pushed range expansions caused by reduction of landscape connectivity**

*Oikos*, 130(5): 708-725

**Dahirel M.**, Bertin A., Haond M., Blin A., Lombaert E., Calcagno V., Fellous S., Mailleret L., Malausa T., Vercken E.

**Increased population density depresses activity but does not influence emigration in the snail *Pomatias elegans***

*Journal of Zoology*, 313(3):172-181

**Dahirel M.**, Menut L., Ansart A.

2020

**Transdisciplinary Bioblitz: Rapid biotic and abiotic inventory allows studying environmental changes over 60 years at the Biological Field Station of Paimpont (Brittany, France) and opens new interdisciplinary research opportunities**

*Biodiversity Data Journal*, 8: e50451

Nicolai A., Guernion M., Guillocheau S., Hoeffner K., Le Gouar P., Ménard N., Piscart C., Vallet D., Hervé M., Benezeth E., Chedanne H., Blémus J., Vernon P., Cylly D., Hotte H., Lois G., Mai B., Perez G., Ouisse T., Monard C., Wiegand C., Caudal J.-P., Butet A., **Dahirel M.**, Barbe L., Balbi M., Briand V., Bormans M., Charrier M., Bouger G., Jung V., Le Lann C., Pannard A., Pétilion J., Rantier Y., Marguerie D., Tougeron K., Devogel P., Dugravot S., Dubos T., Garrin M., Carnet M., Gouraud C., Chambet A., Esnault J., Poupelin M., Welk E., Bütof A., Dubois G., Humbert G., Marie-Réau O., Norvez O., Richard G., Froger B., Rochais C., Potthoff M., Ayati K., Bellido A., Rissel A., Santonja M., Farcy J.-O., Collias E., Sene L., Cluzeau D., Supper R.

***Brachylaima* spp. (Trematoda) parasitizing *Cornu aspersum* (Gastropoda) in France with potential risk for human consumption**

*Parasite*, 27: 15

Gérard C., Ansart A., Decanter N., Martin M.-C., **Dahirel M.**

**Urbanization drives cross-taxon declines in abundance and diversity at multiple spatial scales**

*Global Change Biology*, 26(3): 1196–1211

Piano E., Souffreau C., Merckx T., Baardsen L.F., Backeljau T., Bonte D., Brans K.I., Cours M., **Dahirel M.**, Debortoli N., Decaestecker E., De Wolf K., Engelen J.M.T., Fontaneto D., Gianuca A.T., Govaert L., Hanashiro F.T.T., Higuti J., Lens L., Martens K., Matheve H., Matthysen E., Pinseel E., Sablon R., Schön I., Stoks R., Van Doninck K., Van Dyck H., Vanormelingen P., Van Wichelen J., Vyverman W., De Meester L., Hendrickx F.

## 2019

### The distinct phenotypic signatures of dispersal and stress in an arthropod model: from physiology to life history

*Journal of Experimental Biology*, 222(16): jeb203596

**Dahirel M.**, Masier S., Renault D., Bonte D. (\* contributed equally to the work)

### Dispersers are more likely to follow mucus trails in the land snail *Cornu aspersum*

*The Science of Nature*, 106: 43

Vong A., Ansart A., **Dahirel M.**

### Urbanization driven changes in web building and body size in an orb web spider

*Journal of Animal Ecology*, 88(1): 79–91

**Dahirel M.**, De Cock M., Vantieghem P., Bonte D.

## 2018

### Bottom-up and top-down control of dispersal across major organismal groups: a coordinated distributed experiment

*Nature Ecology and Evolution*, 2: 1859–1863

Fronhofer E.A., Legrand D., Altermatt F., Ansart A., Blanchet S., Bonte D., Chaine A., **Dahirel M.**, De Laender F., De Raedt J., di Gesu L., Jacob S., Kaltz O., Laurent E., Little C.J., Madec L., Manzi F., Masier S., Pellerin F., Pennekamp F., Schtickzelle N., Therry L., Vong A., Winandy L., Cote J.

### Body size shifts in aquatic and terrestrial urban communities

*Nature*, 558: 113–116

Merckx T., Souffreau C., Kaiser A., Baardsen L.F., Backeljau T., Bonte D., Brans K. I., Cours M., **Dahirel M.**, Debortoli N., De Wolf K., Engelen J.M.T., Fontaneto D., Gianuca A., Govaert L., Hendrickx F., Higuti J., Lens L., Martens K., Matheve H., Matthysen E., Piano E., Sablon R., Schön I., Van Doninck K., De Meester L., Van Dyck H.

### Kin competition accelerates experimental range expansion in an arthropod herbivore

*Ecology Letters*, 21(2): 225–234

Van Petegem K., Moerman F., **Dahirel M.**, Fronhofer E.A., Vandegehuchte M.L., Van Leeuwen T., Wybouw N., Stoks R., Bonte D.

## 2017

### Individual boldness is life stage-dependent and linked to dispersal in a hermaphrodite land snail

*Ecological Research*, 32(5): 751–755

**Dahirel M.**, Vong A., Ansart A., Madec L.

### Intraspecific variation shapes community-level behavioral responses to urbanization in spiders

*Ecology*, 98(9): 2379–2390

**Dahirel M.**, Dierick J., De Cock M., Bonte D.

### Dispersal: a central and independent trait in life-history

*Oikos*, 126(4): 472–479

Bonte D., **Dahirel M.**

## 2016

### Dispersal-related traits of the snail *Cornu aspersum* along an urbanisation gradient: maintenance of mobility across life stages despite high costs

*Urban Ecosystems*, 19(4): 1847–1859

**Dahirel M.**, Séguret A., Ansart A., Madec L. (\* contributed equally to the work)

### Density-dependence across dispersal stages in a hermaphrodite land snail: insights from discrete choice models

*Oecologia*, 181(4): 1117–1128

**Dahirel M.**, Vardakis M., Ansart A., Madec L.

### Potential syndromes linking dispersal and reproduction in the hermaphrodite land snail *Cornu aspersum*

*Journal of Zoology*, 299(2): 98–105

**Dahirel M.**, Ansart A., Madec L.

## 2015

### Context-dependence of the olfactory perceptual range in the generalist land snail *Cornu aspersum*

*Canadian Journal of Zoology*, 93(8): 665–669

**Dahirel M.**, Cholé H., Séguret A., Madec L., Ansart A.

### Movement propensity and ability correlate with ecological specialization in European land snails: comparative analysis of a dispersal syndrome

*Journal of Animal Ecology*, 84(1): 228–238

**Dahirel M.**, Olivier E., Guiller A., Martin M.-C., Madec L., Ansart A.

## 2014

### Stage- and weather-dependent dispersal in the brown garden snail *Cornu aspersum*

*Population Ecology*, 56(1): 227–237

**Dahirel M.**, Ansart A., Madec L.

## Communications in conferences

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### Talks (8)

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## 2022

### Urbanisation reshapes *Cornu aspersum* phenotypes along multiple (?) trait dimensions

Annual Meeting of the British Ecological Society | 🌐 Edinburgh, UK

**Dahirel M.**, De Wolf K., Vanthournout B., Bonte D.

### Multivariate effects of urbanisation on an anthropophilic land snail, *Cornu aspersum*

SFE<sup>2</sup> - GFÖ - EEF joint meeting | 🌐 Metz, France

(Talks or posters as non-presenting author not included)

**Dahirel M.**, De Wolf K., De Tombeur Y., Ansart A., Gérard C., Bonte D.

## 2019

### **Pushed to the edge: dispersal restriction shapes eco-evolutionary dynamics of micro-wasp range expansions.**

Annual Meeting of the British Ecological Society | 🌐 Belfast, UK

**Dahirel M.**, Bertin A., Calcagno V., Fellous S., Lombaert E., Mailleret L., Vercken E.

## 2017

### **Body size constraints and behavioural adaptations to city life: a case study in the spider *Araneus diadematus*.**

Ecology Across Borders, joint conference of the BES, GfÖ and NeCoV | 🌐 Ghent, Belgium

**Dahirel M.**, De Cock M., Bonte D.

### **Metabolic dispersal syndromes and response to stress in spider mites**

"Dispersal – Connecting networks", EVENET Movement and Dispersal conference | 🌐 Ghent, Belgium

**Dahirel M.**, Masier S., Renault D., Bonte D.

## 2016

### **Behavioural responses of arachnids to urbanisation: the role of intra- and inter-specific variation**

16th conference of the International Society for Behavioral Ecology | 🌐 Exeter, UK

**Dahirel M.**, Dierick J., Bonte D.

## 2013

### **Habitat specialization and movement characteristics in European helicoid land snails: implications for dispersal and foraging strategies**

9th "Ecology & Behaviour" SERL meeting | 🌐 Strasbourg, France

**Dahirel M.**, Olivier E., Madec L., Ansart A.

## 2012

### **Dispersal strategies in the land snail *Cornu aspersum*: sex-biased dispersal in a hermaphroditic species?**

8th "Ecology & Behaviour" SERL meeting | 🌐 Chizé, France

**Dahirel M.**, Ansart A., Madec L.

## Posters (4)

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## 2019

### **Orb-web spider responses to city life: Species replacement, phenotypic changes and consequences for ecosystem functioning**

67th meeting of the Entomological Society of America | 🌐 St Louis, USA

**Dahirel M.**, Dierick J., De Cock M., Bonte D.



2014

**Studying the interplay between dispersal behavior and reproduction in hermaphrodites, using land snails as models**

15th conference of the International Society for Behavioral Ecology | 🌐 New York, USA

**Dahirel M.**, Ansart A., Madec L.

2013

**How does habitat specialization influence dispersal? A comparative approach in European land snails**

Movement and Dispersal International Conference | 🌐 Aberdeen, UK

**Dahirel M.**, Olivier E., Guiller A., Martin M.-C., Madec L., Ansart A.

**Slow but sure: stage-dependent dispersal in the brown garden snail *Cornu aspersum***

Causes and Consequences of Organism Dispersal | 🌐 Lund, Sweden

**Dahirel M.**, Ansart A., Madec L.

## Workshops

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2017

**An introduction to Bayesian data analysis using Stan.**

Ecology Across Borders, joint conference of the BES, GfÖ and NeCoV | 🌐 Ghent, Belgium

Hertzog L., **Dahirel M.**

## Predoctoral education

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**MSc in Evolutionary, Behavioural and Functional Ecology**

📅 2009 - 2011 🌐 Rennes, France

University of Rennes 1

**BSc in Organismal Biology**

📅 2006 - 2009 🌐 Rennes, France

University of Rennes 1

## Other

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**Qualification from the French National Council of Universities**

authorized to apply for Lecturer/Assistant Professor positions in France, section 67 (Population Biology and Ecology)

**Member of the British Ecological Society**

## References

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### **Prof. Dries Bonte**

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Ghent University, Terrestrial Ecology unit

mentor during 2015-2016 and 2021-2023 positions

### **Dr. Elodie Vercken**

elodie.vercken (at) inrae.fr

INRAE, Institut Sophia Agrobiotech

PI of 2019-2021 research project; current collaborator

### **Dr. Armelle Ansart**

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University of Rennes 1, ECOBIO research unit

PhD co-supervisor; current collaborator