Pierre-Jean G Malé, Ph.D.

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Research Interests

Broadly-trained evolutionary biologist with expertise in genetics and behavioural sciences. My research aims to uncover the mechanisms leading to the establishment and maintenance of mutualisms, and to elucidate the consequences of such relationships on genome evolution. I use multidisciplinary approaches, combining fieldwork in tropical regions, behavioural assays in controlled conditions, and cutting-edge wet lab techniques to tackle the most pressing issues in the global theory of cooperation and mutualism.

Education

2011 **Ph.D. in Ecology and Evolutionary Biology,**
Lab Evolution & Biological Diversity, University of Toulouse, France
Faculty Advisor: Jérôme Orivel, Directeur de recherche, CNRS
Dissertation: Evolutionary stability of mutualisms and control mechanisms
Funding: French Ministry of Higher Education and Research

2007 **M.Sc. in Evolutionary Biology and Ecology**
Center for Biology and Management of Populations, University of Montpellier II, France

2005 **BSc in Organism, Population and Ecosystem Biology**
University of Toulouse III, France

Research Experience

2016- **Postdoctoral Fellow**, Museum of Comparative Zoology, Harvard University, USA, and Max Planck Institute, Jena, Germany
Faculty Mentor: Naomi Pierce, Professor of Organismic and Evolutionary Biology
Project: Reciprocal local adaptation in a mutualism
Funding: Marie Skłodowska-Curie Postdoctoral fellowship

2013-16 **Postdoctoral Fellow**, Department of Ecology and Evolutionary Biology, University of Toronto, Canada
Faculty Mentor: Megan Frederickson, Professor of Ecology & Evolutionary Biology
Project: Genetic ecology of ant-plant mutualisms

2011-13 **Postdoctoral Fellow**, Lab Evolution & Biological Diversity, University of Toulouse, France
Faculty Mentor: Jérôme Chave, Directeur de recherche, CNRS
Project: Phylogeography of a pantropical tree family

PUBLICATIONS

I have published 24 peer-reviewed articles of which 12 have an impact factor greater than 3. My articles have been cited 588 times and my h-index is 12 (Google Scholar). I also wrote five science dissemination articles and I collaborated and supervised the writing of a popularization book.

Selected Publications

1. **Malé P-JG**, Turner KM, Doha M, Anreiter I, Allen AM, Sokolowski MB & Frederickson ME (2017) An ant–plant mutualism through the lens of cGMP-dependent kinase genes. *Proceedings of the Royal Society B* 284:20170896
2. **Malé P-JG**, Bardon L, Besnard G, Coissac E, Delsuc F, Engel J, Lhuillier E, Scotti-Saintagne C, Tinaut A & Chave J (2014) Genome skimming by shotgun sequencing helps resolve the phylogeny of a pantropical tree family. *Molecular Ecology Resources* 14:966-975
3. **Malé P-JG**, Ferdy JB, Leroy C, Roux O, Lauth J, Avilez A, Dejean A, Qulichini A & Orivel J (2014) Retaliation in response to castration promotes a low level of virulence in an ant-plant mutualism. *Evolutionary Biology* 41:22-28

Additional Publications

4. Orivel J, **Malé P-JG**, Lauth J, Roux O, Petitclerc F, Dejean A & Leroy C (2017) Trade-offs in an ant–plant–fungus mutualism. *Proceedings of the Royal Society B* 284:20161679
5. Bourgeois YXC, Delahaie B, Gautier M, Lhuillier E, **Malé P-JG**, Bertrand JAM, Cornuault J, Wakamatsu K, Bouchez O, Mould C, Bruxaux J, Holota H, Milá B & Thébaud C (2017) A novel locus on chromosome 1 underlies the evolution of a melanic plumage polymorphism in a wild songbird. *Royal Society Open Science* 4:160805
6. **Malé P-JG**, Leroy C, Humblot P, Dejean A, Quilichini A & Orivel J (2016) Limited gene dispersal and spatial genetic structure as stabilizing factors in an ant-plant mutualism. *Journal of Evolutionary Biology* 29:2519-2529
7. Bardon L, Sothers CA, Prance GT, **Malé P-JG**, Xi Z, Davic CC, Murienne J, Garcia R, Vincentini A & Chave J (2016) Unraveling the biogeographical history of Chrysobalanaceae from plastid genomes. *American Journal of Botany* 103:1089-1102
8. **Malé P-JG**, Leroy C, Lusignan L, Petitclerc F, Quilichini A & Orivel J (2015) The reproductive biology of the myrmecophyte, *Hirtella physophora*, and the limitation of negative interactions between pollinators and ants. *Arthropod-Plant Interactions* 9:23-31
9. Besnard G, Christin P-A, **Malé P-JG**, Lhuillier E, Lauzeral C, Coissac E & Vorontsova M (2014) From museums to genomics: what can rare C_3 grasses tell about C_4 evolution? *Journal of Experimental Botany* 65:6711-6721
10. Besnard G, Christin P-A, **Malé P-JG**, Coissac E, Ralimanna H & Vorontsova M (2013) Phylogenomic and taxonomical surveys of Lecomtelleae (Poaceae), an isolated, early diverging panicoid tribe from Madagascar. *Annals of Botany* 112:1057-1066
11. Dejean A, Orivel J, Rossi V, **Malé P-JG**, Roux O, Céréghino R & Leroy C (2013) Predation success by a plant-ant indirectly favors the growth and fitness of its host myrmecophyte. *PLoS ONE* 8:e59405
12. Lauth J, **Malé P-JG**, Voglmayr H, Mayer VE, Dejean A & Orivel J (2013) Isolation and characterization of polymorphic microsatellite loci in the ant-associated fungus *Trimmatostroma* sp. (Ascomycota: Chaetothyriales) using pyrosequencing technology. *Molecular Ecology Resources* 13:546-549
13. **Malé P-JG**, Martin J-F, Galan M, Deffontaine V, Bryja J, Cosson J-F, Michaux J & Charbonnel N (2012) Discongruence of Mhc and cytochrome b phylogeographical patterns in *Myodes glareolus* (Rodentia: Cricetidae). *Biological Journal of the Linnean Society* 105:881-899

14. Debout G, Lhuillier E, **Malé P-JG**, Pujol B & Thébaud C (2012) Development and characterization of 24 polymorphic microsatellite loci in two *Antirrhinum majus* subspecies (Plantaginaceae) using pyrosequencing technology. *Conservation Genetics Resources* 4:75-79
    *all the authors equally contributed to the production of this publication.
15. **Malé P-JG**, Leroy C, Dejean A, Quilichini A & Orivel J (2012) An ant symbiont directly and indirectly limits its host plant's reproductive success. *Evolutionary Ecology* 26:55-63
16. Malausa T, Gilles A, Meglécz E, Blanquart H, Duthoy S, Costedoat C, Dubut V, Pech N, Castagnone Sereno P, Délye C, Feau N, Frey P, Gauthier P, Guillemaud T, Hazard L, Le Corre V, Lung-Escarmant B, **Malé P-JG**, Ferreira S & Martin J-F (2011) High throughput microsatellites isolation with 454 GS-FLX Titanium pyrosequencing. *Molecular Ecology Resources* 11:638-644
17. Ruiz-González MX, **Malé P-JG**, Leroy C, Dejean A, Gryta H, Jargeat P, Quilichini A & Orivel J (2011) Specific, non-nutritional association between an Ascomycete fungus and *Allomerus* plant-ants. *Biology Letters* 7:475-479
18. Mariano CSF, da Silva Santos I, Groc S, Leroy C, **Malé P-JG**, Ruiz-Gonzalez MX, Dejean A & Delabie JHC (2011) The karyotypes of *Gigantiops destructor* (Fabricius) and other ants from French Guiana (Formicidae). *Annales de la Société Entomologique de France* 47:140-146
19. **Malé P-JG**, Malausa T, Martin JF, Orivel J & Qulichini A (2011) Isolation and characterization of polymorphic microsatellite loci in the ant-plant *Hirtella physophora* (Chrysobalanaceae) using pyrosequencing technology. *Molecular Ecology Resources* 10:1106-1108
20. Orivel J, Lambs L, **Malé P-JG**, Leroy C, Grangier J, Otto T, Quilichini A & Dejean A (2011) Dynamics of the association between a long-lived understory myrmecophyte and its specific associated ants. *Oecologia* 165:369-376
21. Guivier E, Galan M, **Malé P-JG**, Kallio E, Voutilainen L, Henttonen H, Olsson G, Lundkvist A, Tersago K, Augot D, Cosson JF & Charbonnel N (2010) Associations between Major Histocompatibility Complex genes and PUUV infection in *Myodes glareolus* are detected in wild populations but not from experimental infection data. *Journal of General Virology* 91:2507-2512
22. **Malé P-JG**, Loiseau A, Estoup A, Quilichini A & Orivel J (2010) Characterization of polymorphic microsatellite loci in the neotropical plant-ant *Allomerus decemarticulatus* (Formicidae: Myrmicinae) and multiplexing with other microsatellites from the ant subfamily Myrmicinae. *European Journal of Entomology* 107:673-675
23. Grangier J, Dejean A, **Malé P-JG**, Solano PJ & Orivel J (2009) Mechanisms driving the specificity of a myrmecophyte-ant association. *Biological Journal of the Linnean Society* 97:90-97
24. Grangier J, Dejean A, **Malé P-JG** & Orivel J (2008) Indirect defense in a highly specific ant-plant mutualism. *Naturwissenschaften* 95:909-916

Popular Science Press

Bonhomme V, Cailleau A, Froissart R, Guerreiro R & **Malé P-JG** (2011) Evolution 101 : Petit cours d'évolution à l'usage des non biologistes. 32pp. *Plume!-eds. Acta*, Plume!, Montpellier.

Malé P-JG (2010) Un mathématicien en prise avec la société. *Plume! online*

Malé P-JG (2009) Struggle for evolution. *Plume!*, vulgarisation scientifique 11:8-9

Malé P-JG (2008) Tour d'horizon des interactions biologiques. *Plume!*, vulgarisation scientifique 8:4-5

Malé P-JG (2008) Raison et sentiments. *Plume!*, vulgarisation scientifique 7:6-7

Malé P-JG (2008) Créationnisme et Enseignement : Le Rapport Brasseur aboutit finalement à une Résolution Européenne. *Plume! online*

PRESENTATIONS

Five (among 22) relevant scientific conferences in which I have participated.

Conference talks

Malé P-JG, Turner KM, Doha M, Anreiter I, Allen AM, Sokolowski MB, Frederickson ME (2017) An ant–plant mutualism through the lens of cGMP-dependent kinase genes. *Conference of the Animal Behavior Society*, Toronto, Canada.

Malé P-JG (2012) Building pedigrees on the kitchen worktop: a practical feedback. *Annual meeting of the French Research Network "Quantitative Genetics"*, Toulouse, France.

Malé P-JG, Leroy C, Dejean A, Quilichini A, Orivel J (2011) The importance of sanctions and transmission mode in conflicts resolution: insights from an ant-plant mutualism. *ESEB 13th Congress*, Tübingen, Germany.

Malé P-JG, Leroy C, Dejean A, Quilichini A, Orivel J (2010) Evolutionary conflicts and sanctions between a neotropical ant and its host plant. *Evolution 2010*, Portland (OR), USA.

Malé P-JG, Gibert A, Casquet J (2009) Knowledge 'demythification': aims and challenges of science popularization by university people. *French Ecological Society Day*, Paris, France.

TEACHING & ADVISING EXPERIENCE

Teaching

Teaching Assistant/Temporary Lecturer (2007-11). University of Toulouse, France

Led class discussions and field trips (groups of 30 students); supervised labs (groups of 20 students); graded all assignments; met with students individually. Courses included both undergraduates and Masters' students.

- Animal Biology
- Evolutionary Biology
- Statistics
- Functional Anatomy
- Entomology
- Ornithology
- Parasitology
- Insect Societies

Founder and Volunteer Instructor, Plume (2011-13)

Developed and taught a course on science communication for groups of 15 Ph.D. students.

Advising

I worked with eight undergraduate students on their individual research projects.

Informally mentored two Masters' students at the Universities of Toulouse, France, and of Toronto.

GRANTS & AWARDS

Research grants

- Putnam expedition grant (2017). $10,000 Museum of Comparative Zoology at Harvard
- Marie Skłodowska-Curie postdoctoral fellowship (2016). €250,000 to conduct research at Harvard University and the Max Planck Institute
- Nouragues research grant (2008). €2,000 awarded by the CNRS and Nouragues research station (French Guiana)
- Ph.D. supported by a scholarship (2007-11). €60,000 awarded by the French Ministry of Higher Education and Research

Travel grants

- Society for the Study of Evolution grant (2011), 13th ESEB congress (Tübingen, Germany)
- European Society for Evolutionary Biology grant (2010), Evolution congress (Portland, Oregon USA)
- International Union for the Study of Social Insects grant (2010), IUSSI international congress (Copenhagen, Denmark)
- French Ecological Society grant (2009), 12th ESEB congress (Torino, Italy)

Awards

- Best PhD award, Academy of Sciences of Toulouse (2013)
- Best talk award, SEVAB Grad School (2009)

OUTREACH ACTIVITIES

Media

- Publication of a press release of the University of Toronto on my research results, taken up and relayed by north American online journals (2017)
- Publication of a press release on the French National Centre for Scientific Research on my research results, taken up and relayed by numerous French and Canadian journals (2013)
- Scientific advisor for part of the documentary "Through the jungle and up into space: a walk in French Guiana," broadcasted on the German TV-channel 'NDR' (2012)
- Scientific advisor for a report in the evening news bulletin, on the first French TV-channel (2007)
- Scientific advisor for the documentary "Marriage of convenience," which focused on the mutualistic relationship between a plant and an ant species (2006)

Social Impact

- Manager of the social networks of the "SupayChakra project," which disseminates results from my postdoc project through photos and videos (2016-17)
- Booth animator at various national and local science festivals for children or general public (2008-13)
- Inventor, presenter, and organizer of the "ImprovSciences" comedy show, which gathers two scientists and two improv actors on a stage (2012-13)
- Invited speaker for the lecture "The history of ants and plants," Popular University of Philosophy Alderan, Toulouse, France (2013)
- Designer of the exhibition "Animal societies: live and survive," on the evolution of sociality in animals, shown at the 'knowledge festival' La Novela, Toulouse, France (2012)

- Invited speaker for the public lecture "The marital life of ants and plants," on ant-plant relationships, shown at the 'knowledge festival' La Novela, Toulouse, France (2011)
- Designer of the exhibition "Living world, cunning world," on the evolutionary strategies in animals to survive and reproduce, shown at the 'knowledge festival' La Novela, Toulouse, France (2011)

PROFESSIONAL SERVICE

Elected Positions

- Vice-President of "Plume!," Non-profit organization for science popularization (2008-14)
- Postdoc representative in a Research Federation scientific council, Toulouse Agro-biosciences, Interactions, & Biodiversity Research Federation (2011)
- Graduate student representative, laboratory council, Evolution & Diversité Biologique laboratory (2009)
- Graduate student representative, molecular biology commission, Evolution & Diversité Biologique laboratory (2008)

Organization of Scientific Events

- Member of the organizing committee of the 33rd PPD meeting "French congress of population biology and genetics," Toulouse (2011)
- Member of the organizing committee of the 4th SERL meeting, "Ecology & Behaviour" meeting, Toulouse (2008)
- Co-founder and organizer of the Journal Club, Evolution & Diversité Biologique laboratory (2007)

Peer-Review Activities

Biological Journal of the Linnean Society, *JoVE*, *Research Square* (2017)
Molecular Ecology, *Annals of Botany*, *Biological Journal of the Linnean Society*, *Insectes Sociaux* (2016)
Behavioral Ecology, *Ecology*, *Annals of Botany* (2015)
Evolutionary Ecology, *Oecologia*, *Comptes Rendus Biologies*, *Acta Oecologia* (2014)
Plant Ecology and Evolution, *Acta Botanica Gallica* (2013)
Tropical Ecology (2012)

Professional Affiliations

Animal Behavior Society (2017)
Society for the Study of Evolution (2010-16)
French Ecological Society, European Society for Evolutionary Biology (2009-14)
International Union for the Study of Social Insects - French Section (2009-10)
Association for Tropical Biology & Conservation (2009)