David DUNEAU, PhD

University Toulouse, Laboratory *Evolution Diversité Biologique* (France)
& Instituto Gulbenkian de Ciência (Portugal)
: david.duneau@gmail.com
Languages: French (native speaker); English (Fluent); Portuguese (basic)

Research interests

I seek to understand why individuals within a given species respond differently to environmental challenges, especially those coming from parasitic organisms. To study this, I apply concepts from evolutionary biology to model invertebrate systems (e.g., *Drosophila melanogaster*, *Daphnia magna*). Fundamentally, my approach is empirical; however, I also deploy tools from functional genetics, genomics, and transcriptomics.

◘ Host-parasite interaction ◘ within-host dynamics ◘ co-evolution ◘ steps of infection
◘ sexual dimorphism ◘ genetic basis of quantitative traits ◘ functional genetics
◘ *Drosophila* ◘ *Daphnia* ◘ bacteria

Research positions

2020 to date: **Research fellow**
Instituto Gulbenkian de Ciência, PT & Univ. Toulouse, FR.

2015 - 2019: **Senior Post-doctoral Investigator**
Lab. Evolution and Biological Diversity (EDB) Univ. Toulouse, FR.

2012 - 2015: **SNSF Post-doctoral fellow**
Lazzaro Lab, Cornell University, USA.

2007 - 2011: **PhD student**
Ebert lab, Zoological Institute Basel, CH

2005 - 2006: **Master student**
Master 2: McCoy lab, Institute for Development Research (IRD), Montpellier, FR
Master 1: Thomas lab, Institute for Development Research (IRD), Montpellier, FR

Career break

2018 - 2019: Worked part time for family reasons (1 child now 5 years old)

Education

2007 -2011: **PhD student in Evolutionary parasitology** Basel Univ. (CH) (September 23, 2011)
'Evolutionary and proximate mechanisms shaping host-parasite interactions: The case of Daphnia magna *and its natural bacterial parasite* Pasteuria ramosa*.'*

2005 - 2006: **Master in Ecology and Evolutionary Biology**, Montpellier Univ. (FR)

2003 - 2004: **Bachelor of Science in Organismal Biology**, Montpellier Univ. (FR)

Fellowship awards

- Stipends
  - **Fellowship from Gulbenkian Foundation** (EDB, Toulouse and Lisbon, 1.5 year)
  - **Post-doctoral '*Prestigious and Marie Curie Fellowship*'** (EDB, Toulouse, 1 year)
  - **Post-doctoral fellowship from LabEx TULIP** (EDB, Toulouse, 2 years)
  - **Post-doctoral fellowship from Swiss NSF** (USA, Cornell university, 2 years)

- **Fellowship from the Emilia Guggenheim-Schnurr foundation** (4 months)

- Funded projects
  - PI David Duneau and Lucie Zinger: Disentangling the factors shaping gut microbiota diversity across arthropod predators (EDB Toulouse Univ. funded by **LabEx CEBA; 2016; 20K**)
  - PI Jean-Baptiste Ferdy (D. Duneau co-PI, 15%-time allocation): Pathogens adaptation to their host's microbiome (EDB Toulouse Univ., funded by "**New frontiers" LabEx TULIP project; 2016; 82K**)
  - PI Patricia Beldade (D. Duneau co-PI, 20%-time allocation): Adaptive Developmental Plasticity: genetic and environmental components of phenotypic variation (**FCT Portugal; 2016; 192K**)
- 5 Travel grants to attend conferences

Main scientific accomplishments

So far, my main research accomplishments have contributed to:

- determining the **mechanism** responsible for the **coevolution** between a **host** and its **parasite** (Duneau *et al.* BMC Biol. 2011).
- describing the **sexual dimorphism** of the response to **infections** in *Drosophila* (Belmonte *et al.* Front. Imm. 2020) and characterise part of its **mechanism** (Duneau *et al.* BMC Biol. 2017).
- proposing (Duneau *et al.* PLoS Biol. 2012) and showing (Duneau *et al.* BMC Biol. 2012) that **parasites can adapt specifically to the sex of the host** they encounter the most often.
- understanding the link between **within-host dynamics** and **infection outcomes** (Duneau *et al.* eLife 2017).
- characterising the **genetic basis** of **insecticide resistance** and **phenotypic plasticity** (Duneau *et al.* G3 2018, Lafuente *et al.* PLoS Gen. 2018)
- showing that the differences between **steps of infection** impose **trade-offs** to **bacterial within-host evolution** (Faucher *et al.* mBio 2020).
- showing that **cancer can increase the risk of being predated** (Duneau *et al.* BioRxiv 2020)

Academic leadership

- **Reviewer for 18 Journals:**
  ◘ Animal Behaviour ◘ Biology Letters ◘ BMC ecology ◘ BMC Evolutionary Biology ◘ Coevolution ◘ Ecology and Evolution ◘ Evolution ◘ Epidemiology and Infection ◘ Heredity ◘ Invertebrate biology ◘ Invertebrate Survival Journal ◘ Nature communication ◘ Oecologia ◘ Oikos ◘ Phil. transactions of the royal society ◘ PLoS ONE ◘ PNAS ◘ Proceedings of the Royal Society B.
- **Reviewer for 4 funding agencies:**
  Sigma Xi awards research grants program ◘ National Commission for Scientific and Technological Research of Chile ◘ National Fund for Scientific Research of Belgium (NFWO) ◘ European Research Council (ERC).
- **Thesis committee and jury:**
  - Examiner for S. Pinaud at Univ. Perpignan (FR) supervised by B. Gourbal (2018)
  - Thesis committee M. Hanson at EPFL (CH) supervised by B. Lemaitre (2018)
- **Implication in the French Network "Réseau Ecologie des Interactions Durable" (REID)**
  - Organisation of the National meeting in Toulouse (2017)
  - Part of the organisation committee of the network.

Summary of publications [ORCID ID: 0000-0002-8323-1511]

Total: 28 publications of which 11 first author, 2 last and 11 *corresponding*

Google scholar profile: https://scholar.google.fr/citations?user=VhsB4z0AAAAJ&hl=en

- H-index: 16
- Total citations: 821
- 71% cited more than 10 times

Journal	Impact factor	Number	Author	Funding	
Nature	43	1	5/7		
Current Biology	9,2	1	3/4		
PLoS Biology	8,4	1	**First**		
eLife	7,5	1	**First**		
BMC Biology	6,7	3	**First**		
mBio	6.7	1	**Last**		
Frontiers Immuno.	6,4	1	**co-last**		
Molecular Ecology	6,1	1	5/7		
PLoS Genetics	5,5	1	2/3		
Evolutionary Applications	5	1	3/4		
Proceeding Roy. Soc. B	4,3	1	**First**		
Evolution	4,2	1	2/4		
Genetics	4,1	1	4/7		
Advances in Parasitology	4	1	2/7		
Heredity	3,8	2	3/4 ; 3/4		
Biology Letters	3,3	1	**First**		
Behavioral Ecol.	3,3	2	**Co-first;** 6/8		
Dev. Comp. Imm.	3,1	1	**First**		
G3	2,7	1	**First**		
Ecology and Evolution	2,5	1	6/11		
Inf. Gen. Evol.	2,5	1	**First**		
Parasitology	2,5	1	5/9		
Mar. Ecol. Prog. Series	2,3	1	4/5		
Acts of the BRG	NA	1	2/3		
	Median IF only corresponding: **6.7**	**28**			
BioRxiv		+ 4	3 as first / 1 as last		

SNSF (Cornell)
TULIP (Toulouse)
CEBA (Toulouse)
FCT (Toulouse)

List of publications († corresponding author; * equal contribution)

2020 to date:

1. Faucher C, Mazana V, Kardacz M, Parthuisot N, Ferdy J-B, **Duneau**† **D**. (2021) *Step-specific adaptation and trade-off over the course of an infection by GASP-mutation small colony variants.* **mBio** doi.org/10.1128/mBio.01399-20
2. Belmonte RL, Corbally M-K, **Duneau D***†, Regan JC*† (2020) *Sexual dimorphisms in innate immunity and responses to infection in Drosophila melanogaster*. **Frontiers in Immunology** doi.org/10.3389/fimmu.2019.03075
3. Bento G, Fields P, **Duneau D**, Ebert D. (2020) *An alternative route of bacterial infection is associated with a polymorphism at an alternative resistance locus.* **Heredity** doi.org/10.1038/s41437-020-0332-x
4. Pineaux M, Merkling T, Danchin E, Hatch S, **Duneau D**, Blanchard P, Leclaire S. (2020) *Sex and hatching order modulate the association between MHC-diversity and fitness in early-life stages of a wild seabird.* **Molecular Ecology** doi.org/10.1111/mec.15551

2019 and before:

5. Corse E, Tougard C, Archambaud G, Agnèse J-F, Messu Mandeng FD, Bilong Bilong CF, **Duneau D**, Zinger L, Chappaz R, Xu CCY, Méglecz E, Dubut V (2019) *One-locus-several-primers: a strategy to improve the taxonomic and haplotypic coverage in diet metabarcoding studies.* **Ecology & Evolution** doi.org/10.1002/ece3.5063
6. **Duneau D**†, Sun H, Revah J, San Miguel K, Kunerth HD, Caldas IV, Messer PW, Scott JG, Buchon N. (2018) *Genome wide analysis of resistance to an organophosphate and a pyrethroid insecticide*. **G3: Genes|Genomes|Genetics** doi.org/10.1534/g3.118.200537
7. Lafuente E, **Duneau D**, Beldade P. (2018) *Genetic basis of thermal plasticity variation in* Drosophila melanogaster *body size.* **PLoS Genetics** doi.org/10.1371/journal.pgen.1007686
8. **Duneau**† **D**, Lazzaro B. (2018) *Persistence of an extracellular systemic infection across metamorphosis in a holometabolous insect* **Biology Letters** doi.org/10.1098/rsbl.2017.0771
9. **Duneau**† **D**, Ferdy JB, Revah J, Kondolf HC, Ortiz GA, Lazzaro BP, Buchon N. (2017) *Stochastic variation in the initial phase of bacterial infection predicts the probability of survival in* D. melanogaster. **eLife** doi.org/10.7554/eLife.28298 (Score 8 in F1000Prime RECOMMENDED)
10. **Duneau**† **D**, Kondolf HC, Im JH, Ortiz GA, Chow C, Fox MA, Eugénio AT, Buchon N, Lazzaro BP. (2017) *The Toll pathway underlies host sexual dimorphism in resistance to both Gram-negative and positive-bacteria in Drosophila* **BMC Biology** doi.org/10.1186/s12915-017-0466-3
11. Ebert D, **Duneau D**, Hall M, Luijckx P, Andras J, Du Pasquier L, Ben-Ami F. (2016) *A population biology perspective on the stepwise infection process of the bacterial pathogen* Pasteuria ramosa *in* Daphnia. **Advances in parasitology** doi.org/10.1016/bs.apar.2015.10.001
12. **Duneau**† **D**, Ebert D, Du Pasquier L. (2016) *Infections by* Pasteuria *do not protect its natural host* Daphnia magna *from subsequent infections* **Developmental & Comparative Immunology** doi.org/10.1016/j.dci.2015.12.004
13. Avila F, Cohen A, Ameerudeen F, **Duneau D**, Suresh S, Mattei A, Wolfner M. (2015) *The D*rosophila *mating plug protein, PEBme, is required to maintain the ejaculate within the female reproductive tract at the termination of copulation.* **Genetics** doi.org/10.1534/genetics.115.176669

14. Luijckx P, **Duneau D**, Andras J, Ebert D (2014) *Cross-species infection trials reveal cryptic parasite varieties and a putative polymorphism shared among host species* **Evolution** doi.org/10.1111/evo.12289

15. Luijckx P, Fienberg H, **Duneau D**, Ebert D (2013) *A matching-allele model explains host resistance to parasites* **Current Biology** doi.org/10.1016/j.cub.2013.04.064 (Score 2 in FFCCOPrime RECOMMENDED)

16. **Duneau**† **D**, Ebert D (2012) *Host sexual dimorphism and parasite adaptation* **PLoS Biology** doi.org/10.1371/journal.pbio.1001271

17. **Duneau**† **D**, Luijckx P, Ruder L, Ebert D (2012) *Sex-specific effects of a parasite evolving in a female-biased host population* **BMC Biology** doi.org/10.1186/1741-7007-10-104

18. **Duneau**† **D**, Ebert D (2012) *The role of molting in parasite defense* **Proceedings of the Royal Society of London B** doi.org/10.1098/rspb.2012.0407

19. **Duneau**† **D**, Luijckx P, Ben-Ami F, Laforsch C, Ebert D (2011) *Resolving the infection process reveals striking differences in the contribution of environment, genetics and phylogeny to host-parasite interactions* **BMC Biology** doi.org/10.1186/1741-7007-9-11

20. Luijckx P, Fienberg H, **Duneau D**, Ebert D (2011) *Resistance to a bacterial parasite in the crustacean* Daphnia magna *shows Mendelian segregation with dominance* **Heredity** doi.org/10.1038/hdy.2011.122

21. Ponton F, Otalora-Luna F, Lefevre T, Guerin PM, Lebarbenchon C, **Duneau D**, Biron DG, Thomas F (2011) *Water-seeking behavior in worm-infected crickets and reversibility of parasitic manipulation* **Behavioral Ecology** doi.org/10.1093/beheco/arq215

22. Gómez-Díaz E, Doherty P Jr, **Duneau D**, McCoy KD (2010) *Cryptic vector divergence masks vector-specific patterns of infection: an example from the marine cycle of Lyme borreliosis.* **Evolutionary Applications** doi.org/10.1111/j.1752-4571.2010.00127.x

23. Ponton***** F, **Duneau*** **D**, Sanchez M, Courtiol A, Terekhin A, Budilova, EV, Renaud F, Thomas F (2009) *Effect of parasite-induced behavioral alterations on juvenile development.* **Behavioral Ecology** doi.org/10.1093/beheco/arp092

24. **Duneau D**, Boulinier T, Gomez-Diaz E, Petersen A, Tveraa T, Barrett RT, McCoy KD (2008) *Prevalence and diversity of Lyme borreliosis bacteria in marine birds* **Infection, Genetics and Evolution** doi.org/10.1016/j.meegid.2008.02.006

25. McCoy KD, **Duneau D**, Boulinier T (2008) *Spécialisation de la tique des oiseaux marins et diversité des bactéries du complexe* Borrelia burgdorferi sensu lato*, agents de la maladie de Lyme : effets en cascade dans les systèmes à vecteur.* **Les actes du BRG** 277-291 (french publication with reviewing committee)

26. Ponton F, Lebarbenchon C, Lefèvre T, Biron DG, **Duneau D**, Hughes DP, Thomas F (2006) *How parasitic Gordian worms cut the Gordian knot: a novel solution to predation upon the host.* **Nature** doi.org/10.1038/440756a

27. Ponton F, Lebarbenchon C, Lefèvre T, Thomas F, **Duneau D**, Marché L, Renault L, Hughes DP, Biron DG (2006) *Hairworm anti-predator strategy: a study of causes and consequences* **Parasitology** doi.org/10.1017/S0031182006000904

28. Ponton F, Biron DG, Joly C, **Duneau D**, Thomas F (2005) *Ecology of populations parasitically modified: a case study from a gammarid (*Gammarus insensibilis*)-trematode (*Microphallus papillorobustus*) system.* **Marine Ecology-Progress Series** doi.org/ 10.3354/meps299205

List of publications in BioRxiv

29. Rodrigues YK, van Bergen E, Alves F, **Duneau D***, Beldade P*. *Complex effects of day and night temperature fluctuations on thermally plastic traits in an experimental model of adaptive seasonal plasticity*. BioRxiv) (*equal contribution) doi.org/10.1101/207258

30. **Duneau**† **D**, Altermatt F, Ferdy J-B, Ben-Ami F, Ebert D. *Estimation of the propensity for sexual selection in a cyclical parthenogen*. doi.org/10.1101/2020.02.05.935148.

31. **Duneau**† **D**, Möst M, Ebert D. *Evolution of sperm morphology in* Daphnia *species.* doi.org/10.1101/2020.01.31.929414

32. **Duneau**† **D**, Nicolas Buchon. *Gut cancer increases the risk for* Drosophila *to be preyed upon by hunting spiders*. doi.org/10.1101/2020.07.01.182824

List of thesis chapters

1. Lafuente E, **Duneau D**, Beldade P. *Genetic architecture of plasticity for pigmentation components in* Drosophila melanogaster.
2. Rodrigues YK., Duneau D*, Beldade P*. *Seasonal and sexual dimorphism in immunity in a thermal plasticity model.* (*equal contribution)

Scientific communications

2020:

- Seminar at the Institute of Biology - Zoology, Freie Universität Berlin, 11/2020 (online talk; invited by Olivia Judson, Jens Rolf and Sophie Armitage)
- Seminar New voices in Infection Biology, Max Planck Institute for Infection Biology, Berlin, 10/2020 (online talk; invited by Igor Iatsenko) **Recording at:** https://youtu.be/e0N7eg-U0hI
- Seminar at Department DGIMI, Montpellier University, 10/2020 (online talk; invited by Alain Givaudan)

2019 and before:

- Innsbruck University, Innsbruck, Austria- 11/2019 (talk; Invited by Markus Möst)
- Conference ESEB (2nd joint congress), Montpellier, FR - 08/2018 (Poster)
- Edinburgh University, Edinburgh, UK - 06/2018 (talk; Invited by Sarah Reece)
- EPFL, Lausanne, Switzerland -04/2018 (talk; Invited by Bruno Lemaitre)
- University of Burgundy, Dijon, FR - 12/2017(talk; Invited by Thierry Rigaud)
- University of Montpellier (SEEM), Montpellier, FR - 12/2017(talk; Invited by Karen McCoy)
- Conference Jacques Monod "Open questions in ecology and evolution in infectious diseases: from fundamental research to evolutionary medicine" - Roscoff Biological Station, FR - 10/2017 (Poster)
- Insect Biology Research Institute, Tours, FR - 10/2017 (talk; Invited by Joel Meunier)
- Conference Immuninv2017, Lyon, FR - 06/2017 (Contributed talk)
- CNRS, Gif-sur-Yvette, FR - 04/2016 (talk; Invited by Frédéric Mery)
- Centre Biologie du Développement, Toulouse, FR - 04/2016 (talk; Invited by Alain Vincent)
- Conference LabEx TULIP, Toulouse, FR - 03/2016 (talk; Invited by Etienne Danchin)
- REID Annual Conference, Poitiers, FR - 03/2016 (Contributed talk)

- Conference 15thESEB, Lausanne, Switzerland - 08/2015 (Contributed talk)
- Institute for advanced study, Toulouse, FR - 06/2015 (talk; Invited by Arnaud Togneti)
- Conference Jacques Monod "Infectious diseases as drivers of evolution: the challenges ahead" - Roscoff Biological Station, FR - 09/2014 (contributed talk)
- Seminar at the Center for infectious disease dynamics. PennState University, University Park, PA, USA - 04/2014 (talk; Invited by David Hughes)
- Drosophila research conference, San Diego, USA - 03/2014 (poster)
- Seminar at the department of Evolution, Ecology and Genetics. Australian National University, Canberra, Australia - 02/2014 (talk; Invited by Hanna Kokko).
- Seminar at the department of Ecology and Evolutionary Biology. Rochester University, Rochester, USA - 11/2013 (talk; Invited by John Jaenike).
- Conference 14th ESEB, Lisbon, Portugal - 08/2013 (poster)
- Drosophila research conference, Washington DC, USA - 03/2013 (poster)
- Conference ESEB (joint congress) Ottawa, Canada - 08/2012 (contributed talk)
- Department of Evolutionary Biology of Cornell University, Ithaca, USA - 2012 (talk)
- Conference 13th ESEB Tubingen, Germany - 08/2011 (contributed talk)
- Conference Swiss-Russian Seminar, Freiburg, Switzerland - 2010 (contributed talk)
- Conference 16th EMPSEB,Wierzba, Poland - 2010 (contributed talk)
- *Institute for Development Research* (IRD), Montpellier, FR - 2010 (talk; Invited by Karen McCoy)
- Conference 12 ESEB, Turin, Italy - 2009 (contributed talk)
- Conference 15th EMPSEB,Shoorl, Netherlands -2009 (contributed talk)

Student supervision **(1 thesis as co-director, 3 Master 2, 12 undergrads)**

- **PhD student**
  - Yara Santos Rodrigues *Regulation and evolution of developmental plasticity in insect pigmentation: temperature and immunity interactions.* (Co-supervision with P. Beldade from Lisbon Univ.; 2015 - Oct. 2020)
- **Master 2 students**
  - Lafont P *A stochastic model for estimating immune parameters from the infection dynamics of a pathogen.* (co-supervision with JB Ferdy (EDB, Toulouse Univ.); 2019)
  - Lemoine M *Ecological and evolutionary determinants of gut microbial communities in predatory insects.* (Co-supervision with L. Zinger (ENS Paris); 2017)
  - Mazana V *Role of phenotypic switching in the division of labor during infection.* (2017)
- **Undergraduate students**

◘ Lafont P (2018) ◘ Kardacz M L3 (2017) ◘ Mazana V (2016) ◘ Kondolf H (2014, 2015) ◘ Ortiz G (2013 - 2015) ◘ Fox M (2012 - 2015) ◘ Chow C (2013) ◘ Edraki A (2013) ◘ Ruder L (2010) ◘ Supervisor of scientific projects for 3rd year Bachelor (60hr) (2008 - 2010) ◘ Eichin D. (2009) ◘ Gygli S. (2009) ◘ Hofer L. (2009, 2010)

Workshops

- "Transcriptome assembly, automatic annotation and data mining" (32h), IGC, Lisbon
- "Introduction to Modeling in Ecology and Evolutionary Biology" Cornell University (Ithaca, USA) Fall 2012 semester
- "Introductory Bioinformatics" (35h), IGC, Lisbon.

Scientific outreach

- De Dinechin D, Deguine JP, **Duneau D** (2006) *L'Homme de Florès. La découverte d'une nouvelle espèce humaine.* **Annales de la Société d'Horticulture et d'Histoire Naturelle de l'Hérault** 146 : 38-45
- **Duneau D**, Deguine JP, De Dinechin M, Blondel J (2006) *L'homme de Flores. Nanisme et gigantisme insulaire.* **Annales de la Société d'Horticulture et d'Histoire Naturelle de l'Hérault** 146 : 57-66
- Deguine JP, De Dinechin M, **Duneau D** (2006) *L'Homme de Florès. L'évolution de l'Homme et Homo floresiensis.* **Annales de la Société d'Horticulture et d'Histoire Naturelle de l'Hérault** 146 : 87-94
- **Seminar for high school teachers.**
- **Epidemiology Fact Sheets** *Mosquito Biology for the Homeowner*
- **Documentaire scientifique** (52min) « *Toto le nemato.* », Price Buffon 2008 « Festival Paris science »