

2016 Curriculum Vitae



NAME: Nicolas Buchon
DEPARTMENT/UNIT : Entomology
TITLE : Assistant Professor
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BACKGROUND

EDUCATION

<u>Year</u>	<u>Degree</u>	<u>Institution</u>
2006	Ph.D. , Physiology and Molecular Genetics with honors Research advisor : Dr. Chantal Vaury.	Faculty of Medecine, Universite d' Auvergne Clermont I, France.
2003	M.S. , Cellular and Molecular Biology with honors, Research advisor : Dr. Francois Leulier	Faculty of Medecine, Universite d' Auvergne Clermont I, France
2001	B.S. , Cellular and Molecular Biology with honors	Faculty of Medecine, Universite d' Auvergne Clermont I, France.

ACADEMIC RANK

Assistant Professor: 2012 to present, Cornell University

PRIMARY DEPARTMENTAL/UNIT PROGRAM AREA:

Physiology and Molecular Genetics 60% research and 40% teaching

AREAS OF EXPERTISE:

Insect Immunology

PROFESSIONAL EXPERIENCE

2012-Present **Assistant Professor**, Cornell University

2007-2012 **Post-doctoral Fellow**, Ecole Polytechnique Federale d
Lausanne, Switzerland. Research advisor: Pr. Bruno Lemaitre.

2006-2007 **Post-doctoral Fellow**, Centre Genetique Moleculaire, CNRS Gif sur
Yvette, France. Research advisor: Dr. Bruno Lemaitre.

HONORS AND AWARDS

2011 GSA Delill Nasser award for career development in genetics.

2009 Poster award at the Drosophila Research conference, Chicago.

2006 National Research Agency research fellowship (ANR).

2003 French agency of Higher Education and Research: Graduate Fellowship
(bourse MENRT).

2002 Universite d’Auvergne Clermont I: excellence fellowship for Master
Degree.

2001 Universite Blaise Pascal Clermont II: Education fellowship for
undergraduate teaching.

REPRESENTATIVE ACADEMIC RESPONSIBILITIES

GRANT SUPPORT

Active Grants

AWARDED					
Agency/Award	PI	co-PI	\$amount awarded	dates	Title
Hatch Fund	N. Buchon	G. Loeb	90,000	Oct2013/Sep2016	Towards Biocontrol strategy to manage emerging pest: the spotted wing Drosophila
NYFVI	G. Loeb	N. Buchon	25,000	Apr2013/Dec2015	Biology & management of SWD for NY Berry crops
NSF 1354421	G. Blissard	N. Buchon	486,111	Apr2014/Mar2017	Virus trafficking in insect midgut cells
NYSTEM IDEA	N. Buchon	-	340,000	Jun2014/Jul2016	Impact of microbes on intestinal stem cells in Drosophila
NY Ag&market	N. Buchon	G. Loeb	340,000	Jan2015/Feb2018	towards biological control of SWD using bacterial & fungal pathogens
3CPG	N. Buchon	-	15,000	Nov2015/Dec2017	population level variation and adaptive gut growth
Infinitus	N. Buchon	-	535,283	Dec2016/Jan2018	Effect of polysaccharides on fly fitness and gut homeostasis in Drosophila
TOTAL \$ AMOUNT RECEIVED			1,831,394		

Pending Grants

PENDING					
<i>submission date</i>	<i>Agency/Award</i>	<i>PI</i>	<i>co-PI</i>	<i>amount requested</i>	<i>Title</i>
Feb-16	NIH R01	N. Buchon	-	1,250,000	Mechanisms underlying the regulation of intestinal stem cells by microbes
Jul-16	NIH R21	N. Buchon	G. Blissard	275,000	Zika and Dengue Virus envelope protein traf in polarized insect midgut
Jul-16	NIH R21	N. Buchon	B. Lazzaro	275,000	Mechanisms underlying the stochastic gut infection in <i>Drosophila</i>
Jul-16	NYSTEM IDEA	N. Buchon	-	274,993	The role of nutrition and taste receptors in intestinal stem cell regulation
Aug-16	NSF	N. Buchon	-	preproposal	The gut as an adaptable interface: from architecture to physiological consequence adaptive growth

TEACHING AND ADVISING RESPONSIBILITIES

Undergraduate Courses (past 10 years)

At Cornell :

- 2016 Spring course : Comparative Physiology BioG 1414. 3 Credits. I participate in the reorganization of this course and have taught 2 hrs of course.
- 2015 Spring course : Insect Physiology ENTOM 4830. 4 Credits. 3 hr lecture and one 3 hr lab per week (co-taught with A. Douglas). 14 students.
- 2014 Spring course : Comparative Immunology ENTOM 4500 and 4501. 3 Credits. 2 hr lecture and one 3 hr lab per week. 12 students.
- 2013 Fall course : Guest lecturer in BIOMS 3150 LEC 001. One hour of seminar. 80 students.
- Spring course : Insect Physiology ENTOM 4830 4 Credits. 3 hr lecture and one 3 hr lab per week (co-taught with A. Douglas) 12 students.

Other Institutions :

- 2009 Guest lectures, EPFL. Immunology course, Master Degree.
- 2008 Guest lectures, EPFL. Immunology/Microbiology course, Master Degree.
- 2003-2006 Teaching assistant (160 hrs/year), Faculty of Medecine, Universite d'Auvergne Clermont I. Genetics and epigenetics, medical biochemistry, medical genetics, virology, immunology, Bachelor and Master courses.
- 2001-2003 Teaching assistant, general biology, 1st year Bachelor course.

GRADUATE FIELD MEMBERSHIPS:

Field of Entomology

Field of Genetics, Genomics and Development

GRADUATE MAJORS:

Jonathan Revah MS degree, 2015-2018.
Philip Houtz PhD Student, 2013-2017.
Katia Sotelo-Troha PhD Student, 2013-2017. Co-supervised by Pr. Brian Lazzaro.

Minor committee member at Cornell:

David Sannino PhD student in the lab of Pr. Esther Angert.
Virginia Howick PhD student in the lab of Pr. Brian Lazzaro.
Marissa Cardillo MS Student in the lab of Pr. Linda Rayor.
Joanna Fisher MS Student in the lab of Pr. Ann Hayek.

Other institutions:

2009-2012 Co-directed the Ph.D. thesis project of Sveta Chakrabarti. « Immune suppression of the gut response by the entomopathogen *Pseudomonas entomophila* ». See publication in *Cell Host and Microbe*.
2009 Directed Master project and dissertation of Valentin Sottas. « A new member of the Toll pathway : modSP ». See publication in *PNAS*.

EXTENSION/OUTREACH RESPONSIBILITIES: (No formal extension responsibilities)

REPRESENTATIVE PROFESSIONAL ACTIVITIES

PROFESSIONAL SOCIETIES

American Society for Microbiology (2012 – present)
Genetics Society of America (2011 – present)
Societe Francaise de Biologie du Developpement (2008)
Societe Francaise de Genetique Humaine (2007)

REPRESENTATIVE PROFESSIONAL CONTRIBUTIONS

INVITED PRESENTATIONS (Past 10 years)

2016
Of microbes and stem cells in the Drosophila gut. 2016. Wenner Grenn symposium. Stockholm, Sweden.

Exploring host-microbe dynamics using Drosophila. 2016. Portuguese society of Immunology, Lisbon, Portugal.

Intestinal stem cells: from homeostasis to allostasis. 2016. Cornell Stem Cell symposium. Ithaca, NY.

2016 Cont.

Host microbe interactions in the *Drosophila* gut. 2016. International Conference of the « Korean Society for Biochemistry and Molecular Biology». Seoul, Korea.

Towards a quantitative model of epithelium renewal. 2016. Conference « Modeling and Inference from single molecules to Cells ». Mathematical Biosciences Institute, Columbus, OH.

Deciphering the complex interactions between microbes and the gut epithelium. 2016. Duke University, Durham, NC.

2015

A gut feeling for host microbe interactions: insights from *Drosophila*. 2015. The Buck Institute, Novato, CA.

Gut homeostasis in *Drosophila*. 2015. Seminar series at University of Rochester, Rochester, NY.

Quantitative control of stem cell activity in the midgut. 2015. 24th European *Drosophila* Research Conference. Heidelberg, Germany.

PEER REVIEWED RESEARCH PUBLICATIONS (peer reviewed past 10 years) (56 total)

Bonfini A, Liu X, **Buchon N**: From pathogens to microbiota: how *Drosophila* intestinal stem cells react to gut microbes. *Dev Comp Imm.* 2016, 64:22-38. PMID: 26855015.

Sansone C, Cohen J, Yasunaga A, Xu J, Osborn G, Subramanian H, Gold B, **Buchon N***, Cherry S*: Microbiota-dependent activation of antiviral intestinal immunity in *Drosophila*. *Cell Host & Microbe.* 2015, 11;18(5):571-81. PMID: 26567510

Dutta D, Dobson AJ, Houtz PL, Glasser C, Revah J, Korzelius J, Patel PH, Edgar BA, **Buchon N**. Regional cell-specific transcriptome mapping reveals the regulatory complexity of the adult *Drosophila* midgut. *Cell reports.* 2015, 12(2):346-58. PMID: 26146076.

Buchon N, Osman D: All for one and one for all: regionalization of the *Drosophila* intestine. *Insect Biochem Mol Biol.* 2015. PMID: 26044368

Dutta D, **Buchon N**, Xiang J, Edgar B. Regional cell specific RNA expression profiling of FACS-isolated *Drosophila* intestinal cell populations. *Methods Mol Biol.* PMID: 26146076.

Xiao H, Wang H, Silva EA, Thompon J, Guillou A, Yates Jr Iii, **Buchon N**, Franc NC: The pallbearer E3 ligase promotes actin remodeling via RAC in efferocytosis by degrading the ribosomal protein S6. *Dev Cell.* 2015, 12;32(1):19-30. PMID: 25533207.

Buchon N, Silverman N, Cherry S: Immunity in *Drosophila melanogaster*—from microbial recognition to whole-organism physiology. *Nat Rev Immunol.* 2014, 14(12):796-810. PMID: 25421701

Houtz PL, **Buchon N**. Methods to assess intestinal stem cell activity in response to microbes in *Drosophila melanogaster*. *Methods Mol Biol.* 2014, 1213:171-82. PMID: 25173382.

Osman D, **Buchon N**. Unexpected complexity of the *Drosophila* digestive tract: towards a model for functional regionalization. *Med Sci.* 2014, 30(5):483-5. PMID: 24939527.

Broderick NA, **Buchon N**, Lemaitre B. Microbiota-induced changes in *Drosophila melanogaster* host gene expression and gut morphology. *mBio.* 2014, 5(3):e01117-14. PMID: 24865556.

Buchon N, Broderick NA, Lemaitre B: Gut homeostasis in a microbial world: insights from *Drosophila melanogaster*. *Nat Rev Micro* 2013, 11:615–626. PMID: 23893105

Buchon N*, Osman D*, David FPA, Yu Fang H, Boquete J-P, Deplancke B, Lemaitre B: Morphological and molecular characterization of adult midgut compartmentalization in *Drosophila*. *Cell Rep* 2013, 3:1725–1738. PMID: 23643535

--> Selected by faculty of 1000 with mention “Very good”.

Osman D, **Buchon N**, Chakrabarti S, Huang Y-T, Su W-C, Poidevin M, Tsai Y-C, Lemaitre B: Autocrine and paracrine unpaired signalling regulate intestinal stem cell maintenance and division. *J Cell Sci* 2012. PMID: 23038775

Chakrabarti S, Liehl P, **Buchon N***, Lemaitre B*: Infection-induced host translational blockage inhibits immune responses and epithelial renewal in the *Drosophila* gut. *Cell Host Microbe* 2012, 12:60–70. PMID: 22817988

--> Paper highlighted in Nature Review Microbiology.

Kuraishi T, Binggeli O, Opota O, **Buchon N**, Lemaitre B: Genetic evidence for a protective role of the peritrophic matrix against intestinal bacterial infection in *Drosophila melanogaster*. *PNAS.* 2011, 108:15966–15971. PMID: 21896728

Buchon N, Broderick NA, Kuraishi T, Lemaitre B: *Drosophila* EGFR pathway coordinates stem cell proliferation and gut remodeling following infection. *BMC Biol* 2010, 8:152. PMID: 21176204

--> Selected by faculty of 1000 with mention “Must read”.

Buchon N, Broderick NA, Chakrabarti S, Lemaitre B: Invasive and indigenous microbiota impact intestinal stem cell activity through multiple pathways in *Drosophila*. *Genes Dev* 2009, 23:2333–2344. PMID: 19797770

--> Paper highlighted in Nature Review Microbiology.

Buchon N, Poidevin M, Kwon H-M, Guillou A, Sottas V, Lee BL, Lemaitre B: A single modular serine protease integrates signals from pattern-recognition receptors upstream of the *Drosophila* Toll pathway. *PNAS*. 2009, **106**:12442–12447. PMID: 19590012

Buchon N, Broderick NA, Poidevin M, Pradervand S, Lemaitre B: *Drosophila* intestinal response to bacterial infection: activation of host defense and stem cell proliferation. *Cell Host Microbe* 2009, **5**:200–211. PMID: 19218090

--> Selected by faculty of 1000 with mention “Must read”.

Lhocine N, Ribeiro PS, **Buchon N**, Wepf A, Wilson R, Tenev T, Lemaitre B, Gstaiger M, Meier P, Leulier F: PIMS modulates immune tolerance by negatively regulating *Drosophila* innate immune signaling. *Cell Host Microbe* 2008, **4**:147–158. PMID: 18692774

--> Selected by faculty of 1000 with mention “Must read”.

Desset S*, **Buchon N***, Meignin C, Coiffet M, Vaury C: In *Drosophila melanogaster* the COM locus directs the somatic silencing of two retrotransposons through both Piwi-dependent and -independent pathways. *PLoS ONE* 2008, **3**:e1526. PMID: 18253480.

Buchon N, Vaury C: RNAi: a defensive RNA-silencing against viruses and transposable elements. *Heredity* 2006, **96**:195–202. PMID: 16369574.

Manuscripts under review

1. Guillou A, Sotelo-Troha K, Wang H, Franc NC, **Buchon N**. The *Drosophila* CD36 homologue croquemort is required to maintain immune and gut homeostasis and normal aging. Under review at *PLoS Pathogens*.

2. Duneau D, Sharhestani P, Ortiz GA, Kondolf HC, Chow C, Fox MA, Vanderberg J, **Buchon N***, Lazzaro BP*. The Toll pathway underlies sexual dimorphism in response to both Gram negative and positive bacteria in *Drosophila*. Under review at *BMC biology*.

Manuscripts in preparation

1. Duneau D, Revah J, Lazzaro BP, **Buchon N**. Inter-individual variation in the innate immune response generates a stochastic outcome of infection. *Proc Natl Acad Sci USA*.

* denotes equal contribution.

denotes corresponding authorship.

Life and death of a Crq fly : role of phagocytosis in immune and gut homeostasis. 2015. Seminar at the Cornell group for Aging, Inflammation, Metabolism and Stress. Ithaca, NY.

Tales from the Crypt : from midgut structure to intestinal homeostasis in *Drosophila*. 2015. Entomology department Jugatae symposium at Cornell.

Gut check in *Drosophila*. 2014. Seminar series at the Gulbekian Institute. Lisbon, Portugal.

How do intestinal stem cells behave in a microbial world. 2014. Annual Research Conference of the International Society for Stem Cell Research. Toronto, Canada.

Intestinal stem cells and microbes. 2014. Novo-nordisk bioscience conferences. Copenhagen, Denmark.

Drosophila as a model for gut pathogenesis. 2013. Conference Physiology and disease of the digestive tract Sherbrooke University. Sherbrooke, Canada.

Interplay between immune and repair mechanisms in the gut of *Drosophila*. 2013. EMBO-ESF conference on Integrated Insect Immunology. Pultusk, Poland.

Epithelial dynamics in the gut of *Drosophila* in response to infection. 2013. Seminar series in infectious biology. The Scripps Research Institute. La Jolla, CA.

Quantitative approaches to stem cell biology. 2013. Seminar at the Battelle Center for mathematical medicine. Columbus, Ohio.

Epithelium renewal in the fly intestine, a story of bacteria and stem cells. 2012. Abcam meeting for stem cell biology. Edinburgh, Scotland.

Host/microbe interactions in the *Drosophila* gut. 2012. Seminar series at ETH Zurich. Zurich, Switzerland.

Oral infection and stem cell activation : renewing in infectious conditions. 2011. Seminar at Cambridge University. Cambridge, UK.

Gut immunity : more than NF κ B. 2011. Seminar at King's College. London, UK.

Tissue homeostasis during host-microbe interactions. 2011. Seminar at Centre de genetique moleculaire. Paris, France.

Renewing in immunity, from bacterial elimination to tissue repair. 2011. Seminar at College de France. Paris, France.

Tissue homeostasis during host-microbe interactions: interplay between immunity and stem cell activation in the *Drosophila* intestine. 2011. Seminar at the Department of Biochemistry, University of Bristol. Bristol, UK.

Mechanisms of tissue repair in infectious conditions. Seminar at the Department of Zoology, University of Geneva. Geneva, Switzerland.

Tissue homeostasis during host/microbial interactions, from homeostasis to pathogenesis. 2011. Seminar at the Department of Biomedical Sciences, University of Lancaster. Lancaster, UK.

Live and let die, maintenance of gut homeostasis upon host/microbial interactions . 2010. Seminar at the Department of Biochemistry, University of Geneva.

SUBMITTED MEETING ABSTRACTS & PRESENTATIONS

Gut regionalization in *Drosophila*. 2014. Poster. 55th Annual *Drosophila* Research Conference. San Diego, CA.

Pseudomonas entomophila disrupts *Drosophila* intestinal homeostasis through stress-induced inhibition of translation. 2011. Oral presentation. European *Drosophila* Research Conference 2011. Lisbon, Portugal.

Tissue homeostasis during host-microbe interactions: interplay between immunity and stem cell activation in the *Drosophila* intestine. 2011. Oral presentation. Gordon conference on tissue repair and regeneration. Boston, MA.

JAK-STAT and EGFR pathways are required for intestinal stem cell activation upon bacterial infection in *Drosophila*. 2011. Oral presentation. Swiss Stem Cell meeting. Lausanne, Switzerland.

Interplay between enteric bacteria and gut homeostasis in *Drosophila melanogaster*. 2010. Poster. 51st *Drosophila* Research Conference. Washington DC, USA.

Interplay between enteric bacteria and gut homeostasis in *Drosophila melanogaster*. 2010. Poster. Swiss *Drosophila* Meeting. Fribourg, Switzerland.

The *Drosophila* gut response to bacterial infection: activation of host defense and stem cell proliferation. 2009. Poster. 50th *Drosophila* Research Conference. 2009. Chicago, USA.

“Renewal” in *Drosophila* immunity: Host defense and stem cell proliferation in the gut. 2009. Oral presentation. Swiss *Drosophila* Meeting. Bern, Switzerland.

The *Drosophila* gut response to bacterial infection: activation of host defense and stem cell proliferation. 2008. Oral presentation. *Jacques Monod conference Insect Immunity in Action: From Fundamental Mechanisms of Host Defense to Resistance Against Infections in Nature*. Aussois, France.

Prevalence of the gut immune response and its subversion in a *Drosophila/Pseudomonas* oral model of infection. 2007. Oral presentation. *EMBO* conference at Institut Pasteur. Paris, France.

RNAi silencing and endogenous retroviruses. 2006. Poster. Jacques Monod Conference « Insect Immunity, the post genomic era opens ». Roscoff, France.

Asymmetric RNAi and the control of endogenous retroelements. 2005. Oral presentation. French *Drosophila* Conference. Imbours, France.

Post-transcriptional control of endogenous retroviruses through piRNAs. 2004. Oral presentation. Imbours, France.

Drosophila : a model for epigenetics. 2003. Poster presentation and organizer. French human genetics Society annual conference. Clermont Ferrand France.

PROFESSIONAL OVERVIEW AND OBJECTIVES

Dr. Buchon's laboratory uses the genetic model *Drosophila melanogaster* to study the host response to indigenous and pathogenic microbes using genomics, functional genetics and systems-level approaches. He focuses on the integration of immune, growth and repair mechanisms. In addition, he studies intestinal physiology, and focuses on how intestinal stem cells integrate signals from their environment, including nutrients, stress, or metabolites from the microbiota