



# John R Clayton

SCIENTIST · VECTOR-BORNE DISEASES

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"Nothing in biology makes sense except in the light of evolution"



## Summary

I am a molecular biologist by training with 15 years of experience working on the genetics of disease vector mosquitoes. I have a PhD in Molecular Microbiology & Immunology from Johns Hopkins University. A California native, I was born and raised near Blythe, in the remote expanses of the Sonoran desert. Over the years, I've held more than a dozen positions in the US States of California, Georgia and Maryland as well as Heidelberg, Germany and Strasbourg, France. In addition to being a native speaker of English, I have a working knowledge of French, Spanish & German.

## Education

### Johns Hopkins Bloomberg School of Public Health

#### Department of Molecular Microbiology & Immunology

Baltimore, MD

DOCTORATE

2003-2010

Dissertation: *Transduction of Virulence Factors by Alphaviruses in Vertebrate and Invertebrate Models of Infection*

### Johns Hopkins Bloomberg School of Public Health

#### Department of International Health

Baltimore, MD

CERTIFICATE, VACCINE SCIENCE & POLICY

2003-2005

### University of California

#### Department of Molecular & Cell Biology

Berkeley, CA

BACCALAUREATE

1996-2000

Emphasis: *Genetics & Development*

## Work Experience

### Université de Strasbourg

#### Institut de Biologie Moléculaire et Cellulaire

Strasbourg, France

POST-DOCTORAL RESEARCHER

2011-2015

As a fellow with the French *Institut national de la santé et de la recherche médicale* (INSERM), I successfully developed reagents to silence single alleles of polymorphic genes in *An. gambiae* to determine the contribution of each allele to susceptibility to *Plasmodium* infection in the mosquito. My other main research project involved the characterization of a transgenic strain of *An. gambiae* that produces small piwi-like RNAs derived from its integrated transgene locus, causing them to become hyper-susceptible to *Plasmodium* infection.

### Johns Hopkins Bloomberg School of Public Health

#### Department of Molecular Microbiology & Immunology

Baltimore, MD

PRE-DOCTORAL RESEARCHER

2003-2010

My dissertation research largely involved the characterization of and acquired, sequence-specific anti-viral resistance phenotype observed in *Aedes aegypti* during Alphavirus infection. I also developed a recombinant, mosquitocidal Alphavirus expressing the pro-apoptotic gene *reaper* and evaluated its suitability as a potential biocontrol agent. Another project involved comparative analysis of the Bunyavirus virulence factor NSs in mice and mosquitoes.

### European Molecular Biology Laboratory

#### Kafatos Group

Heidelberg, Germany

POST-BACCALAUREATE RESEARCHER

2002-2003

While working in the Kafatos lab I developed a transgenic strain of *An. gambiae* expressing a fluorescent reporter specifically in midgut epithelial cells that had been invaded by the malaria parasite. In parallel, I performed functional analysis of immunity genes and identified a role for the mosquito NF- $\kappa$ B-like transcription factor *REL2* during *Plasmodium* infection.

**Centers for Disease Control & Prevention**  
**Entomology Branch**

Atlanta, GA

EMERGING INFECTIOUS DISEASES FELLOW

2000-2002

While an EID fellow at the CDC, I invented the breakthrough transformation method for *An. gambiae* still in use today. I also characterized the transgenic strains we obtained while working with both *P. vivax* and *P. falciparum* malaria parasites in a BSL-2 environment. Field work opportunities included surveillance for West Nile Virus and assisting in CDC's emergency response during the 2001 Anthrax bioterror crisis.

**University of California**  
**Department of Integrative Biology**

Berkeley, CA

RESEARCH ASSISTANT

1998-1999

While in the Brent Mishler's laboratory I evaluated the utility of RNA secondary structures to reconstruct deep phylogenies of green plants.

**Languages**

Spoken	• English	★★★★★	Programming	• R	★★★★★
	• French	★★★★		• $\text{\LaTeX}$	★★★★★
	• Spanish	★★★★		• Python	★★★★
	• German	★★		• Bash	★★★★

**Skills**

Laboratory	• Expert at a wide array of molecular biology, biochemistry & genetics techniques	DNA/RNA/protein extraction/purification	PCR	qPCR	RT-PCR	SNP genotyping	Southern blot	RNA Blot
		small RNA blot	SDS-PAGE	cell culture	cell transfection	immunofluorescence microscopy	plaque assay	
		micropipette design	microinjection	DNA sequence analysis	Sanger sequencing	Illumina DNA sequencing		
		small RNAseq	molecular cloning	gene synthesis	agarose gel electrophoresis	ultracentrifugation		
Entomology	• Expert at all aspects of cultivating and maintaining colonies of <i>Anopheles</i> & <i>Aedes</i> mosquitoes	egg bleaching	vacuum hatching	larval feeding & splitting	pupal & adult sexing	adult cultivation		
		stock maintenance	single-pair mating	fluorescence screening of transgenic strains	midgut dissection			
		salivary gland dissection	ovary dissection	hemolymph extraction	blood feeding	genetic crossing		
Software	• Expert user of the Microsoft Windows, Apple Mac OS X, Darwin/BSD Unix and Linux operating systems	Galaxy (workflow management system)	DNASTar Lasergene	Primer Express	Adobe Acrobat	Adobe PageMaker		
		Adobe Photoshop	Adobe Illustrator	Adobe Premiere	MS Word	MS Excel	MS Powerpoint	ffmpeg

**Teaching Experience**

**Université de Strasbourg**  
**Institut de Biologie Moléculaire et Cellulaire**

Strasbourg, France

MASTER'S STUDENT MENTOR

2011-2015

Technical oversight of three master's level students with projects related to functional analysis of *Anopheles* genes during malaria infection and *in vivo* RNA interference in *Anopheles* and *Drosophila*.

**Johns Hopkins Bloomberg School of Public Health**  
**Department of Molecular Microbiology & Immunology**

Baltimore, MD

TEACHING ASSISTANT

2005

Graduate student instructor for Molecular Entomology. Lead exam reviews for students before midterm and final.

**University of California**  
**TEACHING ASSISTANT**

Berkeley, CA

2000

Undergraduate student instructor for Health and Medical ethics.

## Honors & Awards

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2004	<b>Scholarship</b>	Dr. Lloyd and Mae Rozeboom Scholarship in Medical Entomology	Baltimore, MD
2000	<b>Fellowship</b>	Emerging Infectious Diseases Laboratory Research Fellowship	Atlanta, GA
1999	<b>Travel Grant</b>	Deep Green Travel Grant for the XVI International Botanical Congress	Berkeley, CA
1996	<b>Scholarship</b>	Blythe Jaycees Scholarship	Blythe, CA

## Training Courses

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- Ethics & Safety**
- Chemical and biological waste disposal practices and safety training
  - Radioactive isotope certification and safety training
  - Ethical use of vertebrate animals in research training

## Extracurricular Activities

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### Phi Kappa Tau Fraternity

Berkeley, CA

MEMBER, NU CHAPTER

1997-2000

As member of the fraternity, I held the positions of Scholarship Chair and Secretary as well as serving on the chapter Executive Committee.

### The Daily Californian

Berkeley, CA

PRODUCTION INTERN

1998

Responsible for daily page layout

### UC Berkeley Intercollegiate Bowling Team

Berkeley, CA

MEMBER

1996-1997

Selected for the university bowling team as a first semester freshman

### PVHS Class of 1996

Blythe, CA

PRESIDENT

1995-1996

Elected to serve as Senior class president

### PVHS Yellowjackets Golf Team

Blythe, CA

VARSITY LETTERMAN

1993-1996

Played on varsity golf team for four years

### The Stinger

Blythe, CA

EDITOR

1993-1994

Features Editor and Advertisement Sales for our student newspaper

## Extracurricular Employment

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### Skates on The Bay

Berkeley, CA

WAITER

2000

Waitstaff at a seafood restaurant in The Berkeley Marina

### Mazzini Trattoria

Berkeley, CA

BUSSER

1999-2000

Service staff at a fine Northern Italian restaurant

### Robinson Farms

Blythe, CA

FORKLIFT OPERATOR

1996-1997

Loaded tractor-trailers during melon season

### Desert Security Farms

Blythe, CA

LABORER

1994

Tarped hay stacks

### Blythe Drug Company

Blythe, CA

SALES CLERK

1993-1996

Duties included customer service, sales, inventory and deliveries

Filled vending machines for local soft drink vendor

## Personal Interests

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In my spare time, I like to travel and visit monuments, museums and parks. Activities I enjoy include bowling, cycling, golf, tennis, volleyball and poker. I also enjoy dining, cinema, theater and classical as well as contemporary live music performances.

## Published Research

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Lamacchia, Marina, **Clayton, John R**, Rui Wang-Sattler, Lars M Steinmetz, Elena A Levashina, and Stéphanie Blandin (2013). “Silencing of Genes and Alleles by RNAi in *Anopheles gambiae*”. In: *Methods in Molecular Biology* 923.2, pp. 161–176.

**Clayton, John R** (2010). “Transduction of Virulence Factors by Alphaviruses in Vertebrate and Invertebrate Models of Infection”. Dissertation. Johns Hopkins University, p. 193.

**Clayton, John R** and J Marie Hardwick (2008). “Apoptosis and Virus Infection”. In: *Encyclopedia of Virology*. Ed. by BWJ Mahy and MHV Van Regenmortel. 3rd. Oxford: Academic Press. Chap. Apoptosis, pp. 154–162.

Lobo, Neil F, **Clayton, John R**, Malcolm J Fraser, Fotis C Kafatos, and Frank H Collins (2006). “High efficiency germ-line transformation of mosquitoes.” In: *Nature Protocols* 1.3, pp. 1312–1317.

Meister, Stephan, Stefan M Kanzok, Xue-Li Zheng, Coralia Luna, Tong-Ruei Li, Ngo T Hoa, **Clayton, John R**, Kevin P White, Fotis C Kafatos, George K Christophides, and Liangbiao Zheng (2005). “Immune signaling pathways regulating bacterial and malaria parasite infection of the mosquito *Anopheles gambiae*.” In: *Proceedings of the National Academy of Sciences of the United States of America* 102.32, pp. 11420–11425.

Grossman, Genelle L, Cristina S Rafferty, **Clayton, John R**, Theresa K Stevens, Odette Mukabayire, and Mark Q Benedict (2001). “Germline transformation of the malaria vector, *Anopheles gambiae*, with the piggyBac transposable element.” In: *Insect molecular biology* 10.6, pp. 597–604.

## Photographs

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Enserink, Martin (2002). *Ecologists see flaws in transgenic mosquito*.

Jasny, Barbara R and Orla M Smith (2002). *Poster: MOSQUITO Anopheles gambiae*.

Enserink, Martin (2001). *Two New Steps Toward a 'Better Mosquito'*.

## Patents

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Levashina, Helena, Stéphanie Blandin, Fotis Kafatos, **Clayton, John**, Shin-Hong Shiao, and Luis Moita (2004). “Use of Thioester-Containing Proteins (TEPs) for triggering/inducing an immune response in mosquitoes of *Anopheles* against Plasmodium.”

## Research Presentations

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**Clayton, John R** (2002). *Transgenesis in Anopheles gambiae*. Strasbourg, France.

Bendik, Jean, **Clayton, John R**, Andrew Hopkins, Lauren Singer, and Fernando Torres (2001). *EID Roundtable – Q and A Session From Current EID Fellows*. Atlanta, GA USA.

**Clayton, John R** and Mark Q Benedict (2001). *Germline Transformation of Anopheles gambiae with the piggyBac transposable element*. Atlanta, GA USA.

## Courses Attended

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**Clayton, John R** and Stéphanie A Blandin (2011). *Identifying Loci Controlling Resistance to Plasmodium Infection in the Mosquito Anopheles gambiae*. Heidelberg, Germany.

*International Bioinformatics Workshop on Malaria Vectors, Sponsored by The Johns Hopkins Malaria Research Institute* (2003). Baltimore, MD USA.

## Posters

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**Clayton, John R**, Julien Pompon, Elena A Levashina, and Stéphanie A Blandin (2014). *An immunodeficient transgenic Anopheles gambiae line to study the mosquito complement system*. New Orleans, LA USA.

**Clayton, John R** and J Marie Hardwick (2009). *Potent Acquired Antiviral Immunity in the Yellow Fever Mosquito Aedes aegypti*. Baltimore, MD USA.

**Clayton, John R**, Heidi L Galonek, Beth Lamos, Mary Vander-Maten, Pablo Irusta, and J Marie Hardwick (2006). *Effects of Drosophila reaper in Mosquitoes*. Big Sky, MT USA.

Benedict, Mark Q, **Clayton, John R**, and Genelle L Grossman (2001). *Mobility of piggyBac in Anopheles gambiae*. Barcelona, Spain.

**Clayton, John R** and John A Wheeler (1999). *Phylogenetic significance of rbcL secondary structures*. St. Louis, MO USA.

## Scientific Meetings

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*Keystone Symposium: Genetic Manipulation of Insects* (2004). Taos, NM USA.

*American Society of Tropical Medicine and Hygiene 52nd Annual Meeting* (2003). Philadelphia, PA USA.

*Research Training Network Annual Meeting* (2003). Leiden, The Netherlands.

*EMBO/EMBL Conference on Science and Society "Infectious Diseases: Challenges, Threats and Responsibilities"* (2002). Heidelberg, Germany.

*Research Training Network Annual Meeting* (2002). Kolymbari, Crete.

*Cleveland Vector Encounter* (2001). Cleveland, OH USA.

*Keystone Symposium: Genetic Manipulation of Insects* (2001). Taos, NM USA.