aude.bernheim@inserm.fr
https://audebernheim.fr
0033695574972/
@AudeBer
Paris

Aude Bernheim

PhD in microbiology
Engineer of« Corps of Bridges, Waters and Forests » (French civil servant)

Education

2014-2017 **PhD in Microbiology** Pasteur Institute, Paris, France

2013-2014 **Post Master Degree: Management of public policies** Pont ParisTech –AgroParisTech.

2012-2013 **Master Degree, "Interdisciplinary Approaches to life sciences"** Center for Interdisciplinary Research (CRI) (Paris 7)

2009-2013 **Engineering degree from AgroParisTech:** Paris Institute for life and environmental sciences

2007-2009 **Classe préparatoire** : Program preparing the national entrance exams for the selective "Grandes Ecoles" (Lycée Henri IV, Paris). Majoring in Biology, Physicics, Chemistry (ranked 43 out of 5000 candidates)

Working Experiences

2020-curr. **Researcher/ Group leader at INSERM (French National Institute of Health and Medical Research), Paris, France.**
IAME (Infection Antimicrobials Modelling Evolution) Unit.

2018-2020 **Post-doc at the Weizmann Institute of Sciences, Rehovot, Israel.**
Department of Molecular Genetics. Rotem Sorek's lab.

2014- 2017 **PhD in Microbiology at the Pasteur Institute, Paris, France**
Microbial Evolutionary Genomics and Synthetic Biology labs. Supervisors: Eduardo Rocha and David Bikard.

2013- curr **French civil servant***:* Engineer of the « Corps of Bridges, Waters and Forests »
Technical Grand Corps of the French State. Resource for informed public policies for the Ministry of Agriculture

2011-2014 **Short terms working experiences outside biology** *:*
Consulting mission for the French Ministry of Women Rights Mission at the interface of research and public policies on gender equality. Supervisor: Y. L'Horty (2014, 4 months).
French Embassy in The US, Economic Department, Agricultural Affairs, Washington DC. Political and economic analysis of U.S. agricultural and food policies (2011, 6 months).

Scientific productions

Selected publications (full list available at the end of the document)

Tesson F., Hervé A., Touchon M., d'Humières C., Cury J., **Bernheim A**.
Systematic and quantitative view of the anti-viral arsenal of prokaryotes. biorRxiv, (2021)

Bernheim A., Millman A., Ofir G., Meitav G., Abraham C., Shomar H., Rosenberg M., Tal N., Melamed S., Amitai G., Sorek R. *Prokaryotic viperins produce diverse antiviral molecules.* Nature 589, 120-124 (2021)

Millman A*, **Bernheim A*,** Stokar-Avihail A.*, Fedorenko T., Voichek M., Leavitt A., Sorek R.: *Bacterial retrons function in anti-phage defense* Cell 183 (6), 1551-1561 (2020)

Bernheim A, Sorek R : *The bacterial pan-immune system: anti-phage defense as a community resource* Nature Reviews Microbiology 18, 113–119 (2020, Perspective)

Bernheim A, Bikard D, Touchon M, Rocha EPC : *A matter of background: DNA repair, pathways as a possible cause for the sparse distribution of CRISPR–Cas, systems in bacteria*. Phil Trans B B 374 (1772), 2018008 (2019)

Bernheim A, Calvo-Villaman A, Basier C, Cui L**,** Rocha EPC, Touchon M, Bikard D, *Inhibition of NHEJ repair by type II-A CRISPR-Cas systems,* Nature Communications 8 (1), 1-9 (2017)

Patents:

PhD: **Inhibition of NHEJ repair using Csn2** US n° 62/589,660 (2017)
Post doc: **Anti-viral and anti tumoral compounds** P-583071-USP (2019), licensed to Pantheon Biosciences.

Selected communications:

Systematic and quantitative view of the anti-viral arsenal of prokaryotes (2021)
– Evergreen conference, USA (Selected Talk)
– Keynote speaker, PHAGES Network, Roscoff, France (Invited Speaker)

- Viruses of Microbes webinar , online (Invited Speaker)

Conservation of anti-viral immunity in prokaryotes and eukaryotes (2020, 2021)

- MicroSeminar 2020 (available online seminar) : youtu.be/MmQ5lrWV9yA.
- Seminar at the Center of Research and Interdisciplinarity, Paris, France (Invited speaker)
- Neptune Seminar Series CIIMAR, Porto, Portugal (Invited speaker)
- Seminaris IBB (Institut de Biotecnologia i de Biomedicina), Barcelona, Spain (Invited speaker)
- Seminar at the John Ines Center, Norwich, England (Invited speaker)
- Seminar at the Pasteur Institute, Paris, France (Invited Speaker)
- Seminar at the Cochin Institute, Paris, France (Invited Speaker)
- Seminar at the Necker Institute, Paris, France (Invited Speaker)
- 2021 VEGA Series, Joint Genomic Institute, California, USA (Invited Speaker)
– Seminar at UCL Department of Infection, London, Uk (Invited Speaker)
– Seminar at St Andrews University, Scotland (Invited Speaker)
- Keynote at PPU program, Pasteur Doctoral School, (Invited Speaker)

A novel gene family providing chemical defense against phages (2019,2021)

- New Concepts and Approaches in Microbiology, Heidelberg Germany, 2019 (Selected Talk)
- CRISPR 2019 : Quebec, Canada, 2019 (Selected Talk)
- French Society of Virology 2021, Paris, France (Selected Talk)

CRISPR-Cas systems interactions with DNA repair pathways shape CRISPR-Cas systems distribution among bacterial genomes (2017)

- FEMS 2017 : European Society of Microbiology Valencia, Spain (Selected Talk)
- SFM 2017: French Society of Microbiology, Paris, France (Invited speaker)
- ALPHY 2017 : Bioinformatics and Evolutionary Genomics, Lyon, France, (Selected Talk)

Why so rare if so great: the determinants of the sparse distribution of CRISPR-Cas systems in bacterial genomes ?
Journée Claude Bernard, French Society of Biology, French Academy of Medecine, Paris, France (Invited Speaker)

Fellowships and Grants

ERC starting grant 2021: European Research Council (1.5M)
ATIP-avenir laureate 2021: INSERM-CNRS (300k€)
ANR JCJC 2021, French Nation Research Agency (300k€)
Rosalind Franklin Young Investigator Award 2021, American Society of Genetics and Gruber Foundation (75k€)
CRI group Leader, Center for Research and Interdisciplinarity (300k€)
EMBO Long term fellowship (2018)
Weizmann Institute of Science's Dean of Faculty's fellowship (2018)
Israel Academy of Sciences, post-doctoral fellowship (2018)

Scientific Prizes

Jacques Monod Prize for Young Investigators, Fondation Jacques Monod (2020,16k)
Prize for outstanding achievements during post-doctoral research Weizmann Institute of Science (2020)
Bettencourt Schueller Prize for Young Researchers, Fondation Bettencourt Schueller (2018, 25k€)
100, 300 talents 2016, 2017 L'Oréal-UNESCO for Women in Science
Poster prize CRISPR Conference 2016.
Grand Prize iGEM (Competition of synthetic biology) Winning project among 210 international teams

Teaching and supervision experience

Teaching

- **"The immune systems of bacteria"**, (Master 2, Pasteur Institute)
- **Bacterial genetics (Magistere of Genetics of University of Paris, master IMVI)** Coordination and teaching of the module (2nd year of Master Degree, one week, 2020, 2021).
- **'Disruptive technologies and public policies' for Master students, Science-Po Paris, School of Public Affairs.** Creation of a innovative class about links between science and public policies for 2nd year of Master Degree; 2h/week for 12 weeks. (2016, 2017).
- **« Quantitative evaluation of public policies for gender equality » in the Master PAPDD (Public policies and adminsitration Management for Sustainable Devlopment).(**3hours: 2015, 2016, 2017)
- **« Introduction to synthetic biology» Master 1 of cellular biology, Medical Faculty of Paris-Bichat.** (2 hours, 2017)

Science and Society work

Selected Associative Activities

Co-author with F. Vincent of the book "L'intelligence artificielle pas sans elles", Belin edition, 2019
Loose title translation : *Artificial Intelligence, not without her.* **Book for the general public** on algorithms biais and more generally on links between sex/gender and artificial intelligence. The book was accompanied by development of an exhibition, a comic book and a series of conferences on AI sexist bias (Description of the full campaign here). Book was reprinted 3 times in a few months and sold in several thousands of copies. Inspired political, activist and companies to make algorithms less biaises.

Co-Founder and Co-President of WAX Science: WAX Science is an NGO that promotes science without stereotypes and gender balance in science by creating and spreading innovating tools (co-presidency 2013-2016 ; 2022-). It was founded in 2013 and during the co-presidency rose to 40 active volunteers, 6 full time interns, 50k€ budget, dozens of projects, and more than 10 000 people reached by the activities of the association.

Co-Founder and Co-President of ItCounts: an open source, citizen science crowd-sourcing application to promote gender balance. http://itcounts-app.org/.

Member of the Club "Science Publique" on France Culture : Debate for one hour every 2 months on national radio channel France culture about general scientific subjects with scientific personalities (2013-2015)

Selected prizes

European Gender Summit Laureate with the video 'Science It's Your Thing' (2012, more than 50 000 views)
Awards for **Digital Educative Technology** (Ministry of Education and Research, 2013).
Innovative Project of the Year (AIV, 2013, **25k€**).
"Disruptive Activism" Prize of Hackathon Women Innovation by Orange ; Build up program by Google for 6mths
AFNIC Foundation laureate for Digital Solidarity. (2016, **30k€**)

Selected media

Speaking on national radios and TV: **France Inter** (Les Savantes, la TAC), **France Culture** (Science Publique), Europe 1 (30 glorieuses) and France Info (L'instant T)
Portraits and articles about WAX Sciences: Cheek Magazine, ELLE, Le Figaro, Studyrama, L'Etudiant, Mademoizelle, Le Monde, Marie Claire…
Articles about the book « l'intelligence artificielle pas sans elles » : (Le Monde, Les Echos, Challenge, L'Opinion, Liberation, Uzbek et Rica, France Inter, France Info, ...).

Selected communications

L'**Echappée Volée** : General public conference (TED-like, 1200 people) on stereotypes in science (vidéo), the text of the talk was published in the book "**Demain, territoire de tous les possibles** "under the direction of Michel Levy-Provencal, Larousse**.**

General public conferences towards:
- **youth** (Youth We Can, La Riposte…)
- **start-up** (Osons la France, Hello Tomorrow…)
- **gender equality** (Women Forum, Forum de la mixité…).
- **art and sciences** (Gaieté lyrique, Festival Numok, Lieu Unique...)

Talks and workshops for institutionnal organizations, NGOs companies : More than 40 talks for companies (RATP, BNP Parisbas, Altran...), NGOs (Animafac, Open Knowledge Foundation, Network of women administrators...), institutional organizations (French Academy of Medecine, Council of Europe...)

Writings for different specialized journals (with F. Vincent)
Revue de la Ligue des droits de l'homme: *La diversité, outil de questionnement scientifique*
Diplomées: *Cultures numériques, la norme mâle.*

Full List of Publications

* Equal contributions

INSERM

Systematic and quantitative view of the anti-viral arsenal of prokaryotes
Tesson F., Hervé A., Touchon M., d'Humières C., Cury J., **Bernheim A.**
biorRxiv, 2021.09.02.458658 (2021)

Prophage-encoded hotspots of bacterial immune systems
Rousset F., Dowding J., **Bernheim A**, Rocha E.P.C, Bikard D.
Cell Host and Microbes, *in press.*

Evolutionary and mechanistic diversity of Type I-F CRISPR-associated transposons
Klompe S, Jaber N, Bel L, Mohabir J, **Bernheim A**, Sternberg S
Molecular Cell 82 (3), 616-628e5 (2022)

Post-doctoral

Prokaryotic viperins produce diverse antiviral molecules.
Bernheim A., Millman A., Ofir G., Meitav G., Abraham C., Shomar H., Rosenberg M., Tal N., Melamed S., Amitai G., Sorek R
Nature 589, 120-124 (2021)

Bacterial retrons function in anti-phage defense.
Millman A*, **Bernheim A*,** Stokar-Avihail A.*, Fedorenko T., Voichek M., Leavitt A., Oppenheimer-Shaanan Y., Sorek R
Cell 183 (6), 1551-1561 (2020)

The bacterial pan-immune system: anti-phage defense as a community resource
Bernheim A, Sorek R
Nature Reviews Microbiology 2020 18, 113–119 (Perspective)

Multiple phage resistance systems inhibit infection via SIR2-dependent NAD+ depletion.
Garb J, Lopatina A. **Bernheim A,** Zaremba M, Siksnys V, Melamed S, Leavitt A, Millman A, Amitai G, Sorek R
bioRxiv (2021)

Virus cooperate to defeat bacteria
Bernheim A, Sorek R
Nature 2018 559 (7715), 482-484, (News and Views*)*

Phd

Atypical organizations and epistatic interactions of CRISPRs and cas clusters in genomes and their mobile gemetic elements
Bernheim A, Bikard D, Touchon M, Rocha EPC
Nucleic Acids Research 2020 48 (2), 748-760

A matter of background: DNA repair, pathways as a possible cause for the sparse distribution of CRISPR–Cas, systems in bacteria.
Bernheim A, Bikard D, Touchon M, Rocha EPC
Philosophical Transactions of the Royal Society B 2019 B 374 (1772), 2018008

Inhibition of NHEJ repair by type II-A CRISPR-Cas systems
Bernheim A, Calvo-Villaman A, Basier C, Cui L**,** Rocha EPC, Touchon M, Bikard D
Nature Communications 2017 8 (1), 1-9

CRISPRCasFinder, an update of CRISRFinder, includes a portable version, enhanced performance and integrates search for Cas proteins.
Couvin D., **Bernheim A**, Toffano-Nioche C., Touchon M., Michalik J., Néron B, Rocha EPC, Vergnaud G., Gautheret D., Pourcel C.
Nucleic Acids Research 2018 46 (W1), W246-W251

Genetic exchanges are more frequent in bacteria encoding capsules.
Rendueles, O, de Sousa, J, **Bernheim A**, Touchon M, Rocha EPC
PLoS Genetics 2018 (14(12) 1-25

A Eukaryotic-like Serine/Threonine Kinase Protects Staphylococci against Phages

Depardieu,F, Didier J.P, **Bernheim A**, Sherlock A, Molina H. Duclos B, Bikard D,.

Cell Host and Microbes 2016 20 (4), 471-481

Methods for the Analysis and Characterization of Defense Mechanisms Against Horizontal Gene Transfer: CRISPR Systems

Calvo-Villamañán A., **Bernheim A.,** Bikard D.

Horizontal Gene Transfer. 2020 235-249 (Book Chapter)

Master

Genetic and life-history traits associated with the distribution of prophages in bacteria

Touchon M, **Bernheim A**, Rocha EPC

ISME Journal 2016 10 (11), 2744-2754

Phage-mediated Delivery of Targeted sRNA Constructs to Knock Down Gene Expression in *E. coli*

Bernheim A.*, Libis V.*, Lindner A., Wintermute E.,

Journal of Visualized Experiments 2016 109 e53618.

Silencing of antibiotic resistance in E. coli with engineered phage bearing small regulatory RNAs

Libis, V*, **Bernheim, A***, Basier C, Deyell M, Aghoghogbe I, Atanaskovic, I, Amel C, Benony M, Koustoubelis N, Lochner A, Marinkovic Z, Zahra S, Zegman Y, Lindner AB, Wintermute EH,

ACS Synthetic Biology 2014 3 (12), 1003-1006

Engineering gene overlaps to sustain genetic constructs in vivo

Decrulle A, Frenoy A, Meiller-Legrand T, **Bernheim, A**, Lotton C, Gutierrez A, Lindner AB

Plos Computational Biology 2021 17(10): e1009475

Characterization of Mycobacterial Growth Inhibition by Lytic Enzymes Expressed in Vectorized E. *coli In Situ*

Atanaskovic I, Bencherif C, Deyell M, Jaramillo-Riveri M, Benony M, **Bernheim A**, Libis V, Koustoubelis A, Zegman Y, Lochner A, Basier C, afhoghobe I, Marinkovic Z, Zahra S, Toulouze M, Lindner AB, Wintermute EH,

ACS Synthetic Biology 2014 3 (12), 932-934

Assessment of the health impact of GM plant diets in long-term and multigenerational animal feeding trials: A literature review.

Snell C, **Bernheim A**, Bergé JB, Kuntz M, Pascal G, Paris A, Ricroch AE,

Food and Chemical Toxicology 2012 50 (3-4) 1134-48