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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)
2011 **Erasmus program Humboldt Universität, Berlin** (5 months) in Agricultural Economics
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, Physics, Chemistry

Working Experiences

- 2020-curr. **Researcher 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 :**
Research in biology
International Competition of Synthetic Biology iGEM , Team Paris Bettencourt "[Fight Tuberculosis with modern weapons](#)" : Phage engineering, antibiotic resistance. Grand prize winner of the competition (1st Place) among 210 international teams. (2013)
INSERM U1001: Robustness and evolvability of life. Supervisor: A. Lindner (6 months)
Pasteur Institute, Microbial Evolutionary Genomics. Supervisor: E. Rocha (2012, 4 months).
Sino-French Research Center For Life Sciences, Rui Jin Hospital, Shanghai, China. Supervisor J. Zhu (2012, 6 months)
AgroParisTech ,UFR «Genetical Evolution and Breeding of Plants », Supervisor A. Ricroch (2011, 3 months)
- Public policies*
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)

- 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., Voicheck 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: *Atypical organizations and epistatic interactions of CRISPRs and cas clusters in genomes and their mobile genetic elements* Nucleic Acids Research 48 (2), 748-760 (2020)
- 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:

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

- 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 Innes Center, Norwich, England (Invited speaker)
- Seminar at the Pasteur Institute, Paris, France (Invited Speaker)

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

- New Concepts and Approaches in Microbiology, Heidelberg Germany, 2019 (Selected Talk)
- CRISPR 2019 : Quebec, Canada, 2019 (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 Medicine, Paris, France (Invited Speaker)

Scientific Prizes and fellowships

Jacques Monod Prize Fondation Jacques Monod (2020,16k)

Prize for outstanding achievements during post-doctoral research Weizmann Institute of Science (2020)

EMBO Long term fellowship (2018)

Bettencourt Schuller Prize for Young Researchers (2018, 25k€)

Weizmann Institute of Science's Dean of Faculty's fellowship (2018)

Israel Academy of Sciences, post-doctoral fellowship (2018)

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

- **Bacterial genetics for Master students (Magistere of Genetics of University of Paris, master IMVI)** Coordination and teaching of the module (2nd year of Master Degree, one week, started 2020).
- **'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 administration Management for Sustainable Development).**(3hours: 2015, 2016, 2017)
- **« Introduction to synthetic biology» Master 1 of cellular biology, Medical Faculty of Paris-Bichat.** (2 hours, 2017)

Supervision

- Mentored three master students during post doc in Weizmann Institute as well as two undergrad students (2018-2020)
- Mentored two master students and an engineer during PhD at Pasteur Institute (2014-2017)
- Within the work as co-president of the association WAX Science, managed 30 people, and recruited and supervised 6 interns.

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 bias 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.

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). It was founded in 2013 and during the co-presidency rose to 40 active volunteers, 6 full time interns, 50k€ budget, tens 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-Provençal, 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*

Diplômées: *Cultures numériques, la norme mâle*.

Full List of Publications

* Equal contributions

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)

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)

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 genetic 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 CRISPRFinder, 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

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, Toulouse 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