

Dr. Jessica Barbe



Current position: Biology Tutoring

Candidate for the 2025 MSCA postdoctoral fellowship, awarded the European Commission's Horizon Europe Seal of Excellence.

 18/12/1994

 French, Swiss, Spanish

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 <https://jessicabarbe.com>

Research interests:

Mitochondrial bioenergetics, efficiency, endotherms, phylogeny, body mass, individual performances

Education & scientific experiences

- 2020-2023 **Ph.D. in ecophysiology** - Lyon 1 University, France
Endothermy and body mass: effect on the mitochondrial bioenergetic. *Ph.D defense : 11/12/2023, oral congratulations.*
Supervision : Prof. Damien Roussel and Prof. Yann Voituron. LEHNA, UMR 5023.
- 2019-2020 **Master of Science Degree (2nd year) in Integrative Physiology in Extreme Conditions (PICE) (2/7)** - Lyon 1 University, France.
Allometric relationships in birds: mitochondrial energy fluxes and body mass. Supervision : Prof. Damien Roussel and Prof. Yann Voituron. LEHNA, UMR 5023.
- 2018-2019 **Master of Science Degree (1st year) in Integrative and Physiology Biology (BIP) (3/46)** - Lyon 1 University, France.
Muscle ontogeny of energy metabolism in the king penguin chick (*Aptenodytes patagonicus*).
Supervision : Prof. Damien Roussel. LEHNA, UMR 5023.
- 2015-2018 **Bachelor of Science Degree in Ecology (2/61)** - University of Savoie Mont Blanc, France
Biochemical research on the impact of herbivory on ecosystem functioning. Supervision: Dr. Sébastien Ibanez. LECA, UMR 5533
- 2014-2015 **Bachelor (1st year) of Science Degree in Medicine** – University of Geneva, Switzerland

Fieldwork experiences & laboratory skills

Laboratory technics

- Mitochondrial isolation (skeletal muscle, heart, liver and blood)
- Mitochondrial respiration and mitochondrial efficiency (Rank Brothers®)
- Cellular respiration (Respirometers Oroboros®)
- Mitochondrial reactive oxygen species generation (Fluorometer)
- Spectrophotometric assay: Enzyme activities, protein concentration
- Bird and rat dissection

Fieldwork

- Avian tissue sampling (heart, skeletal muscle, liver, and blood)
- Monitoring of chamois population (Bauges massif)
- Sampling in lake and terrestrial ecosystems
- Counting of birds on the Bourget lake (LPO)
- Capture of the common toad (Rhône Alpes)

Softwares

- Biostatistics: RStudio (Frequentist, Bayesian)/Python
- Phylogeny: BEAST, BirdTree
- Metabolism: Datlab - Foxy
- Informatics: PowerPoint /Excel / Word
- GIS : QGIS

Languages

- French (native)
- Spanish (native)
- English C1

Teaching & Students supervision

2024-2025: Sciences teacher in the Anna de Noailles high school, Évian-les-Bains, France

Biology (~400h) - “Sciences, Climate and Societies”, “A history of life” (3rd year of high school)
Physics & Chemistry (~20h) - “A long history of matter” (2nd year of high school)

+ Tutoring in Biology, Mathematics, Physics and Chemistry (all levels, ANACOURS agency)

2020-2023: Complementary teaching activities (ACE) 64h/year- University of Lyon1

Practical work - **UE Physiological regulations** – “Thyroid hormones” (3rd year of BSc)
Practical work - **UE Digestive and Energetic Physiology** – “Energy Expenditure” (3rd year of BSc)
Practical work and lecture course - **UE Enzymology and Metabolism** – “Oxygraphy” (2nd year of BSc)
Tutorial work - **UE Transversals** – “Documentary research” (1st year of BSc), “MSc jury”

2022: Supervision MSc student - Julia Watson, University of Lyon1, France.

Courses

May 2022 (80h): **Diploma Animal Experimentation and Ethics** – University of Lyon, VetAgro Sup

April 2022 (15h): Ethics of research - MOOC

February 2020 (1,5h) : Rendre actif les étudiants à distance - Service ICAP

April 2020 (2h) : Webinaire, repérer le plagiat lors des évaluations - Service ICAP

Main collaborations

Prof. Damien Roussel, Prof. Yann Voituron, Dr. Caroline Romestaing, Dr. Melanie Boël (University of Lyon) : Mitochondrial bioenergetics in birds and mammals

Dr. Antoine Stier (Strasbourg University, France) : Early-life determinants of the hallmarks of ageing: mitochondrial function, oxidative stress, and telomere length

Dr. Benjamin Rey (University of Lyon): Mitochondrial function of avian erythrocytes and body mass

Additional academic activities

2021-2023: Member and head of the organisation of the Annual EDISS Meeting.

Communication, sponsor application, financial and project managing, moderator of the oral communications and posters sessions

2021- 2022: Organiser of e-seminars: “Let's talk about antibiotic resistance” and “Research in the current ecological context”

Grants & Awards

2024-2025 : Application for Postdoctoral fellowships (SNSF Swiss Postdoctoral Fellowships - SPF), The Branco Weiss Fellowship – Society in Science (ETH Zürich), EMBO Postdoctoral Fellowships, Fyssen Foundation and Marie Skłodowska-Curie Actions.

December 2024 : Chermette-Mouratille price (Académie des Sciences, Belles-Lettres et Arts de Lyon) - **Awarded** for the quality of the thesis and all the fieldwork carried out during the PhD research work – 2 500 EUR

July 2023 : Society for Experimental Biology (SEB) **Travel Grant** - £600

July 2022: Company of Biologists (COB) **Travel Grant** - £250

2020 – 2023: **Ph.D. grants**, French Ministry of Higher Education and Research – 60 000 EUR

Society memberships

Society for Experimental Biology (SEB), since 2022

EcoMito Journal Club (monthly online meeting), since 2020

Peer reviewing experience

Philosophical Transactions B of the Royal Society

Scientific publications

// Most of my PhD research focused on the effects of temperature and body mass on energy metabolism in birds and mammals. A central focus of my research was the exploration of mitochondrial allometric patterns in birds (158 birds, 31 species, from 15g to 160kg) using a multi-tissue approach (muscle, liver, blood). My work demonstrated for the first time the existence of a mitochondrial allometric pattern in birds, with a dependence on the tissue studied, and the universality of the effect of body mass on mitochondrial bioenergetics in endotherms. I developed Bayesian linear models in two of my publications, aiming to promote the adoption of this emerging statistical methodology within the scientific community. These models offer improved control over phylogenetic relationships compared to traditional analytical approaches commonly used in mitochondrial bioenergetics research. Overall, my work contributes to a deeper understanding of the role of mitochondrial bioenergetics in shaping key ecological and evolutionary processes in endotherms and enhances comparative assessments between birds and mammals. //

Barbe, J., Watson, J., Roussel, D. and Voituron, Y. (2023). The allometry of mitochondrial efficiency is tissue-dependent: A comparison between skeletal and cardiac muscles of birds. *Journal of Experimental Biology*, 226(23). <https://doi.org/10.1242/jeb.246299>

Barbe, J., Roussel, D. and Voituron, Y. (2023). Effect of physiological hyperthermia on mitochondrial fuel selection in skeletal muscle of birds and mammals. *Journal of Thermal Biology* 117, 103719. <https://doi.org/10.1016/j.jtherbio.2023.103719>

Barbe, J., Voituron Y., and Roussel. Muscle temperature sensitivity of mitochondrial efficiency in endothermic species. *Submitted to Journal of Comparative Physiology B*.

In preparation

Barbe, J., Rey, B., Voituron Y., and Roussel, D. Effect of body mass on mitochondrial respiration in avian erythrocytes.

Barbe, J., Voituron Y., and Roussel. Allometry of enzymatic and oxidase activities: a multi-tissue approach in birds.

Stier, A., **Barbe, J.,** Calandreau, L., Lemarchand, J., Clair, A., Averty, L., and Roussel, D. Complex interplays between stress sensitivity, stress exposure, and glucocorticoid signalling are shaping mitochondrial physiology.

Conferences & Seminars

9. **Seminar at the “Académie des Sciences, Belles-Lettres et Arts”, December 2024 Lyon, France.**
Talk – Presentation of my thesis work for the Chermette-Mouratille award.
8. **Guest speaker at the Institute of Sport Sciences team meeting. April 2024 Lausanne, Switzerland.**
Talk – Hypoxia and mitochondrial coupling efficiency : What is it about ?
7. **Guest speaker at the EcoMito Journal club, March 2024. Talk (online) -** The allometry of mitochondrial efficiency is tissue-dependent: A comparison between skeletal and cardiac muscles of birds.
6. **Guest speaker at the Ecological and Evolutionary Physiology (Lund University) team meeting, January 2024 - Talk (online) -** Endothermy and body mass: effects on mitochondrial bioenergetics.
5. **Annual Conference of the Society for Experimental Biology (SEB), 4-7 July 2023. Edinburgh, Scotland - Poster and Talk.**
The effect of body mass on mitochondrial efficiency in birds is tissue-dependent.
4. **Annual Meeting EDISS, 3 November 2022 Lyon, France – Talk.**
Allometric relationships between body mass and mitochondrial efficiency of birds.
3. **Annual Conference of the Society for Experimental Biology (SEB), 5-8 July 2022 Montpellier, France – Poster.**
Mitochondrial fuel selection in birds and mammals: a question of muscular temperature.
2. **Satellite Conference of the Society for Experimental Biology (SEB), 3-4 July 2022 Montpellier, France – Poster.**
Allometric relationships between body mass and mitochondrial efficiency of birds.
1. **Annual Meeting of Animal Ecophysiology – 5th Edition, 2-4 November 2021 Montpellier, France - Talk.**
Muscular temperature effect on mitochondrial bioenergetics: a comparison between birds and mammals.