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RESEARCH INTERESTS

- Biochemistry of metalloenzymes
- Cytochromes P450, Flavins
- Enzyme catalysis and mechanism
- Coenzyme Q biosynthesis
- Fe-S hydroxylating non O₂-dependent enzymatic system

SUMMARY

Coenzyme Q (CoQ) is an endogenous lipid soluble molecule found in bacterial plasmatic or mitochondrial inner membranes, where it works as an essential electron carrier in the respiratory chain. Today, several inactivating mutations in genes affecting the biosynthesis of CoQ have been identified in severe pathologies as myopathies, nephropathies, or cerebellar ataxia. CoQ biosynthesis is complex and requires no less than a dozen of proteins, but a clear assignment of catalytic or biological function for many participating proteins is still missing. We aim at getting a better knowledge at the fundamental level of the biosynthesis of CoQ in *E.coli*, using a judicious combination of molecular genetics, site-directed mutagenesis, biochemistry, molecular biophysics (rapid-kinetics) and structural biology (X-Ray crystallography). The core of this project will be to provide the first *in vitro* biochemical characterization of the proteins involved in the biosynthesis of CoQ in *E.coli*, to elucidate their exact function, to solve their X-Ray structures and to study their molecular mechanism.

I am also interested in RNA modifying enzymes, notably TrhP and RlhA, two Fe-S proteins that share biochemical and structural identity with UbiU and UbiV involved in anaerobic CoQ biosynthesis in *E.coli*.

PUBLICATIONS

2021

- An enzymatic activation of formaldehyde for nucleotide methylation.
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- Dihydrouridine synthesis in tRNAs under reductive evolution
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2020

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- Structural and functional characterization of 4-Hydroxyphenylacetate 3-hydroxylase from *Escherichia coli*.
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2019

- Ubiquinone Biosynthesis over the Entire O₂ Range: Characterization of a Conserved O₂-Independent Pathway.
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- The UbiK protein is an accessory factor necessary for bacterial ubiquinone (UQ) biosynthesis and forms a complex with the UQ biogenesis factor UbiJ.
Loiseau, L, Fyfe, C, Aussel, L, Hajj Chehade, M, Hernández, SB, Faivre, B, Hamdane, D, Mellot-Draznieks, C, Rascalou, B, Pelosi, L, Velours, C, Cornu, D, **LOMBARD, M**, Casadesús, J, Pierrel, F, Fontecave, M, Barras, F.
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- Coenzyme Q Biosynthesis: Evidence for a Substrate Access Channel in the FAD-Dependent Monooxygenase Coq6.

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2015

- Expression in yeast, new substrates, and construction of a first 3D model of human orphan cytochrome P450 2U1: Interpretation of substrate hydroxylation regioselectivity from docking studies.

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2014

- Biosynthesis and physiology of coenzyme Q in bacteria.

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2011

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