

Curriculum Vitae



Personal information

First name / Family name	Nathalie Le Roy		
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Nationality	French		
Date of birth	04/04/1983		
Gender	Female		

Personal statement and statement of intent

Currently, I am working as a postdoctoral research fellow on the biomineralisation process of the calcified biominerals of the precious Mediterranean red coral at the Scientific Centre of Monaco.

I commenced my research career conducting two MSc internships in palaeobiology as part of my Master of Science education at the world renowned University of Pierre and Marie Curie in Paris, France. During these research projects, I developed a palaeobiological model that is used to determine the resting metabolic rate of extinct amniotes (vertebrates except fishes and amphibians). To this end, I employed morphometric analyses of long bone cross-sections from a range of extant and extinct amniotes and I developed a high interest and expertise in the bone formation process. Results of these studies have been disseminated in 3 publications in peer-reviewed international scientific journals and one presentation at an international conference.

After completing my Master of Science degree in 2007, I continued my scientific training with a PhD degree at the University of Burgundy (Dijon, France) in the laboratory of Dr. Frédéric Marin, who is well recognised as a specialist in biomineralisations by the scientific community. My research project focused on a metallo-enzyme called carbonic anhydrase, which plays a role in the biomineralisation of the shell of molluscs and gastroliths (stomach calcium carbonate concretions) of crayfishes. I very much appreciated the task to develop experimental protocols adapted to various models of biomineralisation. Accordingly, I significantly expanded my knowledge of the biomineralization processes in these biological models and gained a high level of expertise in biochemistry and molecular biology

techniques. My PhD researches has resulted in 9 peer-reviewed scientific papers, among which I am the first author on 3 papers, and 6 presentations at both national and international conferences.

Following the defence of my PhD thesis on 28 June 2011, I continued to work as a research associate with Dr. Frédéric Marin on other aspects of the biomineralization process that I discovered during my PhD research. In addition, I obtained a grant from the European Calcified Tissue Society allowing me to collaborate with the team of Dr. Daniel Jackson at the University of Gottingen (Germany) where I received training on an advanced *in situ* hybridization approach. This collaboration resulted in the publication of an article in a peer-reviewed international journal in 2015.

In 2012, I started a one-year position as a junior lecturer at the University of Limoges (France) that was extended for 6 months, where I taught biodiversity, developmental biology, palaeobiology to Bachelor and Master students. For this position, my research expertise and my extensive knowledge in various biological systems, were considerable advantages.

In my current position as a post-doctoral research fellow in the Scientific Centre of Monaco, I have applied my knowledge of biochemical and molecular biology approaches to conduct experiments aimed to understand biomineralisation in the precious red coral, an ecologically and economically highly valuable species. This research project is essential to my scientific career due to the new knowledge gained on the biomineralization process in metazoans and the improvement of experimental techniques as *in situ* hybridisation, proteomic analyses and *in vitro* crystallisation. Three papers are currently in progress and will be soon submitted to peer-reviewed international journals.

As I am very passionate about biomineral structures and the underlying biomineralisation processes, my career objectives are to investigate these. A scientific project in the internationally renowned team of Professor Joël Gautron is an opportunity to work on another famous biomineralisation structure, the chicken eggshell. I am really interested in studying this model to better understand the origin of biomineral diversity and of the biomineralization processes, but I feel also concerned about the quality and the safety of the eggs for consumers.

For this mobility project, my high researcher quality and high level of skills are essential (1) to determine key genes and key proteins that will enable the selection of hen strains, which could produce more solid and safe eggs and (2) to improve the knowledge of the eggshell formation. I am confident that my significant experience in biomineralisation research and my strong academic track record, as indicated by the substantial number of scientific publications relative to the stage of my career, demonstrates that I possess the skills, expertise and knowledge for the present mobility project that I submitted to AgreenSkills. In the medium to long term, I endeavour to establish my own laboratory in the field of biomineralisation, allowing me to pursue my personal research interests and to develop new models with high impact in the scientific and in industrial fields.

Education and training

Location and dates	University of Burgundy, 6 boulevard Gabriel, France 10/2007 – 06/2011
Title of qualification awarded	PhD in Biology
Principal subjects/occupational skills covered	<p>Carbonic anhydrase in calcium carbonate biomineralisations: Expression, Function and Evolution.</p> <ul style="list-style-type: none"> - Biochemical characterisation of carbonic anhydrases in the shell of molluscs and gastroliths of crayfishes - Expression of genes encoding carbonic anhydrases in target tissues of molluscs and crayfishes - Molecular evolution of identified carbonic anhydrases in the metazoan biomineralisation context <p>Supervisors: Dr Gilles Luquet from October 2007 to March 2010 and Dr. Frédéric Marin from October 2007 to June 2011.</p> <p>Skills: molecular biology (RNA extraction, RT-PCR, qRT-PCR, cDNA libraries production and screening), biochemistry (electrophoresis, western blot, immunolabeling, <i>in vitro</i> crystallisation, enzymatic activity test), microscopy and mineralogy analyses (scanning electronic, X-ray diffraction).</p>
Name of Institute	UMR CNRS 6282 Biogéosciences, University of Burgundy

Location and dates	University of Pierre and Marie Curie, 6 place Jussieu, France 01/2007 – 06/2007
Title of qualification awarded	MSc in Systematic, Evolution and Palaeontology
Principal subjects/occupational skills covered	<p><u>MSc 2 training at the UMR 7193 Biomineralisations & sedimentary environments - University of Pierre and Marie Curie</u></p> <p>Title: Prediction of bone growth rate in extant amniotes using a palaeobiological model</p> <p>Supervisor: Pr. Jorge Cubo Laboratory UMR 7193 – Team of biomineralisation</p> <p>Skills: dissection, cross-section of bone tissue, microscopy, morphometric analysis on computer (using Photoshop and ImageJ), statistical and phylogenetic analyses (using PhyML, MrBayes)</p>
Name of Institute	University of Pierre and Marie Curie

Location and dates	University of Pierre and Marie Curie, 6 place Jussieu, France 04/2006 – 06/2006
Title of qualification awarded	MSc in Systematic, Evolution and Palaeontology
Principal subjects/occupational skills covered	<p><u>MSc 1 training at the UMR 7193 Biomineralisations & sedimentary environments - University of Pierre and Marie Curie</u></p> <p>Title: Relation between metabolic rate and bone growth rate in extinct amniotes</p>

	<p>Supervisors: Pr. Jorge Cubo and Dr. Laëtitia Montes Laboratory UMR 7193 – Team of biomineralisation</p> <p>Skills: dissection, cross-section of bone tissue, microscopy, morphometric analysis on computer (using Photoshop and ImageJ), statistical and phylogenetic analyses (using PhyML, MrBayes)</p>
Name of Institute	University of Pierre and Marie Curie

Work experience

Location and dates	8 quai Antoine 1 ^{er} , 98000 Monaco Since 01/02/2014
Occupation or position held	Post-doctoral Researcher
Main activities and responsibilities	<ul style="list-style-type: none"> - Researcher in biochemistry and molecular biology in the Physiology/Biochemistry Team. The aim of the postdoctoral project is to characterise the organic matrix presents in the biominerals (sclerites and axial skeleton) of the precious Mediterranean red coral. - Skills: biochemistry, proteomic analysis, <i>in vitro</i> crystallisation, microscopy-energy dispersive X-ray spectroscopy, scanning electron microscopy, microscopy Fournier transformed-infra red, RT-PCR, <i>in situ</i> hybridisation. - Supervising of a 1st year Master student (Pauline Bergstein from 01/05/2014 to 30/06/2014) and a 1st year student in engineering (Charlotte Brévert from 15/05/2015 to 15/07/2015).
Name of employer	Scientific Centre of Monaco

Location and dates	UMR 1061 INRA Unity of Animal Genetics - University of Limoges, 87000 Limoges, France From 01/09/2012 to 31/01/2014
Occupation or position held	Young Lecturer
Main activities and responsibilities	<ul style="list-style-type: none"> - Teaching of animal and vegetal developmental biology, biodiversity, bioinformatics, palaeobiology to Bachelor and Master students. - Researcher in molecular and cell biology in the UMR 1061 INRA Unity of Animal Genetics. - Skills: preparation and creation of courses and exams, PCR, cell culture.
Name of employer	University of Limoges

Location and dates	University of Gottingen, Germany From 01/08/2012 to 15/08/2012
Occupation or position held	Internship with the ECTS grant
Main activities and responsibilities	<ul style="list-style-type: none"> - Localisation of carbonic anhydrase gene expression in the mantle tissue and larvae of the European abalone <i>Haliotis tuberculata</i>. - Skills: <i>in situ</i> hybridisation

Name of employer	Grant from European Calcified Tissue Society
Location and dates	UMR CNRS 6282 Biogéosciences - University of Burgundy, 21000 Dijon, France From 30/06/2011 to 30/06/2012
Occupation or position held	Internship with the ECTS grant
Main activities and responsibilities	<ul style="list-style-type: none"> - Research on the organic matrix of the shell of the European abalone <i>Haliotis tuberculata</i>. - Skills: RNA extractions, RT-PCR, sequencing, biochemical characterisation
Name of employer	Volunteering

Location and dates	UMR CNRS 6282 Biogéosciences - University of Burgundy, 21000 Dijon, France From 01/03/2011 to 30/04/2011
Occupation or position held	Supply teacher
Main activities and responsibilities	- Teaching of Invertebrate Palaeontology to Bachelor students in Sciences.
Name of employer	University of Burgundy

Languages

Mother tongue(s)	French				
Other language(s)	Understanding		Speaking		Writing
<i>European level (*)</i>	Listening	Reading	Spoken interaction	Spoken production	
English	C1	B2	B2	B2	B2
Spanish	B1	B1	B1	B1	B1
<i>Add more languages if relevant</i>	(*) Common European Framework of Reference for Languages http://europass.cedefop.europa.eu/en/resources/european-language-levels-cefr				

Academic Record

Add as many lines as needed, delete fields which are not relevant to your profile

Publications	<p>Accepted, in press and published articles / papers:</p> <ol style="list-style-type: none"> 1. Le Roy, N., Jackson, D.J., Marie, B. Ramos-Silva, P. and Marin, F. (2015). Carbonic anhydrase and metazoan biocalcification: a focus on molluscs. <i>Key Engin Mater</i>, 672: 151-157. 2. Le Roy, N., Jackson, D.J., Ramos-Silva, P., Marie, B. and Marin, F. (2014). Evolution of α-carbonic anhydrases in relation to metazoan CaCO_3 biomineralization. <i>Front Zool</i>, 11: 75. 3. Marin, F., Le Roy, N., Marie, B., Ramos-Silva, P., Wolf, S., Benhamada, S., Guichard, N. and Immel, F. (2014). Synthesis of calcium carbonate biological materials: how many proteins are needed? <i>Key Eng Mat</i>, 614: 52-61.
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	<ol style="list-style-type: none"> 4. Luquet, G., Fernández, M.S., Badou, A., Guichard, N., Le Roy, N., Corneillat, M., Alcaraz, G. and Arias, J.L. (2013). Comparative ultrastructure and carbohydrate composition of gastroliths from astacidae, cambaridae and parastacidae freshwater crayfish (Crustacea, Decapoda). <i>Biomolecules</i>, 3: 18-38. 5. Legendre, L., Le Roy, N., Martinez-Maza, C., Montes, L., Laurin, M. and Cubo, J. (2013). Phylogenetic signal in bone histology of amniotes revisited. <i>Zool Scr</i>, 42: 44-53. 6. Le Roy, N., Marie, B., Gaume, B., Guichard, N., Delgado, S., Zanella-Cléon, I., Becchi, M., Auzoux-Bordenave, S., Sire, J.-Y. and Marin, F. (2012). Identification of two carbonic anhydrases in the shell-forming mantle of the European abalone <i>Haliotis tuberculata</i> (Gastropoda, Haliotidae): phylogenetic implications. <i>J Exp Zool B</i>, 318: 353-367. 7. Ramos-Silva, P., Ben Hamada, S., Le Roy, N., Marie, B., Guichard, N., Zanella-Cléon, I., Plasseraud, L., Corneillat, M., Alcaraz, G., Kaandorp, J. and Marin, F. (2012). Novel molluskan biomineralization proteins retrieved from proteomics: a case study with Upsalin. <i>ChemBioChem</i>, 13(7): 1067-1078. 8. Cubo, J., Le Roy, N., Martinez-Maza, C. and Montes, L. (2012). Evolution of bone growth rate in Archosaurs. <i>Paleobiology</i>, 38: 335-349. 9. Marin, F., Le Roy, N. and Marie, B. (2012). The formation and mineralization of mollusk shell. <i>Frontiers in Biosciences S4</i>: 1099-1125. 10. Marie, B., Le Roy, N., Zanella-Cléon, I., Becchi, M. and Marin, F. (2011). Molecular evolution of mollusc shell proteins: Insights from proteomic analysis of the edible mussel <i>Mytilus</i>. <i>J Mol Evol</i>, 72: 531-546. 11. Marie, B., Zanella-Cléon, I., Le Roy, N., Becchi, M., Luquet, G. and Marin, F. (2010). Proteomic analysis of the acid-soluble nacre matrix of the bivalve <i>Unio pictorum</i>: detection of novel carbonic anhydrase and putative protease inhibitor proteins. <i>ChemBioChem</i>, 11: 2138-2147. 12. Montes, L., Le Roy, N., Perret, M., Buffrenil, V. de, Castanet, J. and Cubo, J. (2007). Relationships between bone growth rate, body mass and resting metabolic rate in growing amniotes: a phylogenetic approach. <i>Biol J Linn Soc</i>, 92(1): 63-76. <p>Submitted publications:</p>
Presentations as invited speaker	
Authored books or book chapter(s)	<ol style="list-style-type: none"> 1. Marin, F., Marie, B., Ben Hamada, S., Silva, P., Le Roy, N., Guichard, N., Wolf, S., Montagnani, C., Joubert, C., Piquemal, D., Saulnier, D. and Gueguen, Y. (2013). "Shellome": proteins involved in mollusc shell biomineralization – diversity, functions. In <i>Recent Advances in Pearl Research</i>. Edited by Watabe S, Maeyama K, Nagasawa H. p. 149-166.
Participation in open calls for proposals as contributor or leader	
Graduate teaching as lecturer or training coordinator	<ul style="list-style-type: none"> - Young lecturer from 01/09/2012 to 31/01/2014 at the University of Limoges (France)

	<ul style="list-style-type: none"> - Supply teacher from 01/03/2011 to 30/04/2011 at the University of Burgundy (France)
Awards and prizes, if any	<ul style="list-style-type: none"> 2009 - Price for poster presentation in the JFBTM congress (national congress) 2010 - Price for poster presentation in the Young Researcher Meeting (national congress) 2010 - Price for poster presentation in the JFBTM congress (national congress)

Collaboration and Networking

Participation in collaborative projects funded by competitive programmes	<ul style="list-style-type: none"> - <u>August 2012</u>: Grant from the European of Calcified Tissue Society for a collaboration with the laboratory of Dr. D. Jackson (University of Gottingen, Germany) – Project: Carbonic anhydrases in the biomineralisation of the shell of <i>Haliotis tuberculata</i>: an <i>in situ</i> characterisation. - <u>from October to December 2009</u>: participation to a collaboration with the laboratory of Dr. J-Y Sire funded by the ANR project ACCRO-Earth coordinated by Dr. G. Ramstein. – Project: identification of genes encoding carbonic anhydrases in the mantle tissue of the freshwater mussel. - <u>October 2008</u>: participation in the collaboration with the laboratory of Pr. J-L. Arias (University of Chile) <i>via</i> the ECOS/CONYCIT Project awarded by the French Ministry of Foreign Affairs and the Chilean Ministry of Research coordinated by Pr. G. Luquet and Dr. M-S. Fernandez. – Project: biochemical and ultrastructural characterisation of gastroliths of the red claws crayfish <i>Cherax quadricarinatus</i>.
Partnerships or experience with industry	None
University or post-graduate programme leader	None
Graduate teaching as lecturer or training coordinator; PhD supervision	<p>Graduate teaching as junior lecturer:</p> <ul style="list-style-type: none"> - Young lecturer from 01/09/2012 to 31/01/2014 at the University of Limoges (France) - Supply teacher from 01/03/2011 to 30/04/2011 at the University of Burgundy (France) <p>Supervision of student:</p> <ul style="list-style-type: none"> - <u>from 15/05/2015 to 15/07/2015</u>: Supervising Charlotte Brévert a 1st year student in engineering – Role of the organic matrix extracted from the biominerals of the red coral in the incorporation of the pigment called canthaxanthin in calcium carbonate crystals (Scientific Centre of Monaco). - <u>from 01/05/2014 to 30/06/2014</u>: Supervising of Pauline Bergstein a 1st year Master student – Study of the influence of organic matrix extracted from the biominerals of the red coral in the <i>in vitro</i> crystallisation of calcium carbonate (Scientific Centre of Monaco). - <u>from 01/01/2010 to 01/06/2010</u>: Training to molecular biology techniques of Paula Ramos-Silva a PhD student (Biogéosciences,

	<p>University of Burgundy, France)</p> <ul style="list-style-type: none"> - <u>from 01/07/2009 to 31/08/2009</u>: supervising of Cédric Talobre 1st year Bachelor student – Study of the role of clove oil to anaesthetise freshwater mussels (Biogéosciences, University of Burgundy).
Membership of professional bodies and committees	None

Research management, Technology transfer, and Communication

Team management	None
Technological platform management	None
Consultancy for the public or private sector	None

Other experience and skills relevant to the application	<p>Scientific popularisation in different scientific meetings for dissemination and communication of science to non-scientific persons.</p> <ul style="list-style-type: none"> - <u>from April 2008 to April 2010</u>: 7 weeks of participation to science popularisation organised by the Experimentarium association at the University of Burgundy (France) - <u>October 2013</u>: participation to the “Fête de la Science” in Limoges (France) - <u>April 2015</u>: 1 week of participation to science popularisation organised by the association ScienceArt at La Coquille (France)
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Scientific References

Full name	Doctor Frédéric MARIN
Position	Research Director CNRS
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Full name	Doctor Sylvie TAMBUTTE
Position	Research Director and Head of the team Physiology/Biochemistry
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Full name	Professor Denis ALLEMAND
Position	Scientific Director of the Scientific Centre of Monaco
Institution	Scientific Centre of Monaco
Email address	allemand@centrescientifique.mc

How did you hear about AgreenSkills programmes?

	<p>The first time I heard about Agreenskills programmes was this summer 2015 from colleagues of the Scientific Centre of Monaco. An ancient PhD student of the laboratory talked about this programme with Pr. Denis Allemand and Dr. Sylvie Tambutté who informed me. Then I contacted Pr. Joël Gautron to discuss the possibility to submit a post-doctoral mobility project to AgreenSkills.</p>
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