

Dr Sophie BERLAND, PhD - Research Engineer

Organismic and Evolutionary Biology

2020

- ☐ National Museum of Natural History of Paris, France
- ☐ Biology of Aquatic Organisms and Ecosystems - BOREA Laboratory
- ☐ Birth date 28/11/1961
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Position

Civil Servant - Permanent research engineer at the National Museum of Natural History (MNHN) Paris France, Department of Aquatic living Sciences, CNRS-Mixed Research Unit.

Senior Research Engineer in the 'BIOdiversity, Plasticity, Adaptation and Conservation' (BIOPAC) research team.

Scientific and societal activities

Current knowledge and research domain

1993-2020

Biom mineralizations : morphology and chemical composition responses to environmental (external) factors - studies based on analytic spectroscopy, isotope geochemistry and proteomics methods.

Mineral - molecule interactions and cell commitment playing significant roles in determining the development of calcified biom mineralized systems in different living species (mollusk shell, foraminifer test, fish otolith).

Identification of primary sequences of the proteome associated in the biom mineralization process and control.

Scientific programme

2013-2020

At the scale of the individual, community or species, learning from biom minerals as repository models of environmental information alongside with life cycle changes, evolution arrangements from lineage or adaptive acquisition.

Other scientific domain of activities • Collaborations

2010-2020

Academic national and international collaborations for studying shell microarchitecture and composition.

- ☐ impact of the variation in sulfate concentration on the biology and bio-calcification of the foraminifers : Coupling geochemical and biological data on foraminifer biom mineralization as proxies for environmental changes reconstruction purpose.
- ☐ adaptive responses of species to environmental heterogeneity and ecophenotype formation in a sub-Antartic land snail » - covered fields of research : ecology, biom mineralization, soil mineralogy
- ☐ molecular composition of the organic matrix in calcitic biom mineralization of foraminiferan, unicellular eukaryotic microorganisms that produce calcified shell likely biologically controlled similar to shell formation in metazoan taxa

Student supervision (short list)

☐ Leadership research supervision

co-PI and PhD thesis supervisor in part of an ITN (*Initial Training Network*) programme entitled 'Calcium in a Changing Environment' (CaCHE) to identify novel genes/proteins that underpin responses to environmental changes in commercially exploited molluscan species as model organisms. Work package and PhD thesis on 'Shell proteomics' supervision (2017).

PhD training course included in a funded international exchange research programme 'MarBiotech' (China-Germany-France) for the proteomic analysis of the organic matrix in a freshwater bivalve shell (2011-2014)

▣ PhD thesis secondary supervisor

a work on the identification of mollusc shell matrix proteins efficient on bone cell lineage commitment, for which the PhD student received a national Early Researcher Award (2008)

Referee activities

- ▣ Guest referee for the Int Conf on Biomedical Engineering and Biotechnology (iCBEB) 2013 - 2016
- ▣ Requested to referee manuscripts e.g. J. Morphol Impact Factor-(IF-1,55), MARGEN (IF1,7), CBC (IF 3,08), FEBS (IF 3,9), Scientific Reports (IF 5,228), Marine Environmental Research (IF3.42), PeerJ (IF2,38)
- ▣ Organizing committee member for a great exhibition at the National Muséum of Paris, France 'Pearls, a natural history' (2009)

Education and other qualifications

PhD in Experimental Neuroembryology on the evolution of sensory nervous system at Denis Diderot Paris 7 University (1991)

Continuing professional development e.g. NGS data and Bioinformatics (2018)- MEB-EDX (2009) ; Bioinformatics (2011 ; 2014), PhD project management (2013) ; Morphometry & Principal Component analysis (2014) Occupational healthcare and security (2015)

Publications - Communications

> Peer reviewed references (Short list and selection)

- Arivalagan, J., Marie, B., Chiappetta, G., Vinh, J., Gallet, X., Lebon, M., M'zoudi, S., Dubois, P., Berland S., Marie A. (2020) Deciphering shell proteome within different Baltic populations of mytilid mussels illustrates important local variability and potential consequences in the context of changing marine conditions. *Science of The Total Environment*, Vol.745, doi : 10.1016/j.scitotenv.2020.140878.
- Clark, M.S., Peck, L.S., Arivalagan, J., Backeljau, T., Berland, S., Cardoso, J.C.R., Caurcel, C., Chapelle, G., De Noia, M., Dupont, S., Gharbi, K., Hoffman, J.I., Last, K.S., Marie, A., Melzner, F., Michalek, K., Morris, J., Power, D.M., Ramesh, K., Sanders, T., Sillanpää, K., Sleight, V.A., Stewart-Sinclair, P.J., Sundell, K., Telesca, L., Vendrami, D.L.J., Ventura, A., Wilding, T.A., Yarra, T. And Harper, E.M. (2020) Deciphering mollusc shell production: the roles of genetic mechanisms through to ecology, aquaculture and biomimetics. *Biol Rev.* doi:10.1111/brv.12640
- Marie B., Arivalagan J., Mathéron L., Bolbach G., Berland S., Marie A., Marin F. (2017). Deep conservation of bivalve nacre proteins highlighted by shell matrix proteomics of the Unionoida *Elliptio complanata* and *Villosa lienosa*. *Journal of the Royal Society Interface*, Vol.14,
- Arivalagan, J., Yarra, T., Marie, B., Sleight, V. A., Duvernois-Berthet, E., Clark, M., Berland S. (2016). Insights from the shell proteome: biomineralization to adaptation. *Molecular Biology and Evolution*, vol.34 , pp. 66-77
- Arivalagan J, Marie B, Sleight VA, Clark MS, Berland S, Marie A. (2016) Shell matrix proteins of the clam, *Mya truncata*: Roles beyond shell formation through proteomic study. *Mar Genomics*. 27: 69-74. doi: 10.1016
- Sleight VA, Thorne MA, Peck LS, Arivalagan J, Berland S, Marie A, Clark MS. (2016) Characterisation of the mantle transcriptome and biomineralisation genes in the blunt-gaper clam, *Mya truncata*. *Mar Genomics*. 2016 27: 47-55. doi: 10.1016
- Marie B., Arivalagan J., Dubost L., Berland S., Marie A., Marin F. (2015) Unveiling the evolution of bivalve nacre proteins by shell proteomics of Unionoidae. *Key Engineering Materials* Vol. 672 (2015) pp 158-167
- Sabbatini A., Bédouet L., Marie A., Bartolini A., Landemarre L., Weber M., Berland S., Zito F. and Vénec-Peyré M.-T. (2014) Proteomic and biochemical analysis of shell deposited sequence tags and their sugar moieties in the benthic foraminifer *Schlumbergerella floresiana* (Schlumberger, 1896). *Geobiology*. 2014 Apr 2. doi: 10.1111/gbi.12085

- Charrier M, Marie A, Guillaume D, Bédouet L, Le Lannic J, et al. (2013) Soil Calcium Availability Influences Shell Ecophenotype Formation in the Sub-Antarctic Land Snail, *Notodiscus hookeri*. *PLoS ONE* 8(12): e84527. doi:10.1371/journal.pone.0084527
- Berland S., Ma Y., Marie A., Andrieu J.P., Bédouet L., Feng Q.L (2013). Proteomic and profile analysis of the proteins laced with aragonite and vaterite in the freshwater mussel *Hyriopsis cumingii* shell biominerals. *Protein Pept Lett.* in press
- Marie A., Alves S., Marie B., Dubost L., Bédouet L., Berland S. (2012). Analysis of low complex region peptides derived from mollusk shell matrix proteins using CID, HCD and ETD on a LTQ-Orbitrap: implications for peptide to spectrum match. *Proteomics*, 12: 1–7
- Bédouet L., Marie A., BERLAND S., Marie B., Auzoux-Bordenave S., Marin F., Milet C. (2012) Proteomic Strategy for Identifying Mollusc Shell Proteins Using Mild Chemical Degradation and Trypsin Digestion of Insoluble Organic Shell Matrix: A Pilot Study on *Haliotis tuberculata*. *Marine Biotechnology*. 14: 446–458
- BERLAND S., Marie A., Duplat D., Milet C., Sire J-Y., Bédouet L. (2011) Coupling proteomics and transcriptomics for the identification of novel and variant forms of mollusk shell proteins: a study with *P. margaritifera*. *ChemBioChem* 12: 950-961.
- Auzoux-Bordenave S., Badou A., Gaume B., Berland S., Helléouet M.-N., Milet C., Huchette S., (2010). Ultrastructure, chemistry and mineralogy of the growing shell from the abalone *Haliotis tuberculata*, *J. Structural Biology*, 171: 277-290.
- Duplat D, Gallet M, Berland S, Marie A, Dubost L, Rousseau M, Kamel S, Milet C, Brazier M, Lopez E, Bedouet L (2007) The effect of molecules in mother-of-pearl on the decrease in bone resorption through the inhibition of osteoclast cathepsin K. *Biomaterials* 28:4769-4778
- Duplat D, Gallet M, Berland S, Marie A, Dubost L, Rousseau M, Kamel S, Milet C, Brazier M, Lopez E, Bédouet L. 2007. The effect of molecules in mother-of-pearl on the decrease in bone resorption through the inhibition of osteoclast cathepsin K. *Biomaterials* 28:4769-4778
- Duplat D., A. Chabadel, M. Gallet, S. Berland, L. Bédouet, M. Rousseau, S. Kamel, C. Milet, P. Jurdic, M. Brazier. 2007. The in vitro osteoclastic degradation of nacre. *Biomaterials*, 28: 2155-2162.
- Bedouet L, F. Rusconi, M. Rousseau, D. Duplat, A. Marie, L. Dubost, K. Le Ny, Berland S, J. Peduzzi, E. Lopez (2006) Identification of low molecular weight molecules as new components of the nacre organic matrix. *Comparative Biochemistry and Physiology B*, 144 (4): 532-543.
- Jolly C., Berland S, C. Milet, S. Borzeix, E. Lopez, D. Doumenc (2004) Zona localization of shell matrix proteins in the mantle of *Haliotis tuberculata* (Mollusca, Gastropoda). *Marine Biotechnology*, 6: 541-551.
- Berland S., O. Delattre, S. Borzeix, Y. Catonne, E. Lopez (2005) Nacre/bone interface changes in durable nacre endosseous implants in sheep. *Biomaterials*, 26(15): 2767-2773.
- Atlan G., O. Delattre, Berland S, A. Le Faou, G. Nabias, D. Cot, E. Lopez (1999) Interface between bone and nacre implants in sheep. *Biomaterials*, 20: 1017-1022.

> Conferences - Presentations (short list)

- Berland S., Arivalagan, J, Feunteun, E, Bartolini A., Thaler C., Marie A. Reading between the lines in biomineralizations reaching out for clues of environmental impact : case reports from studies based on analytic spectroscopy, isotope geochemistry and proteomics methods. 15th International Symposium on Biomineralization. BIOMIN XV. Munich Germany 2019.
- Thaler C, Dellinger M, Paris G, Berland S, Marie A, Dissard D, Bartolini A. Sulfate incorporation in foraminifera cell and test : mechanisms and validation of a proxy for past seawater composition. 5th International Paleontological Congress Paris, 9-13 July 2018.

