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Charlotte Sirot

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RESEARCH INTERETS

Effects of human activities on aquatic populations (change in environmental parameters, effect of fishing activities)

EDUCATION

2011 - 2014 **Ph.D. in fish ecology** (*obtained on December 2014*),
University of Montpellier II, France

2003 - 2012 **Doctor of veterinary medicine** with honors,
Veterinary School of Maisons-Alfort, Paris, France

2008 - 2009 **Master of ecology** with honors,
« Compared biology and physiology, environment adaption »,
Univ. Pierre & Marie Curie, Paris VI, France

CURRENT POSITION

August 2016 - August 2018 Post-doc (Marie Curie Scholarship) in Dr. Grønkjear's team (**Department of Bioscience - Aquatic Biology**), Denmark

Project: Understanding the effects of fishing activities on fish trophic ecology

Objectives: Modelling the effects of fishing activities on fish trophic ecology (archived otolith $\delta^{13}C$ and $\delta^{15}N$).

PAST RESEARCH EXPERIENCES

2011 - 2014 Ph.D. in Laboratoire ECOSYM, UMR 5119
University of Montpellier II, France

Title: Using biological traits to understand demographic responses of lagoon fishes to environmental changes
Scientific direction: Dr Panfili J. (IRD) and Dr Darnaude A.M. (CNRS)

Aim: Investigate the role of life history traits and of their temporal changes in fish demographic trajectories.
Context: Fish community from the tropical lagoon of Terminos (Mexico), which experienced strong human-mediated environmental changes (ANR BIODIVNEK)

In a first approach, I developed a multivariate index to characterize fish demographic variations accounting for changes in both species abundance and occurrence. Then, I demonstrated that temporal variations of this index can be accurately predicted by fish life history traits (methods: classifications with mainly FDA and machine learning with Random Forest).

In a second approach, I investigated temporal modifications of biological traits and their implications for fish demography. Thanks to a collection of past (1980) and present otoliths (2011), I monitored temporal variations of growth, migration and diet in an emblematic declining species of Terminos *Bairdiella chrysoura* (study of otolith growth, elemental microchemistry and $\delta^{13}C$ and $\delta^{15}N$ composition). This study detected a diet modification and a growth decrease probably in relation with a shift of the habitat use at juvenile stage. These modifications of life history traits directly linked to individual fitness, allowed to make hypothesis about mechanisms leading to *B. chrysoura*'s decline and thus to provide recommendations for population protection.

2008 - 2009 Master internship – Laboratoire BOREA
Muséum national d'Histoire naturelle, Paris, France

Title: Comparative analysis of tropical insular amphidromous fish otoliths: Are otoliths reflecting environmental quality?
Scientific direction: Pr Keith P. (MNHN) and Dr Monti D. (Université des Antilles)

Aim: Evaluate the effects of water pollution (Chlordecone, organochlorine class) on life history traits of an amphidromous fish.
Context: *Eleotris perniger*, amphidromous fish from Guadeloupe, French Caribbean Islands.

Thanks to otolith micro and macro-structures, I compared growth and pelagic larval duration between individuals from polluted and unpolluted rivers. This study showed that water pollution does not affect pelagic larval duration but highlighted a significant growth decrease for individuals living in polluted rivers during their post-recruitment stage.

SCIENTIFIC COMMUNICATIONS

- **Publications published**

Sirot C., Villéger S., Mouillot D., Darnaude A.M., Ramos-Miranda J., Flores-Hernandez D. and Panfili J. Combinations of biological attributes predict temporal dynamics of fish species in response to environmental changes. *Ecological Indicator 48(2015)* *http://dx.doi.org/10.1016/j.ecolind.2014.07.038*

Sirot C., Darnaude A.M., Guilhaumon F., Ramos-Miranda J., Flores-Hernandez D. and Panfili J. Linking temporal changes in the demographic structure and individual growth to the decline in the population of a tropical fish. *Estuarine Coastal and Shelf Science 165(2015) 166-175* *http://dx.doi.org/10.1016/j.ecss.2015.05.012*

Sirot C. Ph.D. abstract: **"**Biological traits for understanding the demographic responses of lagoon fishes to environmental pressures". *Cybium 40:3 (2016)*

Sirot C., Grønkjear P., Brøgger Pedersen J., Zetina-Rejon M., Tripp-Valdez A., Ramos-Miranda J., Flores-Hernandez D., Panfili J. & Darnaude A.M. Using otolith organic matter to detect diet shifts in *Bardiella chrysoura,* during a period of environmental changes. *Marine Ecology Progress Series* https://doi.org/10.3354/meps12166.

Sirot C., Ferraton F., Childs A., Tournois J., Panfili J. Guilhaumon F. & Darnaude A.M. *ElementR*, a reactive interface for otolith microchemistry data preparation. (*under review for Methods in Ecology and Evolution (2017) 8:1659–1667.* https://doi.org/10.1111/2041-210X.12822

- **Publications in preparation**

Sirot C., Labonne M., Panfili J., Ramos-Miranda J., Flores-Hernandez D. & Darnaude A.M. Mid-term change in the nursery grounds of a tropical species (*Bairdiella chrysoura*) validated through otolith microchemistry (*in prep.)*

Sirot C., Neuheimer A. & Grønkjear P. About the mechanisms that conduct fishing activities to change trophic ecology of aquatic ecosystems (*in prep.)*

Sirot C., Neuheimer A. & Grønkjear P. Change in trophic ecology of Faroe Haddock (*Melanogrammus aeglefinus) (in prep.)*

Sirot C., Brøgger Pedersen J., Posrby Brændgaard T., Steingrund P., Ofstad L.H. , Homrum E. & Grønkjear P. Impact of fishing activities on trophic functioning: Modelling the effects of fishing activities and environmental change on $\delta^{13}C$ and $\delta^{15}N$ of three commercials Faroe species thanks to archived otolith (1950-2014) (*in prep.)*

- **Oral communications & Posters**

Sirot C., Grønkjear P., Brøgger Pedersen J., Zetina-Rejon M., Tripp-Valdez A., Ramos-Miranda J., Flores-Hernandez D., Panfili J. & Darnaude A.M. (2014) Using otoliths to link population decline to modification in diet and growth in a tropical fish species (*Bairdiella chrysoura*, L., Sciaenidae). *5th International Otolith Symposium 2014, Mallorca, Spain. – Oral communication.*

Sirot C., Darnaude A.M, Ramos-Miranda J., Flores-Hernandez D. & Panfili J. (2014) Past and recent growth patterns in two species with contrasting demographic responses to environmental changes in a tropical lagoon*. 5th International Otolith Symposium 2014, Mallorca, Spain. – Oral communication.*

Ferraton F., **Sirot C.**, Guilhaumon F., Tournois J., Childs A., & Darnaude A.M. (2014) Optimising LA-ICPMS rastering protocols and data reduction procedures to produce otolith micro-chemical signatures allowing robust reconstruction of fish past habitats. *5th International Otolith Symposium 2014, Mallorca, Spain. – Poster*

Sirot C., Grønkjear P., Brøgger Pedersen J., Panfili J., Darnaude A.M. (2013) Isotopic signatures in $\delta^{13}C$ and $\delta^{15}N$ from otolith proteins as indicator of actual and past trophic level. *Sclerochronology meeting, Rennes, France – Oral communication.*

Ferraton F., **Sirot C.**, Guilhaumon F., Tournois J., Childs A., & Darnaude A.M (2013). LA ICP-MS raster analysis: protocole optimization and data processing data automation for studying fish migrations through elemental microchemistry of otoliths. *Sclerochronology meeting, Rennes, France – Oral communication*

- **R packages**

elementR: A Set of R6 Classes & a Shiny Application for Reducing Elemental LA-ICPMS Data from Solid Structures
(https://cran.r-project.org/web/packages/elementR/index.html)
Authors: **Sirot C.**, Guilhaumon F.

gRowth: (to be released in autumn) an R package for helping to read otolith growth
(https://github.com/charlottesirot/gRowth)
authors: **Sirot C.**

AWARD

2013 (November) VETERINARY THESIS AWARD: Bronze medal

RESEARCH GRANTS

2011 (July) 61,000€ from the French Ministry of Education and Research
→ Ph.D. financing

2012 (November) 2,000€ from the European Cooperation in Science and Technology institution – COST action
→ Financing the development of the collaboration between the host institution and the experienced researcher

2016 (January) 200,195€ Marie Skłodowska-Curie Actions – Individual Fellowships
→ Financing 2 years post-doctoral research (Denmark)

STUDENT SUPERVISION

2013 (May – July) **Chloe Maladry**
(3rd year B.Sc, Univ. of La Rochelle, France)

2012 (May - August) **Fanny Witkowsky**
(3rd year B.Sc, Univ. of Montpellier II, France)

ADDITIONAL SKILLS

Teaching activities:
- Effect of fishing activities (Aarhus university – Master)
- Internal seminars: R and biostatistics (Aarhus university)

Associative activities :
- Member of Shark Protection Association (A.I.L.E.R.O.N. – 2011-2012)
- Ph.D. representative in the Concil of the Doctoral School (SIBAGHE, 2011- 2013)
- Ph.D. representative in the Scientific Concil of the OSU-OREME (Observatoire de Recherche Méditerranéen de l'Environnement, 2011 – 2013)

Sport:

Scuba Diving (2nd level CMAS), Rock climbing