



Co-Operation for Restoring
Cockle Shellfisheries
and its Ecosystem Services
in the Atlantic Area (AA)

POSTDOC PROPOSITION

Quantification of the effect of cockle population in European coastal habitats as a ecosystem engineer : Experimental study of bioturbation activity on sediment biogeochemistry, nutrient uptake for microphytobenthic primary production of European intertidal flats, sediment erodability and trophic interactions.

KEYWORDS: BIOGEOCHEMISTRY / BIOTURBATION / PRIMARY PRODUCTION / MICROPHYTOBENTHOS / ERODABILITY

LOCATION of the postdoc: University of Caen CAEN (UMR BOREA "Biologie des Organismes et Ecosystèmes Aquatiques" MNHN, UPMC, UCBN, CNRS-7208, IRD-207)

NAME OF THE PROJECT: INTEREG Atlantic Area COCKLES

Gross salary : 2 648 € / month

The University of Caen (UMR BOREA - Francis ORVAIN) is recruiting a postdoctoral fellow for 15 months from November 2018 to February 2020) to work on experiments, data processing and modeling in benthic functional ecology and in particular on the interactions between the bioturbation behavior of this bivalve and other ecological components (biogeochemistry, primary microphytobenthic production, erodibility, microbial community, virology). The candidate must be competent in ecophysiology of benthic organisms (bivalves and benthic diatoms) at the water sediment interface in relation to the physical-biology coupling (and physical sediment transport models). He/She will also be led to carry out experiments also in connection with microbial and viral ecology in addition. This POSTDOC mission is funded by the INTEREG Atlantic Area - COCKLES project under the supervision of F. ORVAIN (University of Caen ; <https://borea.mnhn.fr/fr/users/francis-orvain>) and in partnership with O. MAIRE (UMR EPOC, University of Bordeaux 1, Arcachon marine station, http://www.epoc.u-bordeaux.fr/index.php?lang=fr&page=fiche_permanents&id=omaire) and Laurence JONES (University Of BANGOR, Wales; <https://www.ceh.ac.uk/staff/laurence-jones>).

The INTEREG Cockles project aims to improve the fundamental knowledge of the functional ecology of the species *Cerastoderma edule* in order to improve the management of the fishery and cockle stocks, the zootechnical modes of aquaculture of this species exploited, as well as the management coastal and estuarine ecosystems where the populations of this bivalve are important. The objective of this project and to provide tools to optimize the management and regulation of these populations and / or its aquaculture. The major challenge is 1) to succeed in reducing mortalities (pathology, parasitism, sensitivity to pollutants) 2) and 3) to have new tools for the successful ecological restoration of these species and highlight in an applied manner the positive role that cockle

populations exerts on the physical properties of the sediment and marine biodiversity (ecosystem services).

In detail, WP8 of this project aims to quantify very precisely the ecosystem services rendered by this species (especially the regulatory services). In addition, WP4 aims to integrate the functional role of this species in food web models. The attended postdoctoral work is mainly related to WP8, but also with implications in WP4 (food web model). It will be precisely to carry out experimentations and data processing (until writing of articles) on the behavior of bioturbation of the bivalve and the induced ecological interactions (cascades effects) on the biogeochemical processes (diffusive fluxes of the nutritive salts), the microphytobenthic primary production, the resuspension of this microphytobenthic biomass, which becomes a food source available for a suspension-feeder ... and so in the end, it is possible to quantify a feedback loop between bioturbation by the cockles (mobility / adduction of the valves) and their own growth and performances. This work will combine a laboratory and field study an eco-gardening process between cockles burrows and MPB biofilms at microscale.

The role of the cockles as an ecosystem engineer has already been partly studied (Ciutat et al., 2007, regional project GECOGECO piloted by F. Orvain, thesis of Martin Ubertini, thesis of C. Rakotomalala under the direction of F Orvain) at the University of Caen with the partners of UMR EPOC (Olivier Maire, Jean-Claude Duchêne). We know that the bioturbation behavior of this bivalve modifies the biogeochemical properties of sediments around burrows. Some of the main consequences of this behavior are as follows: 1) Sedimentary disturbance (measured by luminophore tracers); 2) stimulation of diffusive biogeochemical fluxes (nutrient salts) and 3) impact on erodibility and biodeposition of superficial sediments.

The candidate will have the opportunity to work with the different researchers of the project under the coordination of Dr. Francis ORVAIN (UMR BOREA, University of Caen) and Dr. Olivier MAIRE (UMR EPOC - University of Bordeaux 1 - Marine station of ARCACHON) and also different researchers : Laurence JONES (University of BANGOR - Responsible of WP8 of INTEREG project) and Hughes BLANCHET (UMR EPOC - Marine station of ARCACHON - Responsible of WP4 Trophic interaction)

For more information about our research program and the postdoctoral application, please contact Dr Francis Orvain if you are interested in this position. Candidates should send application before the 23 of October with a letter of interest describing their qualifications relevant to the project and past research experience, their full CVs, two relevant publications, and two names of previous supervisors (for asking recommendation). The candidature must be sent to the following address (electronic submission is preferred): francis.orvain@unicaen.fr