Benoît Serive

Entrepreneur & Marine pharmacognosy researcher

Citation index

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ORCID

Research ID

EXPERIENCES

Founder & President

BlueCare discovery - Since September 2022

Post-doctoral researcher position (Marie Skłodowska-Curie program)

Station biologique de Roscoff - CNRS - June 2014 to June 2017 - Part-time - Roscoff - France

- OCEANCHArCoT program: OCEAN CHemodiversity Against Cell cycle Targets
- Development of a microalgae dereplication strategy assisted with metabolomics tools
- Exploration of signaling pathways hit by marine metabolites of interest
- Mode of action of marine metabolites using bioassays, flow cytometry, epifluorescence microscopy
- Marine bioresources valorization (cosmetoceuticals, nutraceutics, feed/aquaculture)
- Involvement in OCEANOMICs Axis 7: Innovation platform for plankton screening for bioactive compounds and metabolites

Postdoctoral research position (Marie Skłodowska-Curie program)

Griffith Institute for Drug Discovery - Griffith University - July 2014 to August 2016 - Part-time - Brisbane - Australia - Queensland

- OCEANCHArCoT program: OCEAN CHemodiversity Against Cell cycle Targets
- Lead-Like Enhanced Fractions production and screening (HTS)
- Evaluation of marine fractions from Great Barrier Reef organisms against biological model
- NMR fingerprint dereplication

PhD student

IFREMER-Laboratory of Physiology and Biotechnology of Algae - March 2009 to December 2012 - Full-time - Nantes - France

- Research and production of metabolites of interest in photodynamic therapy from photosynthetic micro-organisms
  (Work under confidentiality clauses)
- Microalgae and cyanobacteria cultures
- Development of a biotest to assess a specific activity potentially interesting for high throughput screening
- Comparison of cell grinding methods by design of experiments methodology
- Optimization of the extraction of specific molecules of interest
- Development of a dereplication method for target molecules using hyphenated HPLC-UV DAD
- Purification by high performance liquid chromatography
- Image analysis
- Flow cytometry

Postgraduate student (EPHE)

Research group Sea Molecules Health - University of Nantes - September 2007 to July 2008 - Internship - Nantes - France

- Extraction, purification, characterization of marine phospholipids and sterols
- Scuba-diving expedition for collection of sponges, cnidarians, echinoderms
- Analysis and purification by analytical and preparative thin layer chromatography
- Purification by high performance liquid chromatography
- Analysis by hyphenated gas chromatography/mass spectrometry

Postgraduate student (EPHE)

Laboratory of Marine Biotechnology and Chemistry - University of South britany - January 2006 to August 2007 - Internship - Vannes - France

- Development of screening bioassays
- Cell culture (human cell lines, bacteria, virus)

- Anti-viral bioassays
- Anti-bacteria bioassays
- Anti-fouling bioassays
- Tests in cosmetology (anti-free radicals, anti-elastase, anti-oxidant, anti-inflammatory, cytotoxicity)

Undergraduate student (Intechmer)

IFREMER - Laboratory of Invertebrates Physiology - April 2004 to August 2004 - Internship - Brest - France

- Search for alternatives to the use of chloramphenicol in scallop larvae breeding (Pecten maximus)
- Larval breeding
- Microalgae culture (batch and continuous mode)
- Microbiology techniques
- Bioassays (cytotoxicity and growth inhibition)
- Image analysis

SKILLS

Scientific and technical expertise

- Pigment analysis by means of HPLC-UV DAD
- Optimized extraction of photosynthetic microorganisms
- Purification and culture of microalgae strains
- Purification of marine natural products
- Development testing of biological activities (anti-fouling, cosmetology, pharmacology)
- Development of a screening strategy for pharmacological activity
- Collection of marine organisms for studies in scuba-diving
- Light microscopy
  (cell counting and image analysis)
- Cell culture (human cell lines and animal cell lines, viruses)
- Basics of flow cytometry on Accuri C6
- Basic microbiology techniques (isolation, culture, bioassay)

Transversal skills

- Scientific and technological reporting
  (patent database)
- Studies in experimental designs (factors screening and optimization)
- Statistical analysis of data (Statgraphics, Xlstat, Matlab)
- Development and project management
  (Gantt, Mind Mapping on Mindmanager, quotations, inventory management)
- Drafting of specifications
- Results reporting
- Collaborations with external laboratories (LEMAR Brest, Nantes University Hospital, platform BIODIMAR Brest, Nantes Phycotoxins Laboratory, Veolia Environment)
- Publication in refereed journals
- Scientific networking
- Popular science (World Oceans Day, Square of Science, Science Fair, foreshore visit)

EDUCATION

HEC Challenge+

HEC PARIS

Since January 2024

Business, funding, strategy, marketing

Laureate of the vocation award 2006
(Bleustein Blanchet Fundation)

Laureate 2013 - Marie Curie Outgoing Fellowship OCEANCHArCoT programm

Member of the French Speaking Network of Metabolomics and Fluxomics

Member of the French Speaking Society of Pharmacognosy

Member of the American Society of Pharmacognosy

Member of the Association for the Sciences of Limnology and Oceanography

Reviewer for scientific peer-reviewed journals :
Marine Drugs, Algal Research

Invited Speaker at the 5th World Congress on Biotechnology (Valencia, Spain, June 2014)

In brief :

Voluntary, passionate and sensitive to human values, I want to use my skills to the search for molecules with high added value from marine biodiversity.

Golden prize of the most scholar, caring, and honest supervisor awarded to:

Prof. Ronald J. QUINN
(Eskitis Institute for Drug Discovery, Brisbane, Australia)

Mentor :

Emeritus Prof. Jean-Michel KORNPROBST
(University of Nantes, France)

PhD of Science speciality in biomolecules, pharmacology and therapy

PHD SCHOOL VENAM - UNIVERSITY OF NANTES
March 2009 to December 2012

MSc in medical and biological science research specialising in Mechanisms and optimisation of marine bioproduction

UNIVERSITY OF NANTES - FACULTY OF SCIENCES AND TECHNIQUES
September 2007 to June 2008

Marine pharmacognosy, aquaculture, maritime Law, marine biology

MSc in Cell signalling and integrated systems in biology

PRACTICAL SCHOOL OF HIGH STUDIES (EPHE)
September 2006 to July 2008

Cellular and molecular biology, cancerology, flow cytometry, virology

BSc in Biochemistry-Molecular biology

UNIVERSITY OF NANTES - FACULTY OF SCIENCES AND TECHNIQUES
September 2004 to March 2006

Enzymology, biochemistry, molecular biology, bio-organic chemistry, integration of metabolic pathways

DTSM degree : Higher standard technician in marine sciences and techniques specialising in bioengineering and marine productions

INTECHMER CHERBOURG
September 2002 to September 2004

Physical and biological oceanography, marine zoology, algology, aquariology, marine geology, fisheries, aquaculture

Intensive course in science subjects

UCO - INSTITUTE OF APPLIED MATHEMATICS
September 2001 to June 2002

National diploma in aquaculture

MFR LES PLANTES
September 1999 to July 2001

Aquaculture technologies, economy, accounting

First diploma in marine cultures

MFR LES PLANTES
September 1997 to July 1999

Study of breeding and culture techniques of marine species, marine biology

INTERESTS

Selection of publications

- Study on the microalgal pigments extraction process: performance of microwave-assisted extraction (2011) Process Biochemistry 46: 59-67
- Antiproliferative activity of violaxanthin isolated from bioguided fractionation of Dunaliella tertiolecta extracts (2011) Marine Drugs 9: 819-831
- Selection and optimisation of a method for efficient metabolites extraction from microalgae (2012) Bioresource Technology 124: 311-320
- Screening marine resources to find novel chemical inhibitors of disease-relevant protein kinases (2015) Medecine/Sciences 31(5): 538-545
- Community analysis of pigment patterns from 37 microalgae strains reveals new carotenoids and porphyrins characteristic of distinct strains and taxonomic groups (2017) PLoS One 12(2): 1-35

42 years old
Driving License
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- Constituents of Acacia nilotica (L.) Delile with novel kinase inhibitory activity (2017) Planta Medica International Open 4:108-113
- Marine pigment diversity: applications and potential (2018, in process) In: Blue Biotechnology: production and use of marine molecules
- Microalgal biomass of industrial interest: methods of characterization (2018, in process) In: Biomass, waste and related by-products characterization

Sport

- Scuba-diving
- Surfing
- Swimming
- Kayaking
- Tai-chi-chuan
- Apnea

Travel

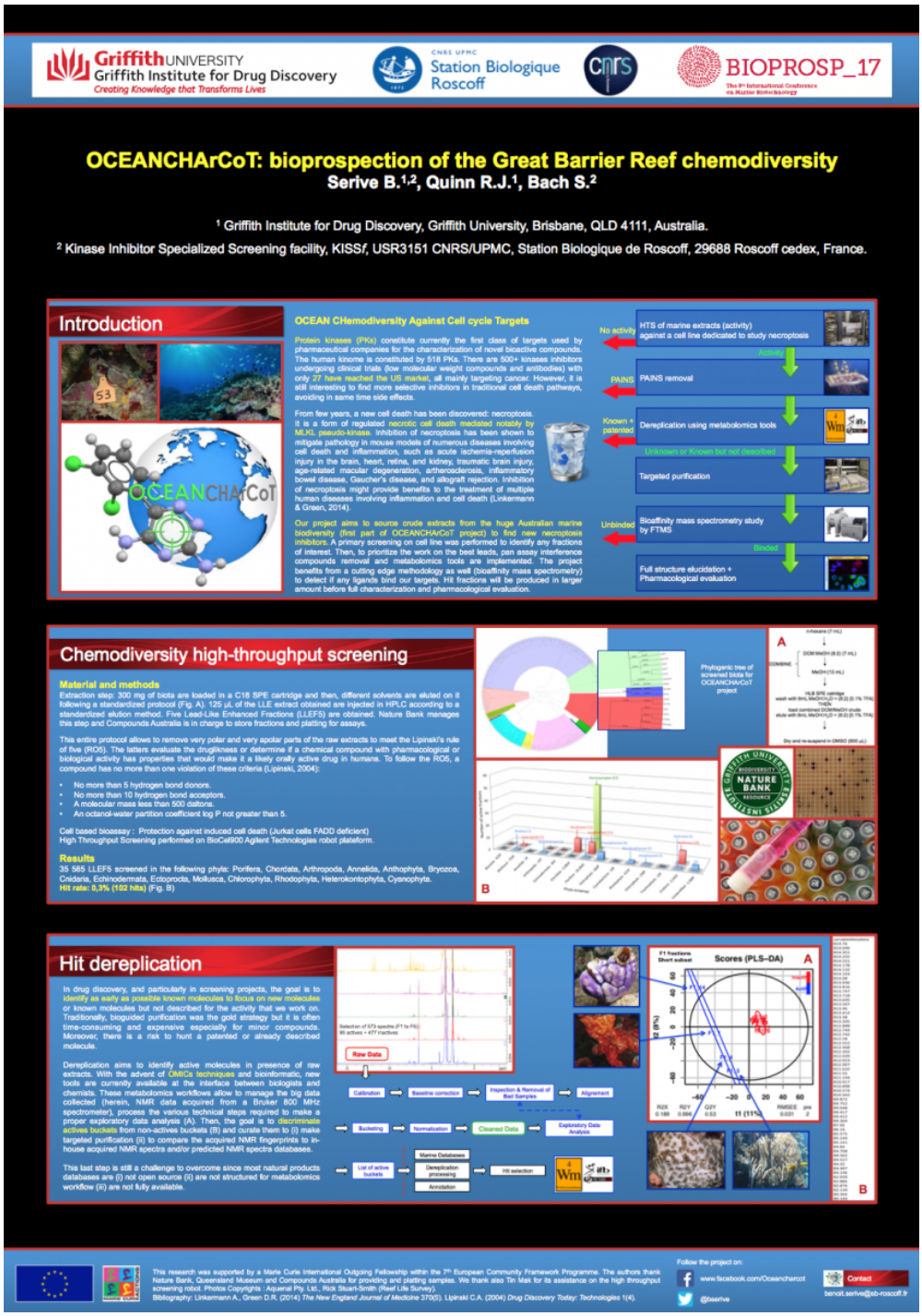
- Senegal
- Germany
- Scotland
- USA
- Australia
- Portugal
- Fiji
- Norway

Hobbies

- Aquariophilly
- Oenology

PORTFOLIOS

OCEANCHArCoT: bioprospection of the Great Barrier Reef chemodiversity

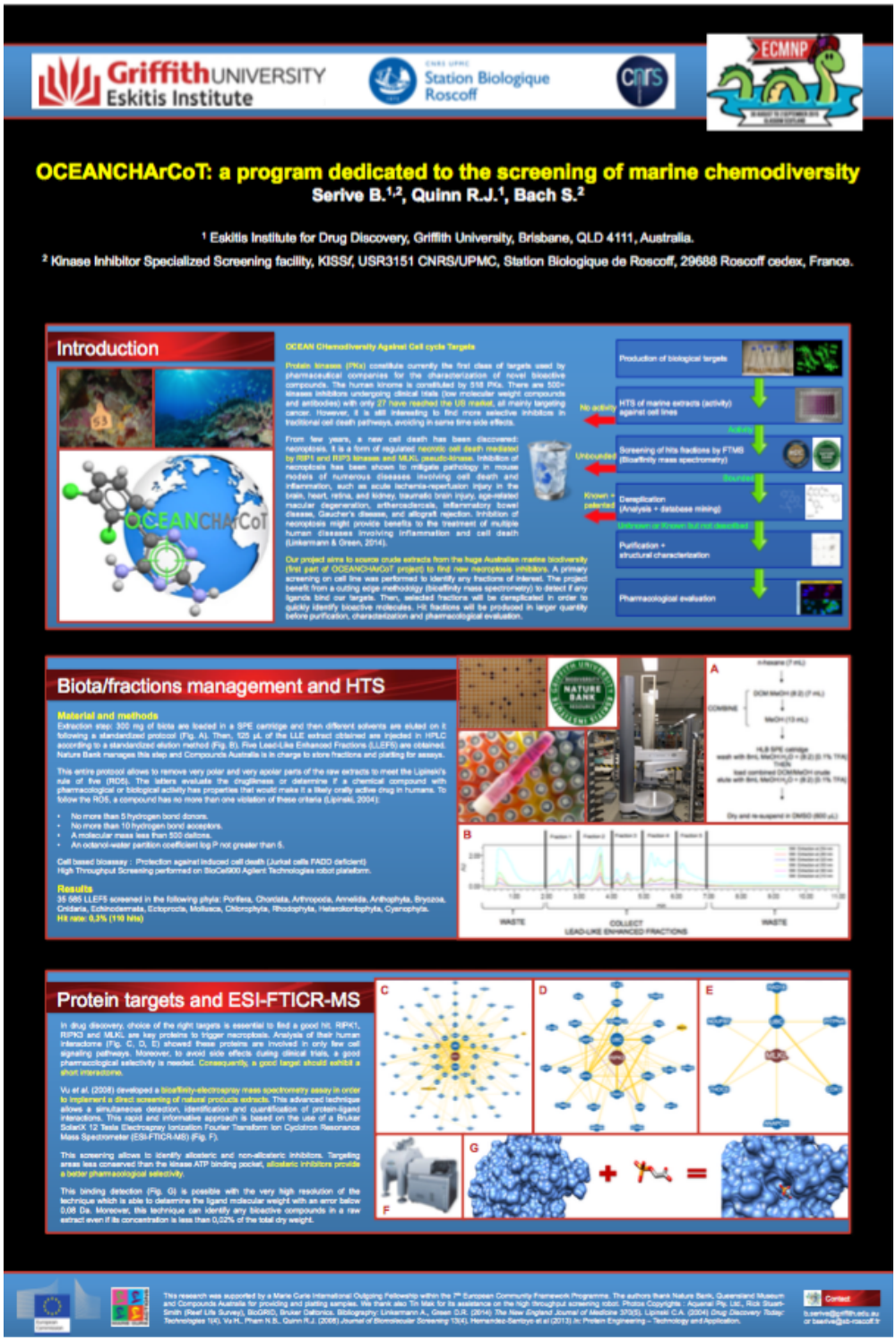


Poster displayed at the 8th International Conference on Marine Bioprospecting

Creation date

07 mars 2017

OCEANCHArCoT: a program dedicated to the screening of marine chemodiversity



Poster 9th European Conference on Marine Natural Products

Creation date

31 août 2015

médecine/sciences 2015 ; 31 : 538-45

Chémobiologie (11)

Le criblage à Roscoff

Une recherche d'inhibiteurs de kinases tournée vers la mer

Blandine Baratte, Benoît Serive, Stéphane Bach

› Les scientifiques de la station biologique de Roscoff (SBR) travaillent depuis plusieurs dizaines d'années sur la régulation de la division cellulaire en utilisant, comme modèles, des organismes marins. Ceci a notamment conduit à l'étude de kinases dépendantes des cyclines (CDK) qui contrôlent le déroulement du cycle cellulaire. Ces cibles ont ensuite été utilisées afin de caractériser des inhibiteurs pharmacologiques, ou « touches » (*hits*), en mettant en place un criblage automatisé. Le mécanisme d'action des meilleures touches sélectionnées a également été étudié en les dérivant, afin de procéder à des approches de criblages inverses par chromatographie d'affinité. À l'interface entre biologie et chimie, le travail de cette plate-forme place au centre des recherches le composé chimique, qui est à la fois (1) une molécule d'intérêt thérapeutique et (2) un outil moléculaire permettant d'analyser la fonction cellulaire des kinases ciblées. À partir d'organismes marins, huit familles structurales d'inhibiteurs ont été caractérisées sur la plate-forme, et l'espoir est grand de voir la mer nous en apporter de nouveaux, encore plus puissants. ›

CNRS/UPMC USR3151, plate-forme de criblage KISSf (*kinase inhibitor specialized screening facility*), station biologique de Roscoff, place Georges Teissier, CS 90074, 29688 Roscoff Cedex, France. bach@sb-roscoff.fr

La plate-forme de criblage KISSf de Roscoff, un site dédié à la recherche sur les inhibiteurs de kinases

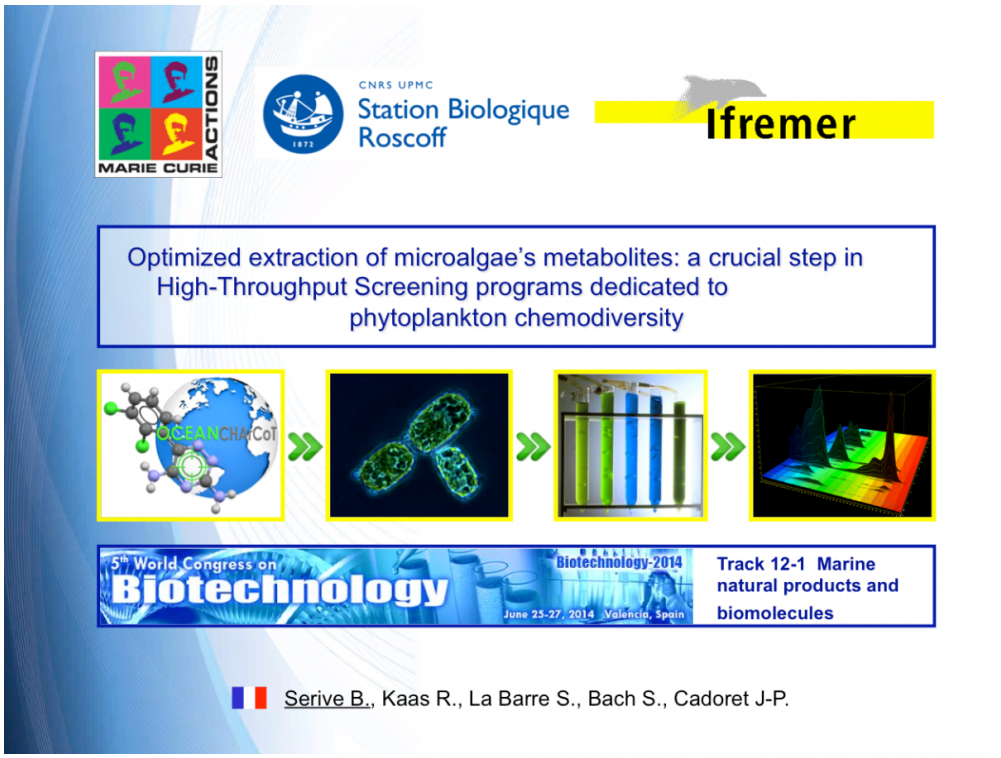
En 1872, Henri de Lacaze-Duthiers, professeur à la Sorbonne, fonde à Roscoff le « laboratoire de zoologie expérimentale ». Ses objectifs sont la recherche, l'enseignement et l'accueil scientifique. Le choix de Roscoff s'explique, notamment, par la grande biodiversité végétale et animale, l'accessibilité au matériel biologique, rendue aisée grâce au phénomène de marée, mais aussi par la proximité avec Paris par le train. Plus de 140 ans plus tard, le site roscovite, dont l'effectif dépasse les 300 personnes, est un des centres de biologie marine parmi les plus importants en Europe[1]. Au sein de cet institut se trouve une plate-forme de criblage spécialisée dans l'identification d'inhibiteurs chimiques de protéine kinases, la plate-forme KISSf (*kinase inhibitor specialized screening facility*) (*Figure 1*). Cette spécialisation prend racine dans les années 1970, une vingtaine d'années après la première observation d'une activité kinase assignée à une enzyme hépatique, la caséine kinase, par Eugene Kennedy [1]. En effet, les travaux pionniers de Pierre Guerrier et Marcel Dorée sur l'implication de la phosphorylation dans la reprise du processus de la méiose, notamment chez les ovocytes d'invertébrés marins, ont été réalisés à Roscoff [2]. Ces études ont conduit à la mise en évidence de l'inhibition d'activité de phosphorylation par de petits composés chimiques, tels que le 6-diméthylaminopurine (6-DMAP) [3]. Par la suite, Laurent Meijer poursuivit ce travail sur différents modèles marins (*Arenicola marina*, *Urechis caupo*, *Marthasterias glacialis*, etc.). Il participa ainsi à la caractérisation des acteurs kinasiques contrôlant le cycle de division cellulaire, et notamment à la découverte de la kinase dépendante de cycline, CDK1/cycline B [4]. La conservation des acteurs régulant la division cellulaire a permis l'utilisation d'une grande variété de modèles cellulaires. Le choix des modèles marins a été judicieux pour les études biochimiques du fait de la division synchronisée des cellules, qui donne ainsi accès à des quantités importantes de protéines. Le laboratoire a alors développé des stratégies permettant de purifier, à partir d'ovocytes d'étoile de mer, des quantités

Cet article fait partie de la série « Chémobiologie » qui a débuté dans le n° 12, vol. 30, décembre 2014 (www.medecinesciences.org).
Vignette (éponge *Axinella verrucosa*, © Océanopolis, Brest, France). Organisme marin duquel a été extrait un puissant inhibiteur de kinase (l'hymenialdisine, représenté sur la *Figure 2*).

[1] http://www.embrc.eu

m/s n° 5, vol. 31, mai 2015
DOI : 10.1051/medsci/20153105016

5th World Congress on Biotechnology



With the recent development of state-of-the-art technologies (e.g hyphenated MS techniques) and methodologies (e.gdereplication), the scientific community is interested in the exploration of poorly chemically studied bioresources. The high diversity of interacting phytoplankton species suggests an important and highly diverse chemical repertoire (e.gisoprenoids, toxins, polysaccharides, PUFAs, oxylipins, phycobiliproteins) which may inspire applications in health, nutrition and biotechnology. Biosynthesis of these metabolites is strongly dependent upon their environment/culture conditions which may be investigated using OMICS approaches. In microalgae, a major bottleneck isthe difficulty in extracting deeply inaccessible molecules, an important issue that demands adapted solutions prior to considering High-Throughput Screening (HTS). Bioactive minority metabolites may pass unnoticed on spectra and thus require special attention. The extraction of metabolites may prove difficult due to the presence of highly resistant cell walls (Phaeodactylumtricornutum), or of exopolysaccharidic secretions surrounding the cell membrane (Porphyridiumpurpureum). The Mix Mill process (vibrating microbeads) which gave excellent extraction yields without chemical alteration of the analytes) and is fully compatible with HPLC and LC-MS analysis was optimised. Being accurate, simple to operate, rapid, safe and preserving sensitive molecules, makes the Mix Mill process suitable for the screening of microalgalchemodiversity. This methodology was applied in the Photomer, and currently in OCEANOMICs and OCEANCHArCoT programs, all being dedicated to the identification of new marine metabolites with high added value. Finally, this methodology represents a significant improvement in the field of OMICS studies from microalgae, as it provides the most representative estimate of their exploitable chemical diversity.

Marie Curie International Outgoing Fellowship – Laureate 2013

OCEANCHArCoT
OCEAN CHemodiversity Against Cell cycle Targets

SEVENTH FRAMEWORK PROGRAMME

EUROPEAN COMMISSION

CNRS UPMC Station Biologique Roscoff

Griffith UNIVERSITY Eskitis Institute

Bioresource Technology 124 (2012) 311–320

Contents lists available at SciVerse ScienceDirect

Bioresource Technology

journal homepage: www.elsevier.com/locate/biortech

Selection and optimisation of a method for efficient metabolites extraction from microalgae

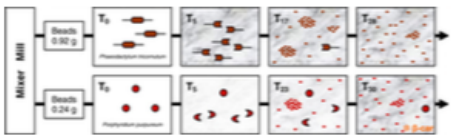
Benoît Serive [a], Raymond Kaas [a,*], Jean-Baptiste Bérard [a], Virginie Pasquet [b], Laurent Picot [c], Jean-Paul Cadoret [a]

[a] IFREMER, Laboratoire de Physiologie et Biotechnologie des Algues, 44311 Nantes, France
[b] Mer, Molécules, Santé, Institut Universitaire Mer et Littoral, FR 3473 CNRS, LUNAM Université, Université du Maine, EA 2160, IUT de Laval, 53020 Laval, Cedex 9, France
[c] University of La Rochelle, UMR CNRS 7266 LIENSs, F-17042 La Rochelle, France

HIGHLIGHTS

- Nine disruption techniques were tested on two microalgae models.
- Image analysis was used to evaluate the efficiency of disruption techniques.
- The best grinding method was the mixer mill with polypropylen grinding jars.
- The disruption method was optimised in the objective of high throughput screening.
- Pigments were good candidates to follow extraction of fragile metabolites.

GRAPHICAL ABSTRACT



ARTICLE INFO

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Keywords:
Metabolites
Pigment
Microalgae
Disruption
Extraction

ABSTRACT

Over the last decade, the use of microalgae for biofuel production and carbon dioxide sequestration has become a challenge worldwide. Processing costs are still too high for these methods to be profitable though, leading to a need to find high value by-products to optimise the added value of this biomass. For high-throughput screening of such metabolites, it is essential to reach the inner content of the cell. This paper presents research and development of a technique enabling a high extraction yield of any metabolite, taking into account the difficulty of extracting bound and or inaccessible molecules with a wide variety of polarities. To this end, several disruption techniques were tested at laboratory scale on two biological models: *Porphyridium purpureum* and *Phaeodactylum tricornutum*. A mixer mill gave the best results, offering access to a broad diversity of metabolites from microalgae for high-throughput screening.
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1. Introduction

Microalgae are nowadays considered to be the best source for biofuel production due to their ability to produce large amounts of triglycerides or to be converted into biogas. These photosynthetic micro-organisms are capable of converting carbon dioxide into lipids representing up to the half of their dry weight (Chisti, 2007). While primary metabolites are the result of the unity of life on earth, secondary metabolites are the expression of its biodiversity (Kornprobst, 2005). Many of them have a high added value (Harun et al., 2010), such as isoprenoids, alkaloids, toxins, polysaccharides, polyunsaturated fatty acids, oxylipins, enzymes, phycobiliproteins and non-ribosomal peptides, which find applications in health, pharmacology, nutrition and biotechnology. Among all new marine molecules identified, the proportion produced by

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E-mail address: Raymond.Kaas@ifremer.fr (R. Kaas).

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Mar. Drugs **2011**, *9*, 819-831; doi:10.3390/md9050819

OPEN ACCESS

Marine Drugs

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www.mdpi.com/journal/marinedrugs

Article

Antiproliferative Activity of Violaxanthin Isolated from Bioguided Fractionation of *Dunaliella tertiolecta* Extracts

Virginie Pasquet [1], Perrine Morisset [1], Said Ihammouine [1], Amandine Chepied [1], Lucie Aumailley [1], Jean-Baptiste Berard [2], Benoit Serive [2], Raymond Kaas [2], Isabelle Lanneluc [1], Valerie Thiery [1], Mathieu Lafferriere [1], Jean-Marie Piot [1], Thierry Patrice [3], Jean-Paul Cadoret [2] and Laurent Picot [1]*

[1] University of La Rochelle, UMR CNRS 6250 LIENSs, F-17042 La Rochelle, France; E-Mails: virginie.pasquet@univ-lr.fr (V.P.); perrinemorisset@hotmail.com (P.M.); said.ihammouine@hotmail.fr (S.I.); amandine.chepied@etudiant.univ-lr.fr (A.C.); lucie.aumailley@etudiant.univ-lr.fr (L.A.); isabelle.lanneluc@univ-lr.fr (I.L.); vthiery@univ-lr.fr (V.T.); mathieu_lafferiere@yahoo.fr (M.L.); jmpiot@univ-lr.fr (J.-M.P.)

[2] IFREMER Laboratory PBA, IFREMER Centre Nantes, F-44311 Nantes, France; E-Mails: jean.baptiste.berard@ifremer.fr (J.-B.B.); benoit.serive@ifremer.fr (B.S.); raymond.kaas@ifremer.fr (R.K.); jean.paul.cadoret@ifremer.fr (J.-P.C.)

[3] Department LASER, CHU Nantes, F-44093 Nantes, France; E-Mail: thierry.patrice@chu-nantes.fr

* Author to whom correspondence should be addressed; E-Mail: lpicot@univ-lr.fr; Tel.: +33-5-46-45-82-20; Fax: +33-5-46-45-82-65.

Received: 29 March 2011; in revised form: 27 April 2011 / Accepted: 4 May 2011 / Published: 11 May 2011

Abstract: *Dunaliella tertiolecta* (*DT*) was chemically investigated to isolate molecules inhibiting cancer cell proliferation and inducing apoptosis *in vitro*. The potency to inhibit cell growth was used for the bio-guided fractionation and isolation of active compounds using chromatographic techniques. The *DT* dichloromethane extract exhibited a strong anti-proliferative activity on MCF-7 and LNCaP cells, and was further fractionated and sub-fractionated by RP-HPLC. High resolution mass spectrometry and spectrophotometric analysis unequivocally identified violaxanthin as the most antiproliferative molecule present in *DT* DCM extract. Violaxanthin purified from *DT* induced MCF-7 dose-dependent growth inhibition in continuous and discontinuous treatments, at concentrations as low as 0.1 $\mu g \cdot mL^{-1}$ (0.17 µM). Phosphatidylserine exposure, typical of early apoptosis, was observed after 48 h treatment at 8 $\mu g \cdot mL^{-1}$ (13.3 µM) but no DNA fragmentation, characteristic of late apoptosis steps, could be detected even after 72 h treatment at

Process Biochemistry 46 (2011) 59–67

Contents lists available at ScienceDirect

Process Biochemistry

journal homepage: www.elsevier.com/locate/procbio

Study on the microalgal pigments extraction process: Performance of microwave assisted extraction

Virginie Pasquet[a], Jean-René Chérouvrier[a], Firas Farhat[a], Valérie Thiéry[a], Jean-Marie Piot[a], Jean-Baptiste Bérard[b], Raymond Kaas[b], Benoît Serive[b], Thierry Patrice[c], Jean-Paul Cadoret[b], Laurent Picot[a,*]

[a] Université de La Rochelle, UMR CNRS 6250 LIENSs, La Rochelle, 17042, France
[b] IFREMER Laboratoire PBA, Centre IFREMER de Nantes, Nantes, 44311, France
[c] Département LASER, CHU de Nantes, Nantes, 44093, France

ARTICLE INFO

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Microalgae
Microwave
Extraction
Chlorophyll
Fucoxanthin
Carotene
MAE
VMAE

ABSTRACT

The performance of microwaves irradiation (MAE and VMAE) to extract pigments from two marine microalgae was compared to conventional processes (cold and hot soaking and ultrasound-assisted extraction). Pigments were quantified by RP-HPLC and extraction performance was assessed regarding rapidity, reproducibility and extraction yields. Scanning electron microscopy was used at all extraction steps to assess the impact of the process on microalgal cell integrity. Freeze-drying and pigments extraction preserved microalgae cell integrity (except sonication) and evoked agglutination in superposed cells layers. All processes performed on *Dunaliella tertiolecta* (chlorophyte) lead to rapid pigments extraction, and equivalent pigments extraction yields, the absence of frustule allowing immediate solvent penetration in microalgae cells. In contrast, presence of the frustule in the diatom *Cylindrotheca closterium* (bacillariophyte) constituted a mechanical barrier to pigment extraction. MAE was identified as the best extraction process for CC pigments as it combined rapidity, reproducibility, homogeneous heating and high extraction yields.

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1. Introduction

Marine microalgae constitute one of the most diverse group of oceanic microorganisms, with an estimated 2×10^5 to several millions species [1], from which only 35,000 are described. Extensive screening of cultivated species has lead to the isolation and chemical determination of over 15,000 compounds, including fatty acids, sterols, phenolic compounds, terpenes, enzymes, polysaccharides, alkaloids, toxins and pigments [2]. Because of their high biodiversity and huge productivity, microalgae represent an untapped resource offering great possibilities for the isolation of original natural substances of interest for food, health or biotechnological applications [3,4]. Their interest also lies in their convenient use as a biotechnological biomass, as they can easily be grown in controlled conditions, handled as conventional lab microorganisms, and genetically modified without any risk of dissemination.

Lipids and pigments extraction processes applied to microalgae are mainly derived from phytochemical techniques developed on superior plants and macroalgae. The main parameters driving selection of an extraction technology are biochemical characteristics of extracted molecules, rapidity, limitation of solvent use, reproducibility, extraction yield, selectivity, protection of extracted molecules against chemical transformation, dimension, cost and easiness [5,6]. Classical organic solvent extraction techniques, including maceration (soaking), percolation, countercurrent extraction, pressurized liquid extraction, and soxhlet are widespread technologies described to extract lipids and pigments. These processes are reproducible, allow the rapid extraction of chemicals, but usually imply the use of large amounts of solvents, and the risk of thermal denaturation or transformation of molecules of interest [5]. Coupling steam distillation or hot water extraction with maceration in solvent increases extraction yields for plant essential oils and bioactive compounds [7], but thermolabile molecules are damaged using this technology. The use of enzymes, such as xylanases, pectinases or cellulases, to enhance pigments extractability rates was proposed and validated for superior plants tissues [8,9] and macroalgae [10], and

Abbreviations: CC, *Cylindrotheca closterium*; Chl, chlorophyll; DT, *Dunaliella tertiolecta*; MAE, microwave-assisted extraction; PVDF, poly(vinylidene difluoride); Rt, room temperature; SCF, supercritical fluid; UAE, ultrasound assisted extraction; VMAE, vacuum-microwave assisted extraction.

* Corresponding author. Tel.: +33 546458220; fax: +33 546458265.
E-mail address: lpicot@univ-lr.fr (L. Picot).

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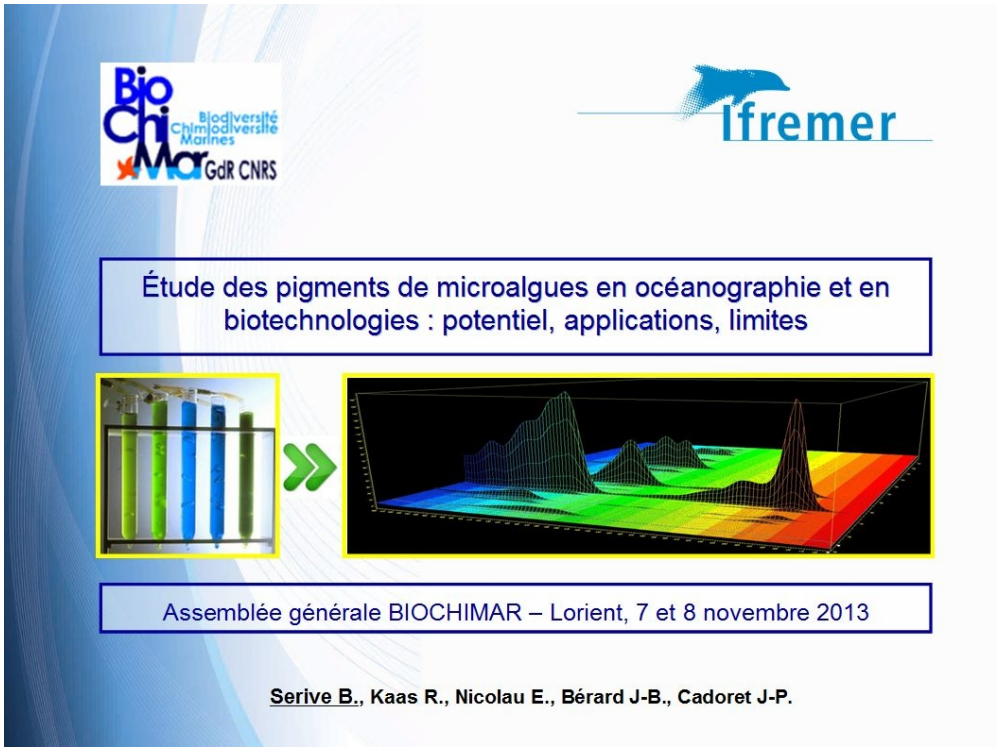
doi:10.1016/j.procbio.2010.07.009

Microalgae pigment study for oceanography and biotechnologies : potential, uses and limits.



Annual general meeting of BIOCHIMAR group

Website

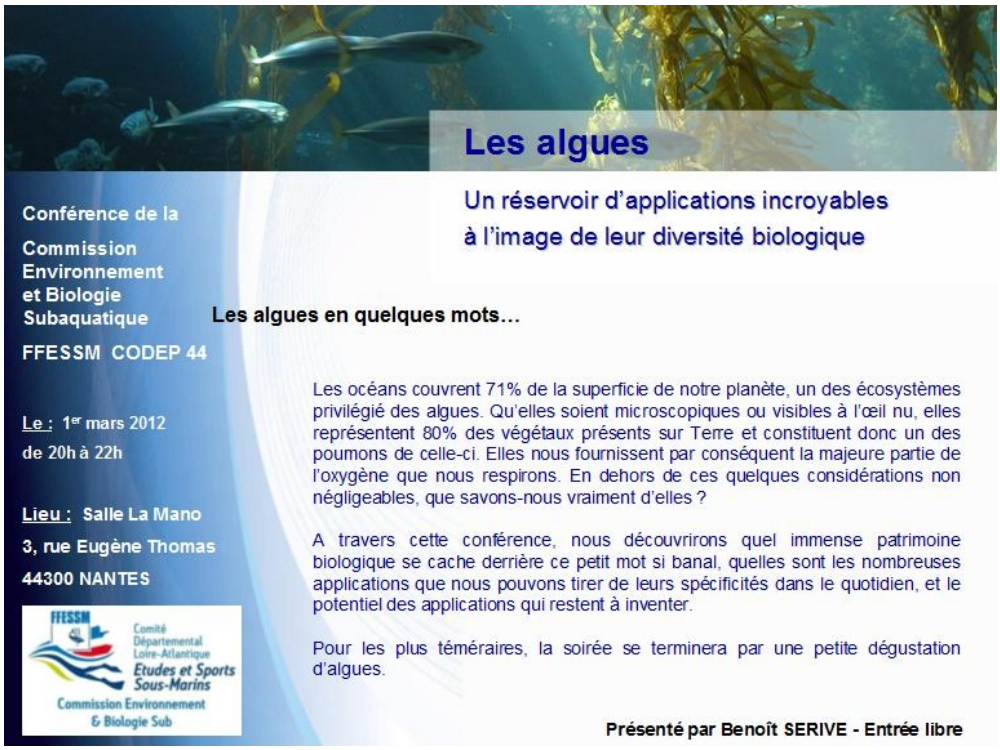
http://biochimar.icsn.cnrs-gif.fr/spip.php?article29

Creation date

08 nov. 2013

Conference Uses from sponges

Conference 01/03/2012



Algae : an incredible reservoir of applications as their biodiversity

Creation date

01 mars 2012

Conference 20/10/2011

Study of microalgal pigments in oceanography and biotechnology through a process of dereplication HPLC-UV DAD

Creation date

20 oct. 2011

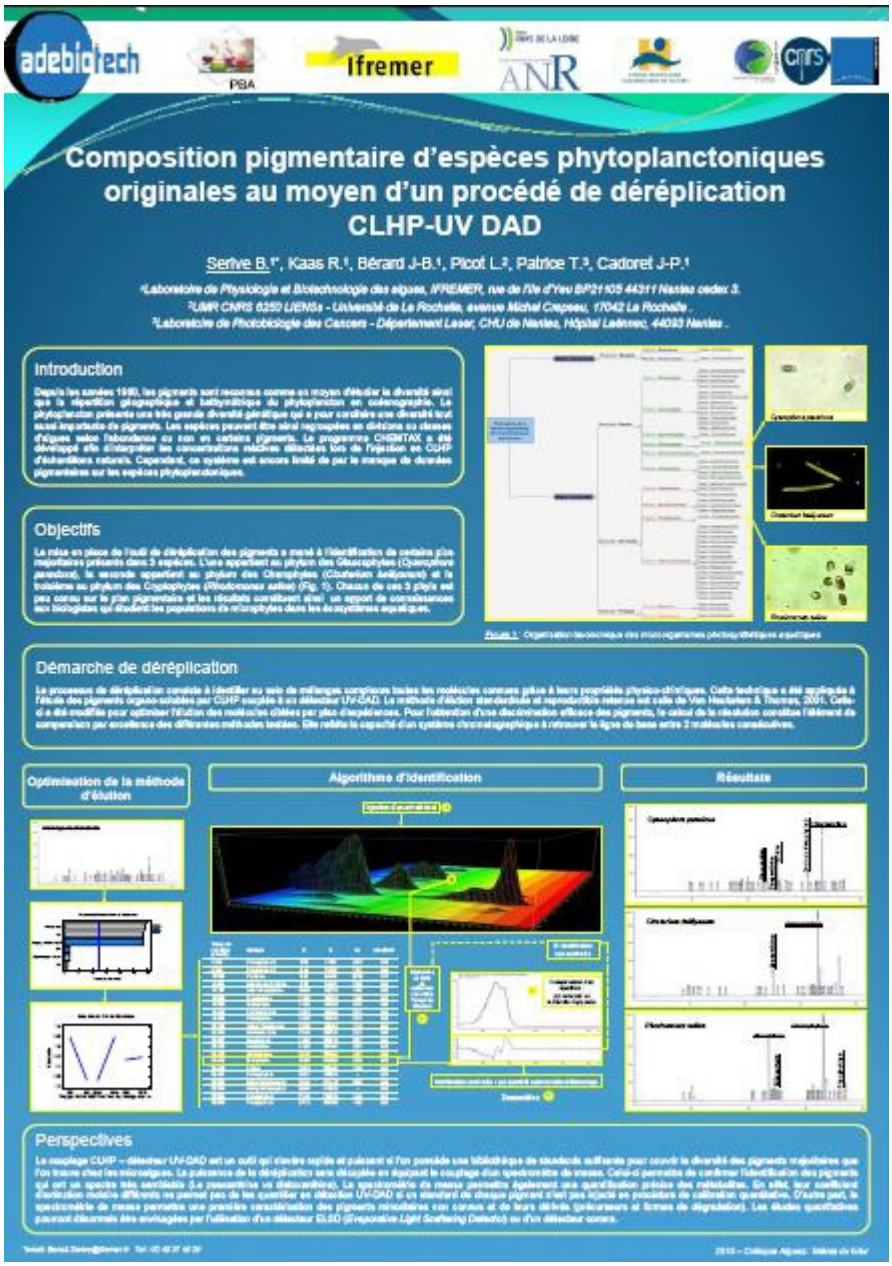
Conference 18/03/2011

Collection of marine tropical organisms in scuba-diving - From the study of biodiversity to the emergence of new drugs

Creation date

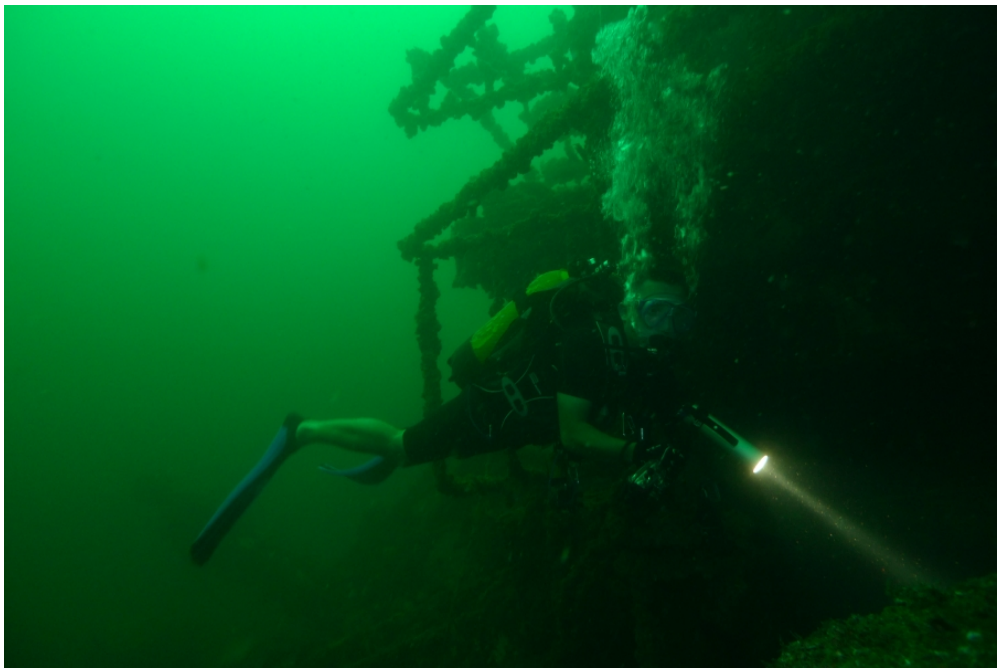
18 mars 2011

Poster Adebiotech : Algae field of the future



A pigment composition of original phytoplankton species by means of a method of HPLC-UV DAD dereplication

Collection of marine organisms in diving



Mission in Senegal mangrove