

# CHARLES BACHY

**36 years old** (born in Dec. 1985 in Paris)  
French.

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## CURRENT POSITION

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Since December 2019

**Post-Doctorat**, Marine ecology Research division, Helmholtz Centre for Ocean Research Kiel (GEOMAR), Kiel, Germany. *Symbiotic association, transcriptomics and isotopic labeling of marine plankton.*  
GEOMAR funding.

## EDUCATION AND PAST POSITIONS

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2006 - 2008

**Master of Science in Oceanography and Marine Environments**. University Pierre et Marie Curie, Paris. Department of Sciences of the Universe, Environment and Ecology. Excellence scholarship.

2008(Sep.) - 2012(Jul.)

**Ph.D in Biology**. University of Paris-Sud, Orsay. Laboratory of Ecology, Systematics and Evolution, under the supervision of David Moreira and Purificación López-García.

*Phylogeny, diversity and temporal dynamics of marine tintinnid ciliates.*

2013(Jan.) - 2016(Sep.)

**Postdoctoral fellow** at the Monterey Bay Aquarium Research Institute (MBARI), Moss Landing, California. Research & Development, Molecular microbial ecology group, Alexandra Z. Worden lab. *Transcriptomics, proteomics, phylogenomics and virus ecology of the marine microbial eukaryotes.*

Department of Energy (DOE) and Gordon and Betty Moore foundation (Microbial Initiative) fundings.

2016(Sep.) - 2018(Dec.)

**Marie Skłodowska-Curie fellow** at the Station Biologique de Roscoff (SBR), France. UMR7144, DIPO team, in collaboration with Fabrice Not. *Characterization of the diversity and function of plankton associated microbiota (DYNAMO project).*

Since 2019(May)

**Micro-entrepreneur**, special scientific and technical activities (SIRET 850 724 295 00017) in Roscoff, France. Bioinformatic analyses, oceanographic cruise planning, publication writing, microbiology class, European project reviewing.

## PUBLICATION LIST

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**Citation index** : since 2010, total citation number is **1133** from Google scholar (*h-index* 15) and **700** from SCOPUS.

**2021**

26- **Bachy C**, Yung CCM, Needham DM, Gazitua MC, Roux S, Limardo AJ, Choi CJ, Jorgens DM, Sullivan MB & Worden AZ (2021) Viruses infecting a warm water picoeukaryote shed light on spatial co-occurrence dynamics of marine viruses and their hosts. **ISME Journal**. (*IF* 9,52).

25- **Bachy C**, Wittmers F, Muschiol J, Hamilton M, Henrissat B, Worden AZ. The landsea connection: insights into the plant lineage from a green algal perspective. *In press* in **Annual Review of Plant Biology**. (*IF* 26,38).

24- Hamilton M, Mascioni M., Hehenberger E., **Bachy C.**, Yung CCM, Vernet M. & Worden AZ (2021) Spatiotemporal variations in Antarctic protistan communities highlight phytoplankton diversity and seasonal dominance by a novel cryptophyte lineage. **mBio**. (*IF* 7,86).

- 23- **Bachy C**, Hehenberger E, Ling YC, Needham DM, Strauss J, Wilken S, Worden AZ. Marine Protists: A hitchhiker’s guide to their role in the marine microbiome. **Chapter for “The Marine Microbiome”** Eds. Lucas J. Stal and Mariana Silvia Cretoiu. *In press*.
- 2020**
- 22- Choi CJ, Jimenez V, Needham DM, Poirier C, **Bachy C**, Alexander H, Wilken S, Chavez PC, Sudek S, Giovannoni SJ, Worden AZ (2020) Seasonal and Geographical Transitions in Eukaryotic Phytoplankton Community Structure in the Atlantic and Pacific Oceans. **Frontiers in Microbiology**. (IF 4,02).
- 2019**
- 21- Needham DM, Yoshizawa S, Hosaka T, Poirier C, Choi CJ, Hehenberger E, Irwin NAT, Wilken S, Yung CM, **Bachy C**, Kurihara R, Nakajima Y, Kojima K, Kimura-Someya T, Leonard G, Malmstrom RR, Mende DR, Olson DK, Sudo Y, Sudek S, Richards TA, DeLong EF, Keeling PJ, Santoro AE, Shirouzu M, Iwasaki W, Worden AZ (2019) A Distinct Lineage of Giant Viruses Brings a Rhodopsin Photosystem to Unicellular Marine Predators. **Proceedings of the National Academy of Sciences**, 116(41):20574–83. (IF 9,5).
- 20- Zimmerman AE, **Bachy C**, Ma X, Roux S, Jang HB, Sullivan MB, Waldbauer JR, Worden AZ (2019) Closely Related Viruses of the Marine Picoeukaryotic Alga *Ostreococcus Lucimarinus* Exhibit Different Ecological Strategies. **Environmental Microbiology**, 21(6): 2148–2170. (IF 4,97).
- 19- Yuichiro K, Yokoyama A, Shiratori T, Hess S, Not F, **Bachy C**, Gutierrez-Rodriguez A, et al. (2019) Taming Chlorophylls by Early Eukaryotes Underpinned Algal Interactions and the Diversification of the Eukaryotes on the Oxygenated Earth. **The ISME Journal**, 13(8): 1899–1910. (IF 9,52).
- 2018**
- 18- **Bachy C**, Charlesworth CJ, Chan AM, Finke JF, Wong CH, Wei CL, Sudek S, Coleman ML, Suttle CA, Worden AZ (2018) Transcriptional responses of the marine green alga *Micromonas pusilla* and an infecting prasinovirus under different phosphate conditions. **Environmental Microbiology**, 20(8): 2898–2912. (IF 4,97).
- 17- Guo J, Wilken S, Jimenez V, Choi CJ, Ansong CK, Dannebaum R, Sudek L, Milner D, **Bachy C**, Reistetter EN, Elrod VA, Klimov D, Purvine SO, Wei CL, Ramamoorthy GK, Richards TA, Goodenough U, Smith RD, Callister SJ, Worden AZ (2018) Specialized Proteomic Responses and an Ancient Photoprotection Mechanism Sustain Marine Green Algal Growth during Phosphate Limitation. **Nature Microbiology** 3(7):781-790. (IF 14,17).
- 16- Villar E, Dani V, Bigeard E, Linhart T, Mendez-Sandin M, **Bachy C**, Six C, Lombard F, Sabourault C, Not F (2018) Symbiont Chloroplasts Remain Active During Bleaching-Like Response Induced by Thermal Stress in *Collozoum Pelagicum* (Collodaria, Retaria). **Frontiers in Marine Science**. 5, 387 (IF 3,09).
- 2017**
- 15- **Bachy C**,\* Choi CJ,\* Spiro Jaeger G, Poirier C, Sudek L, Sarma V.V.S.S., Mahadevan A, Giovannoni SJ, Worden AZ. (2017) Newly Discovered Deep-Branching Marine Plastid Lineages Are Numerically Rare but Globally Distributed. **Current Biology** 27(1):R15-16. (IF 9,25).
- 14- Caron DA, Alexander H, Allen AE, Archibald JM, Armbrust EV, **Bachy C**, Bell CJ, et al. (2017) Probing the Evolution, Ecology and Physiology of Marine Protists Using Transcriptomics. **Nature Reviews Microbiology** 15(1):6-20. (IF 31,85).
- 2016**
- 13- van Baren MJ, **Bachy C**, Reistetter E, Purvine SO, Grimwood J, Sudek S, Yu H, Poirier C, Kuo A, Grigoriev IV, Wong CH, Smith RD, Callister SJ, Wei CL, Schmutz J, Worden AZ (2016) Evidence-based green algal genomics reveals marine diversity and ancestral characteristics of land plants. **BMC Genomics** 17:267. (IF 3,73).
- 12- Santoferrara LF, **Bachy C**, Alder VA, Gong J, Kim YO, Saccà A, da Silva Neto ID, et al. (2015) Updating Biodiversity Studies in Loricata Protists: The Case of the Tintinnids (Alveolata, Ciliophora, Spirotrichea). **Journal of Eukaryotic Microbiology** 63(5):651-6. (IF 2,54).
- 2015**
- 11- **Bachy C**,\* Simmons M,\* Sudek S, van Baren MJ, Sudek L, Ares M, Worden AZ (2015) Intron invasions trace algal speciation and reveal nearly identical Arctic and Antarctic *Micromonas* populations. **Molecular Biology and Evolution** 32 (9):2219-2235. (IF 10,22).

10- Dunthorn M, Lipps JH, Dolan JR, Saab MAA, Aescht E, **Bachy C** et al. (2015) Ciliates—Protists with complex morphologies and ambiguous early fossil record. **Marine Micropaleontology** 119:1-6. (IF 1,87).

2014

9- **Bachy C**,\* Duanmu D,\* Sudek S, Wong CH, Jimenez V, Rockwell NC, Martin SS, Ngan CY, Reistetter E, van Baren MJ, Price DC, Wei CL, Reyes-Prieto A, Lagarias JC, Worden AZ (2014) Marine Algae and Land Plants Share Conserved Phytochrome Signaling Systems. **Proceedings of the National Academy of Sciences** 111(44):15827–15832. (IF 9,5).

8- **Bachy C** and Alexandra Z. Worden (2014) Microbial Ecology: Finding Structure in the Rare Biosphere. **Current Biology** 24(8):R315-17. (IF 9,25).

7- Rockwell NC, Duanmu D, Martin SS, **Bachy C**, Price DC, Bhattacharya D., Worden AZ, Lagarias JC (2014) Eukaryotic algal phytochromes span the visible spectrum. **Proceedings of the National Academy of Sciences** 111(10):3871–3876. (IF 9,5).

6- Dolan JR, Pierce RW, **Bachy C** (2014) *Cyttarocylis ampulla*, a Polymorphic Tintinnid Ciliate of the Marine Plankton. **Protist** 165(1):66–80. (IF 2,7).

5- **Bachy C**, Moreira D, Dolan JR, López-García P (2014) Seasonal dynamics of free-living tintinnid ciliate communities revealed by environmental sequences from the North-West Mediterranean Sea. **FEMS microbiology ecology** 87(2):330-342. (IF 3,5).

2013

4- **Bachy C**, Dolan JR, López-García P, Deschamps P, Moreira D (2013) Accuracy of protist diversity assessments: morphology compared to cloning and direct pyrosequencing of 18S rRNA genes and ITS regions using the conspicuous tintinnid ciliates as a case study. **ISME Journal** 7(2):244-255. (IF 9,52).

2012

3- **Bachy C**, Gómez F, López-García P, Dolan JR, Moreira D (2012) Molecular Phylogeny of Tintinnid Ciliates (Tintinnida, Ciliophora). **Protist** 163(6):873-887. (IF 2,7).

2011

2- **Bachy C**, López-García P, Vereshchaka A, Moreira D (2011) Diversity and vertical distribution of microbial eukaryotes in the snow, sea ice and seawater near the North Pole at the end of the polar night. **Frontiers in Microbiology**. (IF 4,02).

2010

1- Grimsley N, Pequin B, **Bachy C**, Moreau H, Piganeau G (2010) Cryptic sex in the smallest eukaryotic marine green alga. **Molecular Biology and Evolution** 27(1):47-54. (IF 10,22).

\* Co-first : authors contributed equally.

## CONFERENCES

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### ORAL presentation and session organization:

2021 ISYEB Seminar, Paris, France. **Invited talk:** “Spatial co-occurrence of marine viruses and their pico-algal hosts: the *Bathycoccus* case study”

2019 Metabarcoding formation 2019 in Roscoff, France: “Nanopore sequencing for metabarcoding: beginnings”.

2017 International Botanical Congress – Shenzhen, China. **Invited talk:** “*The Prasinophyte - Land plant Connection: Opportunities for Insights into Evolutionary Processes within the Green Lineage*”.

2017 IDEEV seminar – Orsay, France. **Invited talk:** “*Algal phytochromes: exploring the taxonomic distribution and function of a photosensory signaling protein in microbial eukaryotes*”.

2015 CIFAR Integrated Microbial Biodiversity Program Meeting -Victoria, Canada: “*Global host-virus transcriptomic profile*”.

2014 International Society for Microbial Ecology - Seoul, Korea. **Invited oral session:** “*How biochemical pathway gaps can reveal growth requirements of dominant taxa in the surface ocean*” and **Contributed oral session:** “*Discovery of a photosensory signaling protein*”

- widespread in algae”.
- 2014 ASLO Ocean Sciences Meeting, Honolulu, Hawaii, USA.  
**Session organizer** (co-chaired with Alexandra Z. Worden) - *Aquatic microbial eukaryotes: from genomes to ecosystems.*
- 2012 International Society for Microbial Ecology - Copenhagen, Denmark: “*Accuracy of protist diversity assessments*”
- 2011 Symposium on Aquatic Microbial Ecology - Rostock, Germany:  
“*Morphological versus molecular-based diversity surveys of planktonic microbial eukaryotes: the case of tintinnid ciliates*”

#### POSTER presentation:

- 2018 International Society for Microbial Ecology - Leipzig, Germany: “*Characterization of the diversity and function of plankton associated microbiota*”
- 2018 International Society of Symbiosis - Corvallis, USA: “*Characterization of the diversity and function of plankton associated microbiota*”
- 2017 International Congress of Protistology - Prague, Czech Republic: “*Characterization of the diversity and function of plankton associated microbiota*”
- 2016 International Society for Microbial Ecology - Montréal, Canada: “*Quantitative assessment of the green alga *Micromonas* in Arctic phytoplankton communities*”
- 2015 Jacques Monod Conference Marine Eco-system Biology - Roscoff, France: “*Global host-virus transcriptomic profile*”
- 2015 Genomics of Energy & Environment Meeting (JGI-DOE) - Walnut Creek, USA: “*Differential gene expression in the viral infection of the marine alga *Micromonas pusilla* under nutrient limitation*”
- 2015 Western Photosynthesis Meeting - Asilomar, USA: “*Global and photosynthesis-related gene expression in the marine alga *Micromonas pusilla**”
- 2014 ASLO Ocean Sciences Meeting, Honolulu - Hawaii, USA: “*Phytochromes in widespread marine algae reveal origins of plant signaling proteins*”
- 2014 Genomic Science Annual Contractor-Grantee Meeting - Washington DC, USA: “*Phytochromes in photosynthetic algae reveal origins of plant signaling proteins*”
- 2014 Genomic Science Annual Contractor-Grantee Meeting - Washington DC, USA: “*Phytochromes in photosynthetic algae reveal origins of plant signaling proteins*”
- 2010 British Society of Protist Biology-ISOP joint meeting - Canterbury, United Kingdom: “*Merging molecular phylogeny and classical taxonomy of tintinnid ciliates*” – Prize of best poster.
- 2010 Symposium on Aquatic Microbial Ecology - Piran, Slovenia: “*Diversity and vertical distribution of microbial eukaryotes in the snow, sea ice and marine*”

**Reviewer for:** ISME Journal, Microbial Ecology, Molecular Ecology, Environmental Microbiology, Protist, Scientific Reports, Zoologica Scripta, Journal of Eukaryotic Microbiology, Biogeosciences, Frontiers in Microbiology, Journal of Phycology, Aquatic Ecology.

#### **RESPONSABILITIES**

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- Elected member (PhD, Postdocs) in the Ecology, Systematics and Evolution Laboratory Council (2009/2011).
- International Society for Microbial Ecology, American Society of Limnology and Oceanography and Society of Aquatic Microbial Ecology member.
- Temporary member of the JGI user scientific committee in 2015
- Co-funder of Communication committee (CoCom) of AD2M lab (2016)
- Elected member in the board of the Young Researcher Association of the Biological Station of Roscoff (2017/2018)

#### **TRAINING COURSES**

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- Annual Exobiologist students meeting (RED’) in Le Teich, France. University of Bordeaux, 2009.
- “Protists in the biosphere” in Paris, France. National Museum of Natural History, 2010
- Workflow4Metabolomics workshop (W4m) in Roscoff, France. SBR, 2016.
- Moore Foundation Young researchers in Oceanography Summit (ECOS) in Kona, USA, 2017.
- EukRef Annotation International workshop, in charge of a prasinophyte class, 2018

- Thematic school on “single-cell transcriptomics” in Roscoff, France. SBR, 2019

## STUDENT MENTORING

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Wei Ting Chen (University of Taiwan; PhD student), Fabian Wittmers (Kiel University; PhD student), Charlotte Eckmann (University of California Santa Cruz; PhD).

## FIELD SAMPLING

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- Monthly sampling in the bay of Villefranche-sur-Mer from december 2008 to december 2011.
- Frequent scientific cruises in the Pacific ocean between 2013 and 2016, being chief scientist for DSEL15 in May 2015 (2 weeks), on eukaryotic diversity of deep sea sediments.

## PUBLIC OUTREACH AND TEACHING

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- Le Pourquoi du Comment! The science film festival of Roscoff, co-founder (4 editions since 2018).
- PlanktonPlanet in Nantes for “La Mer XXL”, first french ocean fair, June 2019.
- “Circonvolutions”, CNRS project to teach Darwinian evolution to college students in January 2011.
- “Open house” at the MBARI, phytoplankton workshop.
- “Faites de la science”, microscopic workshops with young pupils in May 2010.
  
- Molecular approaches to study marine microbes (Master 2 OEM, since 2017)
- Marine Microbial Ecology introductive class to master students (Master 2 EBE, 2017/2018)
- Analytical techniques for Microbial Ecology (PennState University, 2021)

## SKILLS

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**Languages**    French (mother tongue)  
                  English (current and scientific)  
                  Spanish (basic knowledge)

### **Bioinformatics:**

Bioinformatic expert in metabarcoding (Sanger, Illumina, Nanopore), bulk and single-cell RNA-seq, genome and transcriptome assembly, meta-genomic and –transcriptomic read recruitment, proteomic data mapping (MS), metabolomic data analyses (LC et GC-MS) and Phylogenetic/genomic reconstruction.

**Softwares:** Tuxedo suite, EdgeR, BioEdit, MrBayes, MUST, FastTree, Treefinder, PAUP, BEAST, Phylobayes, MEGA, Mesquite, Network, SplitsTree, Arlequin, AmpliconNoise, CD-HIT, Mothur, USEARCH, Unifrac, GSEA, Galaxy, xcms, QIIME2, IQtree... User of python and Perl scripts.

**Systems biology:** DNA and RNA extraction, PCR, qPCR, purification, cloning, Sanger sequencing, Nanopore sequencing, primer designing, preparation of amplification products and purification for NGS, metabolite extractions, RACE approach, cDNA library, FISH, DAPI, fluorometry, flow cytometry and sorter, ultracentrifugation, algal culture in sterile condition, CO<sub>2</sub> fixation measurement.

## AWARD AND GRANTS

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2016-2018: Marie Sklodowska-Curie grant agreement N°706430 (185000€).

2008-2012: *ANR Grants* (PhD) from the Agence Nationale de la Recherche, France.

2007-2008: “*Excellence Grant*” for MD students, ‘Bourse au Mérite’, (1800 €).

Outstanding Student Presentation, 2010 Annual Meeting of the International Society of Protistologists in Canterbury, United Kingdom.

## PROFESSIONAL EXPERIENCE

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Review and selection of hydrobiological models – A modeling approach coupling hydrodynamics and hydrobiology for water resource management. Biological expert’s work for Veolia-Water, Research & Innovation department in June/July 2009.