

## ***CURRICULUM VITAE***

### **Luo, Haiwei**

**Date of Birth:** 01/1982  
**ADDRESS:** School of Life Sciences, The Chinese University of Hong Kong  
Shatin, New Territories, Hong Kong SAR  
**Telephone:** (852) 3943 6121  
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**Lab Web:** www.luolab.net

### **EDUCATION**

2008-2010 Ph.D. in Molecular Evolution, University of South Carolina, Columbia, SC, USA  
2006-2008 M.S. in Microbial Ecology, University of South Carolina, Columbia, SC, USA  
2000-2004 B.S. in Environmental Science, Xiamen University, Xiamen, China

### **PROFESSIONAL SOCIETIES**

American Association for the Advancement of Science (AAAS)  
American Society for Microbiology (ASM)  
International Society for Microbial Ecology (ISME)  
Society for Molecular Biology and Evolution (SMBE)

### **PROFESSIONAL APPOINTMENT**

01/2015-present, Assistant Professor (tenure-track), School of Life Sciences  
The Chinese University of Hong Kong, Hong Kong SAR  
09/2015-present, Investigator, Partner State Key Laboratory of Agrobiotechnology  
The Chinese University of Hong Kong, Hong Kong SAR  
05/2010-12/2014, Postdoctoral Research Associate, Department of Marine Sciences  
University of Georgia, Athens, GA, USA

### **RESEARCH OVERVIEW**

Research in Luo Lab has been focusing on the population genetic mechanisms giving rise to the genomic diversity among marine microbial lineages. He uses genomic and bioinformatic approaches to investigate the role of selection, drift, mutation, and recombination in assembling genetic diversity at different timescales. The research outcomes have implications for climate change, paleo-oceanic processes, and marine conservation. He is becoming broadly interested in ecologically relevant microbial lineages in the environments, and has initiated genomics research on soil bacteria since 2018.

### **HONORS AND AWARDS**

2017. CUHK Young Researcher Award

### **MANUSCRIPTS SUBMITTED** (\* corresponding author; ^equal contribution; lab members; visiting student)

C-X. Xue<sup>^</sup>, H. Zhang<sup>^</sup>, H-Y. Lin<sup>^</sup>, Y. Sun, D. Luo, Y. Huang, X-H. Zhang\*, **H. Luo**\*. Transiently increased mutation rate driving genome reduction of a free-living marine bacterial lineage. (submitted to *The ISME Journal*)

M. Ren, Y. Huang, H. Wang, Z. Hu, S. Clingenpeel, B.K. Swan, M.M. Fonseca, D. Posada, R. Stepanauskas, J.T. Hollibaugh, P.G. Foster, T. Woyke, **H. Luo**\*. Phylogenomics suggests oxygen availability as a driving force in Thaumarchaeota evolution. (under review at *The ISME Journal*)

H. Jian<sup>^</sup>, G. Xu<sup>^</sup>, C. Chen, S. Liu, X Feng, **H. Luo**, H. Zhang, L. Wang, Z. Wang, Z. Deng, F. Wang, X. Xiao\*. The DNA Phosphorothioation participates in gene regulation: influence the heat-shock response and prophage activation in deep-sea bacterium. (submitted to *Nature Communications*)

H. Cao<sup>^</sup>, T. Xia<sup>^</sup>, Y. Li<sup>^</sup>, Z. Xu<sup>^</sup>, S. Bougouffa, Y.K. Lo, V.B. Bajic, **H. Luo**, P.C.Y. Woo, A. Yan\*. A multidrug resistant clinical *P. aeruginosa* isolate with a distinctive MLST genotype: uncoupled

quorum sensing modulates the interplay of virulence and resistance. (under revision at *Antimicrobial Agents and Chemotherapy*)

**RESEARCH PUBLICATIONS** (a total of 43 refereed papers, >1,300 citations, h-index 19)

- H. Zhang, S. Yoshizawa, Y. Sun, Y. Huang, X. Chu, J.M. González, J. Pinhassi, **H. Luo**\*. 2019. Repeated Evolutionary Transitions of Flavobacteria from Marine to Non-Marine Habitats. *Environmental Microbiology* (accepted)
- G. Yu<sup>^</sup>, Y. Jiang<sup>^</sup>, J. Wang, H. Zhang, and **H. Luo**\*. 2018. BMC3C: Binning Metagenomic Contigs using Codon usage, sequence Composition and read Coverage. *Bioinformatics* (in press)
- Y. Sun and **H. Luo**\*. 2018. Homologous recombination in core genomes facilitates marine bacterial adaptation. *Applied and Environmental Microbiology* 84 (11): e02545-17 (selected as a “Spotlight” article by the journal)
- F.L. Hellweger<sup>\*</sup>, Y. Huang, **H. Luo**\*. 2018. Carbon limitation drives GC content evolution of a marine bacterium in an individual-based genome-scale model. *The ISME Journal* 12 (5):1180-1187
- W. Xie<sup>\*</sup>, **H. Luo**, S.K. Murugapiran, J.A. Dodsworth, S. Chen, Y. Sun, B.P. Hedlund, P. Wang, H. Fang, M. Deng, and C. Zhang<sup>\*</sup>. 2018. Localized high abundance of Marine group II archaea in the subtropical Pearl River Estuary: implications for their niche adaptation. *Environmental Microbiology* 20 (2):734-754
- H. Long<sup>^</sup>, W. Sung<sup>^</sup>, S. Kucukyildirim<sup>^</sup>, E. Williams, S. Miller, W. Guo, C. Patterson, C. Gregory, C. Strauss, C. Stone, C. Berne, D. Kysela, W.R. Shoemaker, M. Muscarella, **H. Luo**, J.T. Lennon, Y.V. Brun, and M. Lynch<sup>\*</sup>. 2018. Evolutionary determinants of genome-wide nucleotide composition. *Nature Ecology & Evolution* 2 (2):237-240
- H. Luo**<sup>^</sup>, Y. Huang<sup>^</sup>, R. Stepanauskas, and J. Tang. 2017. Excess of non-conservative amino acid changes in marine bacterioplankton lineages with reduced genomes. *Nature Microbiology* 2:17091
- H.A. Bullock<sup>\*</sup>, **H. Luo**, and W.B. Whitman. 2017. Evolution of dimethylsulfoniopropionate metabolism in marine phytoplankton and bacteria. *Frontiers in Microbiology* 8:637
- Y. Sun, Y. Zhang, J.T. Hollibaugh, and **H. Luo**\*. 2017. Ecotype diversification of an abundant Roseobacter lineage. *Environmental Microbiology* 19 (4):1625-1638
- Y. Sun, K.E. Powell, W. Sung, M. Lynch, M.A. Moran, and **H. Luo**\*. 2017. Spontaneous mutations of a model heterotrophic marine bacterium. *The ISME Journal* 11 (7):1713-1718
- W. Zhang, W. Ding, B. Yang, R. Tian, S. Gu, **H. Luo**, and P-Y Qian<sup>\*</sup>. 2016. Genomic and transcriptomic evidence for carbohydrate consumption among microorganisms in a cold seep brine pool. *Frontiers in Microbiology* 7:1825
- H. Luo**<sup>\*</sup>, Y. Sun, J.T. Hollibaugh, and M.A. Moran. 2016. Low genome content diversity of marine planktonic Thaumarchaeota. *Environmental Microbiology Reports* 8 (4):501-507
- Y. Zhang, Y. Sun, N. Jiao, R. Stepanauskas, and **H. Luo**\*. 2016. Ecological genomics of the uncultivated marine Roseobacter lineage CHAB-I-5. *Applied and Environmental Microbiology* 82 (7):2100-2111
- H. Luo**<sup>\*</sup>, L. Thompson, U. Stingl, and A.L. Hughes. 2015. Selection maintains low genomic GC content in marine SAR11 lineages. *Molecular Biology and Evolution* 32 (10): 2738-2748
- H. Luo**\*. 2015. Evolutionary origin of a streamlined marine bacterioplankton lineage. *The ISME Journal* 9 (6):1423-1433
- H. Luo**\*. 2015. The use of evolutionary approaches to understand single cell genomes. *Frontiers in Microbiology* 6: 191
- H. Luo** and M.A. Moran<sup>\*</sup>. 2015. How do divergent ecological strategies emerge among marine bacterioplankton lineages? *Trends in Microbiology* 23 (9):577-584
- J.M. Labonté, B.K. Swan, B. Poulos, **H. Luo**, S. Koren, S.J. Hallam, M.B. Sullivan, T. Woyke, K.E. Wommack, and R. Stepanauskas<sup>\*</sup>. 2015. Single cell genomics-based analysis of virus-host interactions in marine surfacebacterioplankton. *The ISME Journal* 9 (11):2386-2399
- (Before CUHK)
- B.P. Durham, S. Sharma, **H. Luo**, C.B. Smith, S.A. Amin, S.J. Bender, S.P. Dearth, B.A.S. Van Mooy, S.R. Campagna, E.B. Kujawinski, E.V. Armbrust, and M.A. Moran<sup>\*</sup>. 2015. Cryptic carbon and sulfur cycling between surface ocean plankton. *Proc. Natl. Acad. Sci. USA* 112 (2): 453-457
- H. Luo** and M.A. Moran<sup>\*</sup>. 2014. Evolutionary ecology of the marine Roseobacter clade. *Microbiology and Molecular Biology Reviews* 78 (4): 573-587
- H. Luo**\*. 2014. New computational methodologies to understand microbial diversity. In: *Encyclopedia of Metagenomics*. Karen E. Nelson, ed. Springer.

- M. Lin, M.V. Kitahara, **H. Luo**, D. Tracey, J. Geller, F. Hironobu, D.J. Miller, and C.A. Chen\*. 2014. Mitochondrial genome rearrangements in the Scleractinia / Corallimorpharia complex: implications for coral phylogeny. *Genome Biology and Evolution* 6 (5): 1086-1095
- B.P. Durham, J. Grote, K.A. Whittaker, S.J. Bender, **H. Luo**, S.L. Grim, J.M. Brown, J.R. Casey, A. Dron, L. Florez-Leiva, A. Krupke, C.M. Luria, A.H. Mine, S. Pather, A. Talarmin, E.K. Wear, T.S. Weber, J.M. Wilson, M.J. Church, E.F. DeLong, D.M. Karl, G.F. Steward, J.M. Eppley, N.C. Kyrpides, S. Schuster, and M.S. Rapp\*. 2014. Draft genome sequence of marine alphaproteobacterial strain HIMB11, the first cultivated representative of a unique lineage within the Roseobacter clade possessing an unusually small genome. *Standards in Genomic Sciences* 9:632-645
- H. Luo**, B.K. Swan, R. Stepanauskas, A.L. Hughes, and M.A. Moran\*. 2014. Evolutionary analysis of a streamlined lineage of surface ocean Roseobacters. *The ISME Journal* 8:1428-1439
- H. Luo**, B.K. Swan, R. Stepanauskas, A.L. Hughes, and M.A. Moran\*. 2014. Comparing effective population sizes of dominant marine Alphaproteobacteria lineages. *Environmental Microbiology Reports* 6 (2): 167-172
- H. Luo\***, B.B. Tolar, B.K. Swan, C.L. Zhang, R. Stepanauskas, M.A. Moran, and J.T. Hollibaugh\*. 2014. Single cell genomics shedding light on marine Thaumarchaeota diversification. *The ISME Journal* 8: 732-736
- H. Luo**, M. Csuros, A.L. Hughes, and M.A. Moran\*. 2013. Evolution of divergent life history strategies in marine Alphaproteobacteria. *mBio* 4 (4): e00373-13
- B.K. Swan, B. Tupper, A. Sczyrba, F.M. Lauro, M. Martinez-Garcia, J.M. Gonzalez, **H. Luo**, J.J. Wright, Z. C. Landry, N.W. Hanson, B. Thompson, N.J. Poulton, P. Schwientek, S.G. Acinas, S.J. Giovannoni, M.A. Moran, S.J. Hallam, R. Cavicchioli, T. Woyke, and R. Stepanauskas\*. 2013. Prevalent genome streamlining and latitudinal divergence of marine bacteria in the surface ocean. *Proc. Natl. Acad. Sci. USA* 110 (28):11463-11468
- H. Luo** and M.A. Moran\*. 2013 Assembly-free metagenomic analysis reveals new metabolic capabilities in surface ocean bacterioplankton. *Environmental Microbiology Reports* 5 (5): 686-696
- N. Akram, J. Palovaara, J. Forsberg, M.V. Lindh, D.L. Milton, **H. Luo**, J.M. Gonzalez, and J. Pinhassi\*. 2013. Regulation of proteorhodopsin gene expression by nutrient limitation in the marine bacterium *Vibrio* sp. AND4. *Environmental Microbiology* 15 (5): 1400-1415
- M.A. Moran\*, B. Satinsky, S.M. Gifford, **H. Luo**, A. Rivers, L. Chan, J. Meng, B.P. Durham, C. Shen, V.A. Varaljay, C.B. Smith, P.L. Yager, and B.M. Hopkinson. 2013. Sizing up metatranscriptomics. *The ISME Journal* 7: 237-243
- H. Luo\*** and A.L. Hughes. 2012.  $d_N/d_S$  does not show positive selection drives separation of polar-tropical SAR11 populations. *Molecular Systems Biology* 8:625
- H. Luo\***. 2012. Predicted protein subcellular localization in dominant surface ocean bacterioplankton. *Applied and Environmental Microbiology* 78 (18): 6550-6557
- H. Luo**, W. Arndt, Y. Zhang, G. Shi, M. Alekseyev, J. Tang, A.L. Hughes\*, and R. Friedman. 2012. Phylogenetic analysis of genome rearrangements among five mammalian orders. *Molecular Phylogenetics and Evolution* 65 (3): 871-882
- H. Luo**, A. Loytynoja, and M.A. Moran\*. 2012. Genome content of uncultivated marine *Roseobacters* in the surface ocean. *Environmental Microbiology* 14 (1): 41-51
- H. Luo**, R. Friedman, J. Tang, and A.L. Hughes\*. 2011. Genome reduction by deletion of paralogs in the marine cyanobacterium *Prochlorococcus*. *Molecular Biology and Evolution* 28 (10): 2751-2760
- H. Luo**^, H. Zhang^, R.A. Long, and R. Benner. 2011. Depth distributions of alkaline phosphatase and phosphonate utilization genes in the North Pacific Subtropical Gyre. *Aquatic Microbial Ecology* 62: 61-69 (recommended by Faculty of 1000, <http://f1000.com/prime/13445998>)
- H. Luo**, J. Tang, R. Friedman, and A.L. Hughes\*. 2011. Ongoing purifying selection on the intergenic spacers in the Group A *Streptococcus*. *Infection, Genetics and Evolution* 11 (2): 343-348
- J. Shi, Y. Zhang, **H. Luo**, and J. Tang\*. 2010. Using jackknife to assess the quality of gene order phylogenies. *BMC Bioinformatics* 11:168
- H. Luo\***, R. Benner, R. A. Long, and J. Hu. 2009. Subcellular localization of marine bacterial alkaline phosphatases. *Proc. Natl. Acad. Sci. USA* 106 (50): 21219-21223
- H. Luo\***, Z. Sun, W. Arndt, J. Shi, R. Friedman, and J. Tang. 2009. Gene order phylogeny and the evolution of methanogens. *PLoS ONE* 4 (6): e6069
- H. Luo**, J. Shi, W. Arndt, J. Tang, and R. Friedman\*. 2008. Gene order phylogeny of the genus *Prochlorococcus*. *PLoS ONE* 3 (12): e3837
- B. Huang, L. Ou, H. Hong\*, **H. Luo**, and D. Wang. 2005. Bioavailability of dissolved organic phosphorus

compounds to typical harmful dinoflagellate *Prorocentrum donghaiense* Lu. *Marine Pollution Bulletin* 51: 838-844

### **RESEARCH TALKS (selected)**

- 07/2018. "Drivers of genome reduction in free-living marine bacteria". Society of Molecular Biology and Evolution annual meeting, Yokohama, Japan (contributed talk)
- 06/2018. "Evolutionary mechanisms driving niche specialization of a marine flavobacterial lineage". First International Conference on Marine Flavobacteria: Ecology, Pathology, Genomics and Integrative Biology, Cargèse (Corsica), France (contributed talk)
- 07/2017. "New evolutionary mechanisms giving rise to marine bacterioplankton lineages with highly reduced genomes". Gordon Research Conference, Marine Molecular Ecology, Hong Kong SAR (invited talk)
- 05/2017. "Environmental genomics of the marine Roseobacter group". 9<sup>th</sup> International Food Safety Symposium: Gut Microbiome of the Infant / Microbes and Environmental Health, The Hong Kong Polytechnic University, Hong Kong SAR (invited talk)
- 06/2016. "Evolutionary genomics of a generalist marine bacterial lineage". 2016 International Symposium on Marine Genomics, Seoul National University, Seoul, South Korea (invited talk)
- 12/2015. "How do bacterial genomes change in the ocean?" Biodiversity Research Center, Academia Sinica, Taipei, Taiwan (invited talk)
- 05/2015. "How do bacterial genomes expand and shrink in the oceans?" Next-Generation Sequencing Data Analysis Workshop 2015. The University of Hong Kong, Hong Kong SAR (invited talk)

### **RESEARCH GRANTS**

- 2019-2021. 深圳市科技創新委員會 (Shenzhen Science and Technology Innovation Commission), 基礎研究學科佈局項目, "深圳海域造礁石珊瑚共生細菌基因組學研究 (Genomic study of stony coral symbiotic bacteria in Shenzhen coastal waters)" (基 20180279), PI, RMB ¥3,000,000,
- 2018-2021. 國家重點研發計劃 (National Key R&D Program of China), "海斗深淵環境特征與生命演化過程 (Environmental features and life evolution in hadopelagic waters)" (2018YFC0309800), co-I (with Xiang Xiao at Shanghai Jiao Tong University as PI), RMB ¥1,453,600 (my allocation)
- 2018-2020. Hong Kong Research Grants Council (RGC) General Research Fund (GRF), "Roseobacter genome content diversification in a heterogeneous ocean" (14163917), PI, HK\$848,714
- 2018-2021. National Natural Science Foundation of China (NSFC), "Evolution of anaerobic metabolic genes in marine Roseobacters" (41776129), PI, RMB ¥680,000
- 2017-2025. Hong Kong Research Grants Council (RGC) Area of Excellence Scheme (AoE), "Center for genomic studies on plant-environment interaction for sustainable agriculture and food security", co-PI (with H-M Lam at CUHK as PI); HK\$1,000,000 (my allocation during the first period 2017-2021)
- 2017-2019. Hong Kong Environment and Conservation Fund (ECF), "Genomic analysis of coral associated bacteria in Hong Kong waters" (15/2016), PI (with David Baker at HKU as co-I), HK\$998,673
- 2016-2019. National Natural Science Foundation of China (NSFC), "Genomic diversity of marine planktonic Roseobacters and the underlying ecological and evolutionary mechanisms" (41576141), PI, RMB ¥816,000
- 2016-2018. Hong Kong Research Grants Council (RGC) Early Career Scheme (ECS), "Metabolism and evolution of uncultivated members of a generalist marine bacterial lineage" (24101015), PI, HK\$1,067,343

### **PROFESSIONAL ACTIVITY**

#### **Panel Service**

National Natural Science Foundation of China (NSFC) Department of Microbiology 2017, 2018

#### **Research Proposal Review**

The Swiss National Science Foundation (SNSF) 2018  
The UK Biotechnology and Biological Sciences Council (BBSRC) 2018  
The U.S. National Science Foundation (NSF) 2013, 2015  
The National Natural Science Foundation of China (NSFC) 2017, 2018

#### **Editorship**

Associate Editor, *Frontiers in Microbiology*, 09/2017-  
I have handled >45 manuscripts.

Associate Editor, *Frontiers in Marine Science*, 08/2017-

I have handled 2 manuscripts.

**Manuscript Review** (selected)

2018 Reviewed for eLife  
2018 Reviewed for *Nature Microbiology*  
2018 Reviewed for *The ISME Journal*  
2018 Reviewed for *The ISME Journal*  
2018 Reviewed for *The ISME Journal*  
2018 Reviewed for mBio  
2018 Reviewed for *Nature Microbiology*  
2018 Reviewed for *Genome Biology*  
2017 Reviewed for *Communications Biology*  
2017 Reviewed for *Nature Microbiology*  
2017 Reviewed for *Genome Biology and Evolution*  
2017 Reviewed for *The ISME Journal*  
2017 Reviewed for *The ISME Journal*  
2017 Reviewed for *Environmental Microbiology*  
2017 Reviewed for *Molecular Microbiology*  
2017 Reviewed for *Environmental Microbiology*  
2016 Reviewed for *Science Advances*  
2016 Reviewed for *Molecular Biology and Evolution*  
2016 Reviewed for *Environmental Microbiology*  
2015 Reviewed for *The ISME Journal*  
2015 Reviewed for *Environmental Microbiology*  
2015 Reviewed for *BioTechniques*  
2015 Reviewed for *Proceedings of the National Academy of Sciences*  
2015 Reviewed for *The ISME Journal*  
2014 Reviewed for *The ISME Journal*  
2014 Reviewed for *The ISME Journal*  
2014 Reviewed for *Photosynthesis Research*  
2014 Reviewed for *The ISME Journal*  
2013 Reviewed for *The ISME Journal*  
2013 Reviewed for *The ISME Journal*  
2013 Reviewed for *The ISME Journal*  
2013 Reviewed for *The ISME Journal*  
2013 Reviewed for *Proceedings of the National Academy of Sciences*  
2012 Reviewed for *The ISME Journal*  
2012 Reviewed for *Environmental Research Letters*  
2011 Reviewed for *Proceedings of the National Academy of Sciences*

## TEACHING

***Courses Taught or co-Taught at CUHK:***

- (1) BIOL3410 General Microbiology (Fall)
- (2) BIOL4010 Evolutionary Biology (Fall)
- (3) LSCI5011 Advanced Topics in Marine and Environmental Science (Spring)
- (4) ENSC2270 Introduction to Environmental Science (Spring)
- (5) GNB5050 Theories and Algorithms in Bioinformatics (Fall and Spring)

***Postgraduate Students Advised:***

Xiaoyuan Feng, Ph.D student (08/2018-now)  
Hao Zhang, Ph.D student (08/2017-now)  
Xiao Chu, Ph.D student (co-advised by Put Ang, 08/2017-now)  
Danli Luo, Ph.D student (02/2017-now)  
Xiaojun Wang, Ph.D student (08/2016-now)  
Siyao Li, Ph.D student (08/2015-now)  
Ying Sun, Ph.D student (08/2015-07/2018; Ph.D dissertation defended in 07/2018)

***Postdoctoral Assistant/Associate Advised:***

Dr. Sishuo Wang (Ph.D awarded by University of British Columbia, Canada), (11/2017-now)

Dr. Ying Sun (Ph.D awarded by The Chinese University of Hong Kong, Hong Kong SAR), (08/2018-02/2019)

Dr. Minglei Ren (Ph.D awarded by Institute of Hydrobiology, CAS, China), (08/2016-12/2018)

Dr. Zhichao Zhou (Ph.D awarded by University of Hong Kong, Hong Kong SAR), (05/2017-11/2018)

Dr. Jesse McNichol (Ph.D awarded by WHOI-MIT joint program, USA), (11/2016-11/2017)

Dr. Yongjie Huang (Ph.D awarded by University of Georgia, USA), (05/2015-06/2017)

***Junior Research Assistant Advised:***

Jinjin Tao (08/2018-now)

Jie Liu (co-advised by Hon-Ming Lam, 08/2018-now)

Rong Zhao (08/2017-now)

Jianjun Xu (09/2018-12/2018)

Xiaoyuan Feng (03/2018-07/2018)

Hao Zhang (07/2016-07/2017)

Xiao Chu (07/2016-07/2017)

Ying Sun (03/2015-07/2015)