Jean-Marie Volland, Ph.D.

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RESEARCH INTERESTS

Evolution of biological complexity; chemosynthesis; large sulfur bacteria as models

POSITIONS

2023 – Current	Assistant Professor, University of California Santa Barbara, Santa Barbara, CA
2020 – 2023	Scientist, Laboratory for Research in Complex Systems, Menlo Park, CA
2018 – Current	Affiliate Scientist, Joint Genome Institute (DOE, LBNL)
2010 – 2011	Visiting Guest Researcher, Center for Research and Advanced Studies of the National Polytechnic Institute of Merida, Mexico, & University of Antilles.

EDUCATION

Fellow	(2018-2020)	Jointly at Laboratory for Research in Complex Systems & Joint Genome Institute (California). Supervisors: Drs. Shailesh Date & Tanja Woyke
Postdoc	(2016-2017)	University of Vienna (Austria). Chemosynthetic symbiosis. Supervisor: Dr. Silvia Bulgheresi
Postdoc	(2012-2015)	University of Vienna (Austria). Chemosynthetic symbiosis. Supervisor: Dr. Monika Bright
Ph.D.	(2007-2010)	University of Antilles (France). Physiology & Biology of Organisms. Supervisor: Pr. Olivier Gros
MS	(2005-2007)	University of Antilles & University of La Rochelle (France). Tropical Biodiversity and Marine Coastal Environments
BS	(2002-2005)	University of la Réunion (France). Biology of Organisms

MENTORING

- Currently supervising 1 Postdoc, 2 Ph.D. students (UCSB), 50% of 2 additional Ph.D. students (Univ. Antilles), 3 undergraduate students.
- Past supervisor of 7 undergraduate students and 6 Master students

PUBLICATIONS

1. Contarini PE, Emboule E, Jean-Louis P, Woyke T, Date SV, O Gros, Volland JM. 2024. A novel open-source cultivation system helps establish the first full cycle chemosynthetic symbiosis model system involving the giant ciliate *Zoothamnium niveum*. Frontiers in Microbiology 15, 1491485
2. Ionescu D, Volland JM, Contarini PE, Gros O. 2023. Genomic Mysteries of Giant Bacteria: Insights and Implications. Genome Biology and Evolution, 15 (9), art. no. evad163

3. **Volland JM.** 2023. Small cells with big secrets. Nature Reviews Microbiology, 21 (7), p. 414.
4. Sannino DR, Arroyo FA, Pepe-Ranney C, Chen W, Volland JM, Elisabeth NH, Angert ER. 2023. The exceptional form and function of the giant bacterium Ca. Epulopiscium viviparus revolves around its sodium motive force. Proceedings of the National Academy of Sciences of the United States of America, 120 (52), art. no. e2306160120
5. Bizic M, Brad T, Ionescu D, Barbu-Tudoran L, Zoccarato L, Aerts J, Contarini PE, Gros O, Volland JM, Popa R, Ody J, Vellone D, Flot JF, Tighe S, and Sarbu SM. 2022. Cave Thiovulum (*Candidatus* Thiovulum stygium) differ metabolically and genomically from marine species. ISME J. 17 (3), pp. 340-353
6. Volland JM, Gonzalez-Rizzo S, Gros O, Tyml T, Ivanova N, Schulz F, Goudeau D, Elisabeth NH, Nath N, Udwary D, Malmstrom R, Guidi-Rontani C, Bolte-Kluge S, Davies KM, Jean MR, Mansot JL, Mouncey NJ, Angert E, Woyke T, Date SV. 2022. A centimeter-long bacterium with DNA contained in metabolically active membrane-bound organelles. Science 376, 1453–1458.
7. Espada-Hinojosa S, Drexel J, Kesting J, Kniha E, Pifeas I, Schuster L, **Volland JM**, Zambalos HC, Bright M. 2022. Host-symbiont stress response to lack-of-sulfide in the giant ciliate mutualism. PLOS One 17(2).
8. Weiner AKM, Cullisona B, Date SV, Tyml T, **Volland JM**, Woyke T, Katz LA, Sleith RS. 2022. Examining the relationship between the testate amoeba *Hyalosphenia papilio* (Arcellinida, Amoebozoa) and its associated intracellular microalgae using molecular and microscopic methods. Protist 173(1).
9. Weber PM, Paredes GF, Viehboeck T, Pende N, **Volland JM**, Gros O, VanNieuwenhze, M, Ott J, Bulgheresi S. 2022. FtsZ-mediated fission of a cuboid bacterial symbiont. iScience 25(1).
10. Paredes GF, Viehboeck T, Lee R, Palatinszky M, Mausz MA, Reipert S, Schintlmeister A, Maier A, **Volland JM**, Hirschfeld C, Wagner M, Berry D, Markert S, Bulgheresi S, König L. 2021. Anaerobic sulfur oxidation underlies adaptation of a chemosynthetic symbiont to oxic-anoxic interfaces. mSystems, 6 (3), art. no. e01186-20
11. Bright, M., Espada-Hinojosa, S., **Volland, JM.**, Drexel, (…), Nemeschkal, H.L. 2019. Thiotrophic bacterial symbiont induces polyphenism in giant ciliate host *Zoothamnium niveum*. Scientific Reports, 9 (1), art. no. 15081
12. **Volland JM**, Schintlmeister A, Zambalos H, Reipert S, Mozetič P, Espada-Hinojosa S, Turk V, Wagner M, Bright M. 2018. NanoSIMS and tissue autoradiography reveal symbiont carbon fixation and organic carbon transfer to giant ciliate host. ISME Journal, 12 (3), pp. 714-727.
13. **Volland JM**, Bustamante P, Aldana Aranda D, Gros O. 2018. The potential role of spherocrystals in the detoxification of essential trace metals following exposure to Cu and Zn in the fighting conch *Strombus (Lobatus) pugilis*. BioMetals, 31 (4), pp. 627-637.
14. Tsao HF, Scheikl U, **Volland JM**, Köhsler M, Bright M, Walochnik J, Horn M. 2017. '*Candidatus* Cochliophilus cryoturris' (Coxiellaceae), a symbiont of the testate amoeba *Cochliopodium minus*. Scientific Reports 7 (1): art. no. 3394.
15. Seah BKB, Schwaha T, **Volland J-M**, Huettel B, Dubilier N, Gruber-Vodicka HR. 2017. Specificity in diversity: Single origin of a widespread ciliate-bacteria symbiosis. Proceedings of the Royal Society B: Biological Sciences, 284 (1858).
16. Szabo G, Schulz F, Toenshoff E, **Volland JM**, Finkel O, Belkin S,Horn M. 2017 Convergent patterns in the evolution of mealybug symbioses involving different intrabacterial symbionts. ISME journal 11 (3): 715-726.
17. **Volland JM,** Scanning Electron Microscopy for the Life Sciences – Book Review. Marine Ecology, 2016, 37(1), pp. 235.
18. B. Bayer, J. Vojvoda, P. Offre, R.J.E. Alves, N.H. Elisabeth, J.A.L. Garcia, **Volland JM**, A. Srivastava, C. Schleper, and G.J. Herndl. 2016 Physiological and genomic characterization of two novel marine thaumarchaeal isolates indicate putative niche differentiation. ISME journal. 10 (5): 1051-1063.
19. Enriquez-Diaz M.R., **Volland J-M.**, Chavez-Villegas J.F., Aldana-Aranda D & Gros O. 2014 Development of the planktotrophic veligers and newly metamorphosed juveniles of *Strombus pugilis* (mollusca: gastropoda). *Journal of Molluscan Studies*. 81 (3): 335-344
20. Bright M., Espada-Hinojosa S., Lagkouvardos I & **Volland JM.** 2014 The giant ciliate *Zoothamnium niveum* and its thiotrophic epibiont *Candidatus* Thiobios Zoothamnicoli: a model system to study interspecies cooperation. *Frontiers in Microbiology – Microbial symbioses.* 5: 145.

21. Volland JM, Gros O. 2012. Cytochemical investigation of the digestive gland of two Strombidae species (*Strombus gigas* and *S. pugilis*) in relation to the nutrition. *Microscopy research and Techniques*. 75: 1353-1360.
22. Volland JM, Lechaire J-P., Frebourg G., Aldana Aranda D., Ramdine G., and Gros O. 2012. Insight of EDX analysis and EFTEM: Are spherocrystals located in Strombidae digestive gland implied in detoxification of trace-metals. *Microscopy research and Techniques*. 75: 425-432.
23. Volland JM, Frenkiel L., Aldana Aranda D. & Gros O. 2010. Occurrence of Sporozoa-like microorganisms in the digestive gland of various species of Strombidae. *Journal of Molluscan Studies* 76 (2): 196-198.

in review/preprints

24. Seah BKB, Volland JM, Leisch N, Schwaha T, Dubilier N, Gruber-Vodicka HR. 2020. *Kentrophoros magnus* sp. nov. (Ciliophora, Karyorelictea), a new flagship species of marine interstitial ciliates. bioRxiv preprint
25. Mankowski A, Kleiner M, Erséus C, Leisch N, Sato Y, Volland JM, Hüttel B, Wentrup C, Woyke T, Wippler J, Dubilier N, Gruber-Vodicka H. 2021. Highly variable fidelity drives symbiont community composition in an obligate symbiosis. bioRxiv preprint

BOOK CHAPTERS

Gros O, Gonzalez-Rizzo S, Elisabeth N, Volland J.-M. 2024. *Thiomargarita magnifica*: A Giant from Marine Mangroves, Pushing the Limits of Bacteriology. In V. Nicolas, L'inventaire de la biodiversité aujourd'hui - nouvelles méthodes et découvertes (pp. 161-172). Great Britain by ISTE Editions Ltd.

Gros O, Gonzalez-Rizzo S, Elisabeth N, Volland, J-M. 2024. *Thiomargarita magnifica* : un géant des mangroves de bord de mer repoussant les limites de la bactériologie. In V. Nicolas, L'inventaire de la biodiversité aujourd'hui - nouvelles méthodes et découvertes (pp. 161-172). Great Britain by ISTE Editions Ltd.

INVITED TALKS

1. Harvard University's Microbial Sciences Initiative (May 24). Challenging simplicity: The intricate cellular architecture of large sulfur bacteria. Cambridge, MA.
2. Moore-Simons Project on the Origin of the Eukaryotic Cell 2023 Annual Meeting (Oct' 23). Characterization of large sulfur bacteria: unveiling new boundaries of microbial life. Stanford University, Palo Alto, California
3. AAAS Annual Meeting (Mar. '23). A Surprisingly Massive Microbe. Washington CD.
4. ASCB-EMBO Cell Bio meeting (Dec. '22). A centimeter-long bacterium with DNA and RNA compartmentalized in membrane-bound organelles. Washington DC.
5. Institute for Integrative Systems Biology. University of Valencia. (Nov. '22). "World's largest bacteria *Ca*. Thiomargarita magnifica stretches more than a centimeter in length." (Virtual)
6. University of Texas at San Antonio Fall 2022 STCEID Seminar Series (Oct. '22). "*Thiomargarita magnifica*, the largest bacterium ever observed, challenges traditional concepts of bacterial cells". San Antonio, TX
7. French National Research Institute for Agriculture (Sep.'22) "Economic principles in cell physiology" (virtual)
8. Lake Arrowhead Microbial Genomics conference (Sep. '22). "Crossing bacterial boundaries. Larger and more complex than ever". Lake Arrowhead, CA
9. New York University Science Society (Sept. '22): "*Thiomargarita magnifica*, the largest bacterium ever observed is a complex macroscopic single cell" (virtual)
10. Karolinska/Uppsala SciLifeLab Clinical Seminar Series (Apr. '22) "Seeing is believing, unraveling the discovery of a centimeter-long macro-bacteria" (virtual)

11. San Jose State University Biological Sciences Department Graduate Seminar Series (Oct. '19) "Characterization of Mutualistic Symbiosis from Marine Shallow Water Environments". San Jose, CA
12. Max-Plank-Institute for marine microbiology, Department of Symbiosis Bremen, Germany: "Trophic interactions between the giant ciliate Zoothamnium niveum and its ectosymbiotic sugar factory". Bremen, Germany

CONFERENCE TALKS & OTHER PRESENTATIONS

1. Volland JM. 2023. Bacterial Cell Biology Outside the Streetlight: A Deep Dive into the Complex World of Giant Bacteria. 26th annual MCDB-BMSE Symposium. UCSB, Santa Barbara, California.
2. Volland et al. 2023 Dec 19. Advancing chemosynthetic symbiosis research: a novel in vitro cultivation approach for *Zoothamnium niveum*. Moore Foundation Symbiosis Model Systems Virtual Meeting.
3. Volland JM, Emboulé E, Raju Narayanasamy S, Holman HY, T, Andeer P, Northen T, Tyml T, Woyke T, Gros O, Date S 2021. New flow-through cultivation chambers for the first chemosynthetic symbiosis model system *Zoothamnium niveum*. 2021 NeLLi Symposium, Berkeley, California. Link to recording: https://www.youtube.com/watch?v=aes20lrq5mo&t=1787s (International Conference).
4. Volland JM, Gros O, Tyml T, Woyke T, Date SV. 2020. Cultivation of chemosynthetic symbiosis model systems. Moore Foundation Symbiosis Model System Virtual Gathering.
5. Volland JM. 2020. *Candidatus* Thiomargarita magnifica a centimeter-long prokaryote challenges our concept of bacterial cell. The Boundaries of Life Initiative Spring 2020 meeting. Virtual meeting.
6. Volland JM. 2019. Exploration of symbiosis within bacteria and archaea. Flash talk at the Biosciences Area Annual Meeting. Berkeley, California.
7. Volland JM, Schintlmeister A. 2018. Elucidating carbon transfer in a thiotrophic symbiosis with Correlative NanoSIMS/TEM Analysis, Tissue Autoradiography and Fluorescence in situ hybdridization. SIMS Europe 2018 Conference & Workshop. Muenster, Germany. (International Conference).
8. Volland JM. 2018. Characterization of prokaryotic symbiosis from aquatic environments. The Boundaries of Life Initiative March 2018 meeting. Pasadena, California.
9. Volland J-M., Espada-Hinojosa S., Drexel J., Kolar I., Rinke C. & Bright M. 2013. What keeps us together? Maintenance and termination of the thiotrophic symbiosis between the ciliate *Zoothamnium niveum* and *Cand.* Thiobios zoothamnicoli. 5th International Symposium on Chemosynthesis-Based Ecosystems. Victoria, Canada. (International Conference).
10. Volland J-M., Espada-Hinojosa S., Drexel J., Kolar I., Rinke C. & Bright M. 2013. What keeps us together? Maintenance and termination of the thiotrophic symbiosis between the ciliate *Zoothamnium niveum* and *Cand.* Thiobios zoothamnicoli. Workshop : "Let's talk about symbiosis" 2nd edition. University of Vienna, Austria.
11. Volland J-M., Aldana Aranda D., Bustamante P. & Gros O. 2011. Increasing knowledge about spherocrystals detoxification role: insight of EDX analysis and EFTEM. 11th Interamerican Congress of Electron Microscopy, CIASEM 2011. Mérida, Mexico. (International Conference).
12. Volland J-M., Lechaire J-P. and Gros O. 2011. Use of EDX and EELS for the characterization of Strombidae spherocrystals. 47th GUMP days (Groupe des Utilisateurs de Microscopie électronique Philips-FEI. St François, Guadeloupe. (International Conference).
13. Ariste-Zelise O., Santos J., Enriquez Diaz M., Montejo J., Volland J-M. & Aldana Aranda D. 2010. Habitat impact in the reproductive cycle of *Strombus pugilis* in the Campeche bank and analysis of Apicomplexa and urospherules-like granules. 63rd *annual conference of the Gulf and Caribbean Fisheries Institute.* San Juan, Puerto Rico. (International Conference).
14. Volland J-M., Aldana Aranda D. & Gros O. 2008. Detection of Apicomplexa like parasites in two species belonging to the family Strombidae: *Strombus gallus,* Linnaeus, 1758 and *S. raninus,* Gmelin 1791. *61st annual conference of the Gulf Caribbean Fisheries Institute.* Pointe à Pitre, Guadeloupe. (International Conference).

REVIEWER DUTIES

- Ad hoc reviewer for: Nature Microbiology, ISME Journal, PCI Ecology, Aquatic Biology, African Journal of Biotechnology, Bulletin of Marine Science, Microscopy Research and Technique, Symbiosis and Recent Patents on Food Nutrition & Agriculture. Reviewer for DOE EMSL/JGI Proposal and NSF GRFP applications.
- Recommender (=editor) for the Peer Community In Microbiology.

AWARDS AND NOMINATIONS

- 2023: Falling Walls Science Breakthrough of the Year nomination
- 2022: Runner-up for the AAAS "Scientific Breakthrough of the Year 2022"
- 2022: "People's choice – Most effective Talk Awards" at the Lawrence Berkley Lab 2022 Biosciences Area Annual Meeting, Berkeley.
- 2019: "Judge's choice Flash Talk Award" at the Lawrence Berkley Lab 2019 Biosciences Area Annual Meeting, Berkeley.
- 2018: "Poster award" at the Lake Arrowhead Microbial Genomics conference, September 2018.
- 2010: Nomination to the "price of excellence" of the University of Antilles. PhD thesis.
- 2008 "Outstanding Student Award for Academic Achievement" obtained at the 61st annual conference of the Gulf Caribbean Fisheries Institute.
- 2005: "Outgoing student grant" from Region Guadeloupe, Third Year of bachelor's degree.

TEACHING EXPERIENCE

- 2023 to now: Assistant Professor at UCSB, teaching MCDB101A – Prokaryotes.
- 2022: 1h as a seminar speaker for graduate student of the Department of Molecular Microbiology and Immunology. University of Texas San Antonio.
- 2019: 1h as a seminar speaker for graduate student of the department of biological sciences. San Jose State University.
- 2016-2017: 30h as a part time lecturer for undergraduate students in *IT and multimedia tools in biology*. University of Antilles, Guadeloupe.
- 2013: Teaching assistant during 10 days of a field work practical course in *Marine Biology* in Slovenia for Bachelor and Master students of the University of Vienna.
- 2007-2010: 192h of teaching as a graduate teaching associate in: *Methodology, Cellular Biology, Evolution, Experimentation in Biology*, and *Physiology*. University of Antilles, Guadeloupe, France.
- 2005-2007: 210h of unsupervised teaching as a teaching assistant in *General Biology* (for high-school students), *Computer and Informatic Technologies* (for Undergraduate students) at the University of Reunion Island (La Reunion, France) and at the University of Antilles (Guadeloupe, France).

EDUCATIONAL OUTREACH

- 2024: Interview for the Daily Nexus journal: "Faculty Feature: Dr. Jean-Marie Volland's road to UCSB"
- 2022: Padverb Podcast hosted by K.M.O.
- 2022: ASM MicroTalk podcast hosted by Pr. Karl Klose.
- 2021 & 2022: Analysis of International Space Station samples for the educational program ExoLab9&10 at Magnitude.io whose mission is to inspire K-12 students around the world.
- 2021: Berkeley Lab K-12 Live Science Show "Exploring Earth". https://bit.ly/30pM1wm

- 2021: Article on the online publishing platform Medium.com: "On the hunt for giant microbes along the California coast". https://tinyurl.com/4xddta6w
- 2019: Science Festival at Cal State East Bay and San Francisco Discovery Day at Oracle Park.
- 2018 onwards: Video conferences with students in classrooms K-12 through "skype a scientist".
- 2009: Booth and talk at the National Science Fair to raise awareness on marine endangered species. Guadeloupe, France.

PREVIOUS GRANTS & SUPPORT

- Gordon and Betty Moore Foundation (2020-2023): Symbiosis in Aquatic System Initiative. Grant amount: $300 000. (Primary author of the proposal and Co-PI, my salary was supported by this grant for 3 years).
- Full Ph.D. fellowship from the French Minister of Higher Education and Research based on academic achievement (2007)

TECHNICAL EXPERTISE

- Scanning Electron microscopy: Hitachi1 S-2500, FEI Quanta 250, Jeol IT 300
- Transmission Electron Microscopy: LEO 912 Omega; Zeiss Libra 120; FEI Tecnai 12; Jeol 1200; Jeol 1400FLASH
- Sample preparation for microscopy: cryo- and chemical fixations; resin embedding and sectioning; resin-based FIB-SEM; critical point drying; sputter coating; glow discharge
- Correlative Light and Electron Microscopy (FISH, DNA and membrane staining)
- Elemental analyses: Energy-Dispersive X-ray Spectroscopy, Electron Energy Loss Spectroscopy, and Energy Filtered-Transmission Electron Microscopy
- Microscopy cryo-techniques: plunge freezing (Leica EM CPC, FEI Vitrobot); high-pressure freezing (BAL-TEC HPM 010); freeze substitution (Leica AFS2); cryostat sectioning
- X-ray tomography: Zeiss Xradia 520 Versa.
- Light microscopy: histology, transmitted light, epifluorescence, and confocal microscopy.
- Fluorescence Activated Cell Sorting (certified operator on BD Influx cell sorter)
- Tissues autoradiography (radioisotope probing)
- NanoSIMS analysis (stable isotope probing and TEM correlation)
- Image analysis: 2D and 3D acquisition, visualization and analysis using SerialEM, ImageJ FIJI, IMOD and ORS.Dragonfly (including deep learning assisted and manual segmentation and multi-ROI volume analysis)
- Fluorescence labeling: fluorescence in situ hybridization, BONCAT, immunohistochemistry
- Next Generation Sequencing (single-cell and metagenomics) and genome analysis using Kbase

OTHER INTERESTS

- Traveling; playing guitar; climbing; scuba diving; free diving and surfing (in warm waters preferably!).