



Christopher Lowe

John B. and Jean De Nault Professor of Marine Science at the Hopkins Marine Station

Biology

 NIH Biosketch available Online

CONTACT INFORMATION

• Administrative Contact

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Bio

BIO

Professor Lowe trained as a biologist in the UK at Sussex University. He moved to The USA for graduate training with Greg Wray at SUNY Stony Brook in the Department of Ecology and Evolution, where he worked on the evolution of body plans and the origin of the echinoderms. Following his PhD. he worked as a Miller Fellow at UC Berkeley working on the origin of chordates focussing on the evolution of the vertebrate central nervous system, first in Mike Levine's lab, then with John Gerhart and Marc Kirschner from Harvard. His first academic position was as an Assistant Professor in the Department of Organismal Biology and Anatomy at the University of Chicago in 2005. He moved to Stanford in 2010 and his lab is based at Hopkins Marine Station in Monterey.

His main research interests involve how major groups of animals evolved and is interested in adapting emerging techniques in biotechnology to apply to new species. His appointment at Hopkins Marine Station gives access to the incredible biodiversity of the marine environment in Monterey Bay.

ACADEMIC APPOINTMENTS

- Professor, Biology
- Member, Bio-X
- Member, Wu Tsai Neurosciences Institute

ADMINISTRATIVE APPOINTMENTS

- Director, Center of Cellular and molecular Diversity, (2022- present)

HONORS AND AWARDS

- BioHub Investigator, Chan/Zuckerberg, BioHub (07/01/2022 - 06/30/27)
- Searle Scholars Fellow, Searle Scholars Program (2008-2011)
- Miller Postdoctoral Fellowship, UC Berkeley (1998-2001)

PROFESSIONAL EDUCATION

- BSc. Hons, University of Sussex , Biology with European Studies (1991)
- PhD, Dept of Ecology and Evolution, SUNY Stony Brook , Ecology and Evolution (1998)

LINKS

- <http://lowe.stanford.edu>: <http://lowe.stanford.edu>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Evolution and development, specifically the evolution of the deuterostomes

Teaching

COURSES

2025-26

- Advanced Biological Imaging of Marine Embryos and Larvae: BIOS 427 (Spr)
- Macroevolution: BIO 136, BIO 236, EPS 136, EPS 236 (Spr)

2024-25

- Evolution of Developmental Mechanisms: BIO 119, BIO 219 (Spr)

2023-24

- Developmental Biology in the Ocean: Comparative Embryology and Larval Development: BIOS 236 (Spr)
- Macroevolution: BIO 136, BIO 236, EPS 136, EPS 236 (Spr)

2022-23

- Comparative Single-cell Genomics in the Ocean: BIO 269, BIOE 269 (Sum)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Joel Erberich

Postdoctoral Faculty Sponsor

Jana Sipkova

Doctoral Dissertation Advisor (AC)

Christopher Kirby, Lauren Lubeck, Albert Marti i Sabari, Brennan McDonald, Heidi Tate

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Biology (School of Humanities and Sciences) (Phd Program)

Publications

PUBLICATIONS

- **Untangling posterior growth and segmentation by analyzing mechanisms of axis elongation in hemichordates** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Fritzenwanker, J. H., Uhlinger, K. R., Gerhart, J., Silva, E., Lowe, C. J.
2019; 116 (17): 8403–8
- **I-SceI Meganuclease-mediated transgenesis in the acorn worm, *Saccoglossus kowalevskii***. *Developmental biology*
Minor, P. J., Clarke, D. N., Andrade Lopez, J. M., Fritzenwanker, J. H., Gray, J., Lowe, C. J.
2018

- **Anteroposterior axis patterning by early canonical Wnt signaling during hemichordate development** *PLOS BIOLOGY*
Darras, S., Fritzenwanker, J. H., Uhlinger, K. R., Farrelly, E., Pani, A. M., Hurley, I. A., Norris, R. P., Osovitz, M., Terasaki, M., Wu, M., Aronowicz, J., Kirschner, M., Gerhart, et al
2018; 16 (1): e2003698
- **The Adult Body Plan of Indirect Developing Hemichordates Develops by Adding a Hox-Patterned Trunk to an Anterior Larval Territory** *CURRENT BIOLOGY*
Gonzalez, P., Uhlinger, K. R., Lowe, C. J.
2017; 27 (1): 87-95
- **Cis-regulatory architecture of a brain signaling center predates the origin of chordates** *NATURE GENETICS*
Yao, Y., Minor, P. J., Zhao, Y., Jeong, Y., Pani, A. M., King, A. N., Symmons, O., Gan, L., Cardoso, W. V., Spitz, F., Lowe, C. J., Epstein, D. J.
2016; 48 (5): 575-?
- **The deuterostome context of chordate origins** *NATURE*
Lowe, C. J., Clarke, D. N., Medeiros, D. M., Rokhsar, D. S., Gerhart, J.
2015; 520 (7548): 456-465
- **The Biodiversity Cell Atlas: mapping the tree of life at cellular resolution.** *Nature*
Sebé-Pedrós, A., Tanay, A., Lawniczak, M. K., Arendt, D., Aerts, S., Archibald, J., Arnone, M. I., Blaxter, M., Cleves, P., Coelho, S. M., Dias, M., Dunn, C., Elek, et al
2025; 645 (8082): 877-885
- **Two parallel lineage-committed progenitors contribute to the developing brain.** *bioRxiv : the preprint server for biology*
Dundes, C. E., Jokhai, R. T., Ahsan, H., Kang, R. S., Salomon-Shulman, R. E., Rajan, A., Kim, Y. S., Stanton, L. J., Xu, C., Do, S., McDonald, B. D., López, J. M., Urrutia, et al
2025
- **Antero-posterior patterning in the brittle star *Amphipholis squamata* and the evolution of echinoderm body plans** *EVODEVO*
Formery, L., Peluso, P., Rank, D. R., Rokhsar, D. S., Lowe, C. J.
2025; 16 (1): 7
- **VitelloTag: a tool for high-throughput cargo delivery into oocytes.** *Development (Cambridge, England)*
Clarke, D. N., Kane, A., Perillo, M., Lowe, C. J., Swartz, S. Z.
2024
- **Temperature-dependent hypoxia tolerance of purple sea urchin *Strongylocentrotus purpuratus* across biogeography and ontogeny** *MARINE ECOLOGY PROGRESS SERIES*
Duncan, M. I., Micheli, F., Marquez, J., Lowe, C. J., Hamilton, S. L., Sperling, E. A.
2024; 739: 129-146
- **See-Star: a versatile hydrogel-based protocol for clearing large, opaque and calcified marine invertebrates** *EVODEVO*
Clarke, D. N., Formery, L., Lowe, C. J.
2024; 15 (1): 8
- **Chromosome-level genome assemblies of 2 hemichordates provide new insights into deuterostome origin and chromosome evolution.** *PLoS biology*
Lin, C. Y., Marlétaz, F., Pérez-Posada, A., Martínez-García, P. M., Schloissnig, S., Peluso, P., Conception, G. T., Bump, P., Chen, Y. C., Chou, C., Lin, C. Y., Fan, T. P., Tsai, et al
2024; 22 (6): e3002661
- **Molecular evidence of anteroposterior patterning in adult echinoderms.** *Nature*
Formery, L., Peluso, P., Kohnle, I., Malnick, J., Thompson, J. R., Pitel, M., Uhlinger, K. R., Rokhsar, D. S., Rank, D. R., Lowe, C. J.
2023; 623 (7987): 555-561
- **Molecular characterization of nervous system organization in the hemichordate acorn worm *Saccoglossus kowalevskii*.** *PLoS biology*
Andrade López, J. M., Pani, A. M., Wu, M., Gerhart, J., Lowe, C. J.
2023; 21 (9): e3002242
- **Integrating Complex Life Cycles in Comparative Developmental Biology.** *Annual review of genetics*
Formery, L., Lowe, C. J.

2023

- **Induced immune reaction in the acorn worm, *Saccoglossus kowalevskii*, informs the evolution of antiviral immunity.** *Molecular biology and evolution*
Tassia, M. G., Hallowell, H. A., Waits, D. S., Range, R. C., Lowe, C. J., Graze, R. M., Schwartz, E. H., Halanych, K. M.
2023
- **Comparisons of cell proliferation and cell death from tornaria larva to juvenile worm in the hemichordate *Schizocardium californicum*.** *EvoDevo*
Bump, P., Khariton, M., Stubbert, C., Moyen, N. E., Yan, J., Wang, B., Lowe, C. J.
2022; 13 (1): 13
- ***Saccoglossus kowalevskii*: Evo-devo insights from the mud.** *Current topics in developmental biology*
Gray, J., Fritzenwanker, J. H., Cunningham, D. D., Lowe, C. J.
2022; 147: 545-562
- **Molecular insights into deuterostome evolution from hemichordate developmental biology.** *Current topics in developmental biology*
Lowe, C. J.
2021; 141: 75–117
- **Molecular evidence for a single origin of ultrafiltration-based excretory organs.** *Current biology : CB*
Gąsiorowski, L., Andrikou, C., Janssen, R., Bump, P., Budd, G. E., Lowe, C. J., Hejzol, A.
2021
- **Neural anatomy of echinoid early juveniles and comparison of nervous system organization in echinoderms.** *The Journal of comparative neurology*
Formery, L., Orange, F., Formery, A., Yaguchi, S., Lowe, C. J., Schubert, M., Croce, J. C.
2020
- **Molecular patterning during the development of *Phoronopsis harmeri* reveals similarities to rhynchonelliform brachiopods** *EVODEVO*
Andrikou, C., Passamaneck, Y. J., Lowe, C. J., Martindale, M. Q., Hejzol, A.
2019; 10 (1): 33
- **Untangling posterior growth and segmentation by analyzing mechanisms of axis elongation in hemichordates.** *Proceedings of the National Academy of Sciences of the United States of America*
Fritzenwanker, J. H., Uhlinger, K. R., Gerhart, J., Silva, E., Lowe, C. J.
2019
- **The cadherin-catenin complex is necessary for cell adhesion and embryogenesis in *Nematostella vectensis*** *DEVELOPMENTAL BIOLOGY*
Clarke, D., Lowe, C. J., Nelson, W.
2019; 447 (2): 170–81
- **The Cadherin-Catenin Complex is Necessary for Cell Adhesion and Embryogenesis in *Nematostella vectensis*.** *Developmental biology*
Nathaniel Clarke, D., Lowe, C. J., James Nelson, W.
2019
- **I-Scei Meganuclease-mediated transgenesis in the acorn worm, *Saccoglossus kowalevskii*** *DEVELOPMENTAL BIOLOGY*
Minor, P. J., Clarke, D., Lopez, J., Fritzenwanker, J. H., Gray, J., Lowe, C. J.
2019; 445 (1): 8–15
- **The development and metamorphosis of the indirect developing acorn worm *Schizocardium californicum* (Enteropneusta: Spengelidae)** *FRONTIERS IN ZOOLOGY*
Gonzalez, P., Jiang, J. Z., Lowe, C. J.
2018; 15
- **The development and metamorphosis of the indirect developing acorn worm *Schizocardium californicum* (Enteropneusta: Spengelidae).** *Frontiers in zoology*
Gonzalez, P., Jiang, J. Z., Lowe, C. J.
2018; 15: 26

- **Characterization of the Cadherin-Catenin Complex of the Sea Anemone *Nematostella vectensis* and Implications for the Evolution of Metazoan Cell-Cell Adhesion** *MOLECULAR BIOLOGY AND EVOLUTION*
Clarke, D. N., Miller, P. W., Lowe, C. J., Weis, W. I., Nelson, W. J.
2016; 33 (8): 2016-2029
- **Embracing the comparative approach: how robust phylogenies and broader developmental sampling impacts the understanding of nervous system evolution** *PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES*
Hejnal, A., Lowe, C. J.
2015; 370 (1684)
- **Embracing the comparative approach: how robust phylogenies and broader developmental sampling impacts the understanding of nervous system evolution.** *Philosophical transactions of the Royal Society of London. Series B, Biological sciences*
Hejnal, A., Lowe, C. J.
2015; 370 (1684)
- **Hemichordate genomes and deuterostome origins.** *Nature*
Simakov, O., Kawashima, T., Marlétaz, F., Jenkins, J., Koyanagi, R., Mitros, T., Hisata, K., Bredeson, J., Shoguchi, E., Gyoja, F., Yue, J., Chen, Y., Freeman, et al
2015; 527 (7579): 459-465
- **On a Possible Evolutionary Link of the Stomochord of Hemichordates to Pharyngeal Organs of Chordates** *GENESIS*
Sato, N., Tagawa, K., Lowe, C. J., Yu, J., Kawashima, T., Takahashi, H., Ogasawara, M., Kirschner, M., Hisata, K., Su, Y., Gerhart, J.
2014; 52 (12): 925-934
- **Animal evolution: stiff or squishy notochord origins?** *Current biology*
Hejnal, A., Lowe, C. J.
2014; 24 (23): R1131-3
- **Phylogenomic analysis of echinoderm class relationships supports Asterozoa** *PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES*
Telford, M. J., Lowe, C. J., Cameron, C. B., Ortega-Martinez, O., Aronowicz, J., Oliveri, P., Copley, R. R.
2014; 281 (1786)
- **Phylogenomic analysis of echinoderm class relationships supports Asterozoa.** *Proceedings. Biological sciences*
Telford, M. J., Lowe, C. J., Cameron, C. B., Ortega-Martinez, O., Aronowicz, J., Oliveri, P., Copley, R. R.
2014; 281 (1786)
- **The Fox/Forkhead transcription factor family of the hemichordate *Saccoglossus kowalevskii*** *EVODEVO*
Fritzenwanker, J. H., Gerhart, J., Freeman, R. M., Lowe, C. J.
2014; 5
- **The Fox/Forkhead transcription factor family of the hemichordate *Saccoglossus kowalevskii*.** *EvoDevo*
Fritzenwanker, J. H., Gerhart, J., Freeman, R. M., Lowe, C. J.
2014; 5: 17-?
- **FGF signaling induces mesoderm in the hemichordate *Saccoglossus kowalevskii*** *DEVELOPMENT*
Green, S. A., Norris, R. P., Terasaki, M., Lowe, C. J.
2013; 140 (5): 1024-1033
- **The evolutionary origin of epithelial cell-cell adhesion mechanisms.** *Current topics in membranes*
Miller, P. W., Clarke, D. N., Weis, W. I., Lowe, C. J., Nelson, W. J.
2013; 72: 267-311
- **Identical Genomic Organization of Two Hemichordate Hox Clusters** *CURRENT BIOLOGY*
Freeman, R., Ikuta, T., Wu, M., Koyanagi, R., Kawashima, T., Tagawa, K., Humphreys, T., Fang, G., Fujiyama, A., Saiga, H., Lowe, C., Worley, K., Jenkins, et al
2012; 22 (21): 2053-2058
- **Evolutionary crossroads in developmental biology: hemichordates** *DEVELOPMENT*
Roettinger, E., Lowe, C. J.

2012; 139 (14): 2463-2475

● **Ancient deuterostome origins of vertebrate brain signalling centres** *NATURE*

Pani, A. M., Mullarkey, E. E., Aronowicz, J., Assimacopoulos, S., Grove, E. A., Lowe, C. J.

2012; 483 (7389): 289-U79

● **Animal Evolution: A Soap Opera of Unremarkable Worms** *CURRENT BIOLOGY*

Lowe, C. J., Pani, A. M.

2011; 21 (4): R151-R153

● **Structural shifts of aldehyde dehydrogenase enzymes were instrumental for the early evolution of retinoid-dependent axial patterning in metazoans** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*

Sobreira, T. J., Marletaz, F., Simoes-Costa, M., Schechtman, D., Pereira, A. C., Brunet, F., Sweeney, S., Pani, A., Aronowicz, J., Lowe, C. J., Davidson, B., Laudet, V., Bronner, et al

2011; 108 (1): 226-231

● **Dorsoventral patterning in hemichordates: Insights into early chordate evolution** *PLOS BIOLOGY*

Lowe, C. J., Terasaki, M., Wu, M., Freeman, R. M., Runft, L., Kwan, K., Haigo, S., Aronowicz, J., Lander, E., Gruber, C., Smith, M., Kirschner, M., Gerhart, et al

2006; 4 (9): 1603-1619