D. Nathaniel (Nat) Clarke
Department of Biology, University of Miami
natclarke@miami.edu | +1.206.679.8183 | Google Scholar profile

EDUCATION

2018	Ph.D.	Stanford University (Biology)
2011	B.A.	Whitman College (Biology, *cum laude; Honors for Research Thesis*)

RESEARCH EXPERIENCE

2025 – present	**University of Miami**, Assistant Professor
2018 – 2024	**Massachusetts Institute of Technology,** NIH postdoctoral fellow *Regulation of cell-cell adhesion during tissue remodeling* Advisors: Adam Martin, Brady Weissbourd
2012 – 2018	**Stanford University**, Ph.D. Student *Evolution of animal cell adhesion mechanisms* Advisors: Chris Lowe, W. James Nelson
2012 *Spring, summer*	**University of Washington, Friday Harbor Labs,** Research Technician *Fitness of detrital foraging in subtidal sea urchins* Advisors: Adam Summers, David Duggins
2011 *Summer, Fall*	**Harvard University,** Research Assistant *Mechanisms of germ cell specification in hemimetabolous insects* Advisor: Cassandra Extavour
2011 *Summer, Fall*	**Harvard Museum of Comparative Zoology,** Curatorial Assistant *Department of Ichthyology and Herpetology*
2009 – 2011	**Whitman College**, Research Assistant *Effects of climate change on reproduction and growth in temperate ectotherms* Advisors: Kate Jackson, Peter Zani

AWARDS

2023	MIT School of Science SPOT Award for Outstanding Service to the Community
2023	Infinite Expansion Award, MIT (Institute-wide honor for excellence in mentorship)
2016	Esther Lederberg Prize, Hopkins Marine Station, Stanford University
2011	Order of Waiilatpu (senior honor awarded to top 10 students in graduating class)
2011	Eugene Marx Award for Public Service
2011	Thomas Cronin Award for Environmental Leadership
2011	Highest Honors for Senior Thesis in Biology
2010	Brode Prize for Excellence in Biological Research

RESEARCH INTERESTS

- Evolution of multicellularity and the origin of the first animals
- Marine invertebrates, with expertise in non-bilaterians: cnidarians, ctenophores, and sponges
- Mechanisms of cell-cell and cell-matrix adhesion; molecular function of adhesion receptors

FELLOWSHIPS & GRANTS

Awards > $25,000:

2019	$195,098	NIH NRSA F32 Ruth L. Kirchstein Postdoctoral Fellowship
2016	$25,000	Esther Lederberg Award, Hopkins Marine Station
2013	$109,500	NSF Graduate Research Fellowship
2012	$109,500	Stanford Kimball Graduate Fellowship

Small awards:

2023	$3,200	MIT Quality of Life Grant, Biology Postdoc Association (*lead writer*)
2022	$3,000	MIT Quality of Life Grant, Biology Postdoc Association
2021	$2,900	MIT Quality of Life Grant, Biology Postdoc Association
2015	$2,500	Myers Oceanographic and Marine Biology Trust
2014	$2,000	Eugene and Aileen Haderlie Award, Hopkins Marine Station
2013	$500	Student Travel Award, Society for Integrative and Comparative Biology
2011	$1,000	Abshire Undergraduate Research Fellowship
2010	$1,000	Abshire Undergraduate Research Fellowship

PEER-REVIEWED PUBLICATIONS (*Google Scholar profile; * equal author contribution*)

16. **Clarke, DN,** Miller, PW, Martin, AC. EGFR-dependent actomyosin pre-patterning couples morphogenetic movement between tissues. *Developmental Cell,* 60(2): P270-287.E6.
15. **Clarke, DN*,** Kane, A*, Perillo, M, Lowe, CJ, Swartz, ZS. VitelloTag: a tool for high-throughput gene editing and cargo delivery into oocytes. *Development,* 151(20): dev202857.
14. **Clarke, DN***, Formery, L*, Lowe, CJ. (2024). See-Star: a versatile hydrogel-based protocol for clearing large, opaque and calcified marine invertebrates. *EvoDevo.* 15(8).
13. Staats, EG*, **Clarke, DN*,** Pearse, VB*, Govenar, K, De Meulenaere, E, Deheyn, DD**.** (2024). Production of Green Fluorescent Proteins by sea anemones (*Anthopleura* spp.) in Response to Light. *Integrative and Comparative Biology*, icae024.
12. Horo, UH**, Clarke, DN***, Martin, AC*. (2024). *Drosophila* Fog/Cta and T48 pathways have overlapping and distinct contributions to mesoderm invagination. *Molecular Biology of the Cell*, 35(5):ar69.
11. **Clarke, DN**, Rose, NH, De Meulenaere, E, Rosental, B, Pearse, VB, Pearse, JS, & Deheyn, DD. (2024). Fluorescent proteins generate a genetic color polymorphism and counteract oxidative stress in intertidal sea anemones. *PNAS*, 121(11): e2317017121.
10. **Clarke, DN** & Martin, AC. (2021). Actin-based force generation and cell adhesion in tissue morphogenesis. *Current Biology,* 31(10): R667-680.
9. **Clarke, DN,** Lowe, CJ, & Nelson, WJ. (2019). The cadherin-catenin complex is necessary for cell adhesion and embryogenesis in *Nematostella vectensis*. *Developmental Biology,* 447(2): 170-181.
8. Minor, PJ*, **Clarke, DN*,** Andrade López, JM, Fritzenwanker, JH, Gray, J, & Lowe CJ. (2019). I-SceI meganuclease-mediated transgenesis in the acorn worm, *Saccoglossus kowalevskii*. *Developmental Biology,* 445(1): 8-15.
7. Rosental, B, Kowarsky, M, Seita, J, Corey, DM, Ishizuka, KJ, Palmeri, KJ, Chen, SY, Sinha, R, Okamoto, J, Mantalas, G, Manni, L, Raveh, T, **Clarke, DN**, Tsai, JM, Newman, AM, Neff, NF,

Nolan, GP, Quake, SR, Weissman, IL, & Voskoboynik, A. (2018). Complex mammalian-like haematopoietic system found in a colonial chordate. *Nature,* 564(7736):425–429.

6. Miller, PM, Pokutta, S, Mitchell, JM, Chodaparambil, JV, **Clarke, DN**, Nelson, WJ, Weis, WI & Nichols, SA. (2018). Analysis of a vinculin homolog in a sponge (phylum porifera) reveals that vertebrate-like cell adhesions emerged early in animal evolution. *Journal of Biological Chemistry,* 293(30): 11674-11686.
5. **Clarke, DN**, Miller, PW, Lowe, CJ, Weis, WI, & Nelson WJ. (2016). Characterization of the cadherin-catenin complex of the sea anemone *Nematostella vectensis*: implications for the evolution of metazoan cell-cell adhesion. *Molecular Biology and Evolution,* 33(8):2016–2029.
4. Lowe, CJ, **Clarke, DN**, Medeiros, DM, Rokhsar, DS, Gerhart, J. (2015). The deuterostome context of chordate origins. *Nature,* 520(7548): 456–465.
3. Miller, PW*, **Clarke, DN*,** Weis, WI, Lowe, CJ, & Nelson, WJ. (2013). The evolutionary origin of epithelial cell-cell adhesion mechanisms. *Current topics in membranes,* 72:267.
2. Ewen-Campen, B, Donoughe, S, **Clarke, DN**, & Extavour, CG. (2013). Germ cell specification requires zygotic mechanisms rather than germ plasm in a basally branching insect. *Current Biology,* 23(10):835–842.
1. **Clarke, DN**, and Zani, PA. (2012). Effects of night-time warming on temperate ectotherm reproduction: potential fitness benefits of climate change for side-blotched lizards. *Journal of Experimental Biology,* 215 (7):1117–1127.

MANUSCRIPTS IN ADVANCED PREPARATION

1. **Clarke, DN,** Gilly, WF, Haddock, SH, Meech, RW. Neural basis of fast and slow swimming behaviors in the deep-sea jellyfish, *Colobonema*.
2. **Clarke, DN**, Minor, PJ, Pani, A, Kane, M, & Lowe, CJ. An evolutionarily conserved retinoic acid signaling pathway controls posterior growth and neural patterning in hemichordates.

MENTORSHIP & TRAINEES (*year, name, current position*)

Undergraduate Mentees:

2015, Summer	Alia Hidayat	Ph.D. student in Biology, MIT
2016, Spring	Julia Goolsby	Research assistant, USGS
2016, Spring	Julia Eberhard	Ph.D. student in Immunology, U Penn.
2016, Summer	Miranda Vogt	Research assistant, MBL
2016 – 2017	John Rogers	Medical student, USC
2017, Spring	Amy Lee	Medical student, UCF
2018, Summer	Erica Olsen	Masters student in Bioinformatics, Stanford
2021 – 2022	Fernando Barahona	Ph.D. student in Biophysics, Vanderbilt U.
2020 – 2023	Thara Antony	Research Specialist, IBS Genome Institute, Korea
2021 – present	Uzuki Horo	Ph.D. sudent in Biology, Pasteur Institute

Laboratory Technicians:

2016 – 2017	Cody Dawson	Ph.D. student, UT Austin
2017 – 2018	Auston Rutledge	Ph.D. student, UNC Charlotte
2022 – present	Mingmar Sherpa	Research assistant
2022 – present	Akshay Kane	Research assistant, MBL

TEACHING EXPERIENCE (*year, institution, course title*)

Instructor:

2022	Stanford University	Developmental Biology in the Ocean (graduate-level intensive)
2017	Stanford University	Developmental Biology in the Ocean
2015	Stanford University	Developmental Biology in the Ocean
2015	Stanford University	Larval Ecology and Physiology (undergraduate mini-course)

Teaching Assistant:

2017	Marine Biological Laboratory	Embryology (hemichordate and echinoderm section)
2014	Stanford University	Developmental Biology and Evolution
2013	Stanford University	Cell Biology and Physiology
2011	Whitman College	Comparative Vertebrate Anatomy
2011	Whitman College	Herpetology
2010	Whitman College	Introductory Biology, Part 2: Organismal Diversity & Evolution
2009	Whitman College	Introductory Biology, Part 1: Cellular & Molecular Biology

INVITED LECTURES AND SYMPOSIA

2024	University of Washington	lecture, Friday Harbor Labs Functional Genomics course
2024	Wesleyan University	Biology Department Research Seminar
2024	Harvard University	Museum of Comparative Zoology Seminar
2024	University of Miami	Biology Department Research Seminar
2024	University of Vermont	UVM Biology - Departmental Research Seminar
2023	VGZT Series	Virtual Gastrulation Zoom Talks (selective online talk series)
2023	LBDV, France	Research seminar - Evolution of cell adhesion mechanisms
2023	IBDM, France	Developmental Biology departmental research seminar
2023	Sars Center, Norway	Research seminar - evolution of animal multicellularity
2023	UC San Diego	Natural Products and Marine Biochemistry seminar series
2023	University of Chicago	Organismal Biology Departmental Research Seminar
2022	University of Virginia	Biology Department Research Seminar
2021	Developmental Mechanics	International Seminar Series
2020	Amherst College	lecture, Developmental Biology course
2017	University of San Francisco	lecture, Invertebrate Zoology course
2016	Cal. State, Monterey Bay	lecture, Evolutionary Biology course
2015	Cal. State, Monterey Bay	lecture, Biological Oceanography course

SELECTED FIRST-AUTHORED CONFERENCE PROCEEDINGS

2023 American Society for Cell Biology (mini-symposium on cell dynamics and polarity)
2023 Developmental Biology of the Sea Urchin and other Marine Invertebrates
2023 Genetics Society of America (*Drosophila* research conference)
2023 Society for Integrative and Comparative Biology (*1 talk, 1 poster*)
2022 Fostering Quantitative Modeling in Developmental Biology (Co. of Biologists Workshop)
2022 Signaling by Adhesion Receptors – Gordon Research Conference
2022 Developmental Biology of the Sea Urchin and other Marine Invertebrates
2021 American Society for Cell Biology
2021 Society for Developmental Biology
2020 Western Society of Naturalists
2019 American Society for Cell Biology
2019 Society for Developmental Biology
2016 International Hemichordate Meeting

2015 Pan-American Society for Evolutionary and Developmental Biology
2014 Society for Integrative and Comparative Biology
2011 American Society for Ichthyology and Herpetology
2010 West Coast Biological Sciences Undergraduate Research Conference

UNIVERSITY SERVICE

2024	MIT	Postdoc Rep., Biology Department Visiting Committee
2022 – present	MIT	Co-President, MIT Biology Postdoc Association
2022 – 2023	MIT	Member, MIT Biology Department Committee on Mentorship
2021 – 2023	MIT	Social Event Co-Chair, MIT Biology Postdoc Association
2020 – 2023	MIT	Member, Institute Committee on Race and Diversity
2020 – 2023	MIT	Member, Steering Team for 5-year DEI Strategic Action Plan
2016 – 2018	Stanford University	President, Hopkins Marine Station Graduate Student Org.
2015 – 2016	Stanford University	Treasurer, Hopkins Marine Station Graduate Student Org.
2013	Stanford University	Organizer, Biosciences Graduate Student Orientation
2010 – 2011	Whitman College	Campus Sustainability Coordinator

PROFESSIONAL SERVICE

Community:

2024	Co-Organizer	EchinoClub Zoom seminar series (dev. bio. / marine inverts)
2022 – 2023	Co-Organizer	Virtual Gastrulation Zoom Talks seminar series

Journal Peer Review:

- *Nature Communications* **(1)**
- *Nature Ecology & Evolution* (**1**)
- *Science Advances* **(1)**
- *Development* (**2**)
- *Molecular Biology & Evolution* (**2**)
- *Developmental Biology* (**3**)
- *Frontiers in Cell and Developmental Biology* (**1**)
- *PNAS* **(1)**
- *Current Biology* **(1)**
- *Ecology & Evolution* **(1)**
- *Aquaculture, Fish, and Fisheries* **(1)**
- *ReviewCommons* (**2**)

Grant Review:

- National Geographic Committee for Research and Exploration (**3**)

OUTREACH ACTIVITIES

2020 – present	Mentor, STEM Grad School Application Mentorship Program, Project SHORT
2021 – present	Judge, Massachusetts Junior Academy of Sciences Research Symposium
2018, 2019	Exhibitor, MIT Open Oceans Project Middle School Science Open House
2017	Exhibitor, Hopkins Marine Station Open House
2015 – 2017	Instructor, Santa Catalina School Marine Biology tidepooling field day
2015	Exhibitor, Bay Area Science Festival (*developed a touch tank exhibit*)
2013 – 2015	Instructor, Livermore High School Biology Camp

RELEVANT CERTIFICATIONS & CERTIFICATES

- AAUS-certified Science Diver
- Kauffman Teaching Certificate, MIT
- LEAPS STEM Leadership and Mentorship Training Certificate, MIT
- Inclusive Teaching Certificate, MIT

Mentors:

Christopher J. Lowe *
Professor of Biology
Stanford University, Hopkins Marine Station
cjlowe@stanford.edu

W. James Nelson *
Rudy J. and Daphne Donohue Munzer Professor in the School of Medicine
Professor of Biology and of Molecular and Cellular Physiology, *emeritus*
Stanford University
wjnelson@stanford.edu

Adam C. Martin *
Professor of Biology and McNair Faculty Fellow
Massachusetts Institute of Technology
acmartin@stanford.edu

Brady Weissbourd *
Assistant Professor of Biology
Massachusetts Institute of Technology
bweissb@mit.edu

Collaborators:

Dimitri D. Deheyn
Associate Scientist
Scripps Institute of Oceanography
ddehyn@ucsd.edu

Zak Swartz
Assistant Scientist
Marine Biological Laboratory
zswartz@mbl.edu