

Maxwell E. Miller

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SUMMARY

Marine scientist and biochemist preparing for a PhD program in marine natural products and microbial biodiscovery. Molecular biology and microbiology training across gene therapy and cnidarian physiology laboratories, with at-sea fieldwork and aquaculture experience. NOAA Hollings Scholar, Phi Beta Kappa, and co-author on a peer-reviewed gene therapy publication.

EDUCATION

Bachelor of Science with High Honors

May 2022

Eckerd College, St. Petersburg, FL

GPA: 3.86 | Majors: Marine Science (Biology) & Biochemistry | Minor: Japanese

Selected Honors: Phi Beta Kappa (inducted as a junior, 2021) | NOAA Ernest F. Hollings Scholar (2020) | Eckerd College Marine Science Freshman Award (2019) | Eckerd College Founders Scholarship (2018–2022)

PUBLICATION

Sangster ML, Bishop MM, Yao Y, Feitor JF, Shahriar S, **Miller ME**, Chekuri AK, Budnik B, Bei F, Grishchuk Y. (2024). A blood-brain barrier-penetrant AAV gene therapy improves neurological function in symptomatic mucopolipidosis IV mice. *Molecular Therapy: Methods & Clinical Development*, 32(2), 101269.

[doi:10.1016/j.omtm.2024.101269](https://doi.org/10.1016/j.omtm.2024.101269)

PRESENTATIONS & INVITED TALKS

- **Miller ME**. “Marine Bioprospecting: Untapped Potential.” Invited guest lecture, First-Year Experience Seminar, Eckerd College, St. Petersburg, FL, 2024.
- **Miller ME**, Lopez-Perez JE, Goessling JM, Krediet CJ. “Elucidating Pentastome Population Dynamics in Aruba.” Poster presentation, 14th Annual Eckerd College Research Symposium, St. Petersburg, FL, 2021.

RESEARCH EXPERIENCE

Research Assistant I

Aug 2022 – Feb 2023

Grousbeck Gene Therapy Center, Massachusetts Eye and Ear/Harvard Medical School, Boston, MA

- Selected as the laboratory’s inaugural research assistant; established SOPs, workflows, and experimental infrastructure for a new gene therapy research group
- Co-authored a published study on AAV-mediated gene therapy for mucopolipidosis IV
- Contributed to the development of a split-intein AAV vector system targeting Usher syndrome
- Co-developed subretinal microinjection protocols for AAV delivery in mice, including equipment setup, injection parameters, and procedural documentation
- Brought new subretinal microinjection equipment online for the lab through troubleshooting, maintenance, and SOP authorship
- Maintained BSL-2 mammalian cell cultures using aseptic technique to support *in vitro* validation workflows
- Managed breeding colonies of four genetically distinct mouse models of inherited retinal diseases by maintaining accurate colony records, coordinating genotyping, and screening mice for retinal phenotypes
- Conducted *in vivo* phenotyping assays using spectral domain OCT, fundus imaging, and electroretinography
- Prepared retinal samples through cryostat sectioning and immunohistochemistry for tissue characterization
- Applied molecular techniques including DNA/RNA extraction, PCR, cloning, and gel electrophoresis
- Coordinated detailed sample and data tracking across mouse colony records, genotyping results, *in vivo* imaging datasets, and molecular workflows, supporting traceability through downstream analysis

Undergraduate Research Assistant

Jul 2019 – May 2022

Krediet Cnidarian Physiology Lab & Goessling Herpetology Lab, Eckerd College, St. Petersburg, FL

- Maintained lab stocks of glass anemones (*Exaiptasia diaphana*) including artificial seawater preparation, husbandry, and live-feed culture
- Performed PCR-based genotyping of endosymbiotic dinoflagellate strains in *Exaiptasia* lab stocks, monitoring for cross-contamination to maintain strain integrity
- Genotyped pentastome parasites from Aruban snake populations to elucidate host-parasite population dynamics within native and invasive snake populations
- Performed bacterial transformations, plating, colony selection, and liquid culture workflows using aseptic technique in a laminar flow hood; prepared agar plates with antibiotic selection
- Applied core molecular biology techniques including DNA extraction and quantification, PCR and PCR purification, gel electrophoresis and imaging, restriction enzyme digestion, bacterial transformation and culture, plasmid preparation, and aseptic technique
- Trained fellow research assistants in DNA extraction, PCR, PCR purification, gel electrophoresis, restriction enzyme digestion, and plating bacteria
- Followed sterile technique, labeling, storage, cleaning/sterilization, and disposal procedures for biological samples, chemical reagents, and prepared solutions
- Maintained detailed records of protocols, modifications, and outcomes; troubleshoot failed experiments

NOAA Hollings Scholar Research Intern

May 2021 – Aug 2021

National Systematics Lab, Smithsonian National Museum of Natural History, Washington, DC (Remote)

- Identified marine invertebrates from autonomous reef monitoring structures (ARMS) imagery to support standardized marine biodiversity monitoring
- Analyzed marine eDNA bioinformatics outputs and ARMS imagery as biodiversity assessment methods
- Trained a CoralNet image-classification model on ARMS imagery to help develop ARMS analysis workflows and support the automation of marine invertebrate biodiversity monitoring
- Collaborated with NOAA and Smithsonian scientists to troubleshoot eDNA bioinformatics outputs

HUSBANDRY & AQUACULTURE EXPERIENCE

Aquaculture Technician II

Aug 2025 – Present

Reef Aquaria Design, Fort Lauderdale, FL

- Provide daily husbandry for hundreds of coral, fish, and invertebrate species across 30+ marine aquaculture and display systems (20–2,000 gal), including feeding, cleaning, health observation, and record-keeping
- Culture moon jellyfish (*Aurelia aurita*) through the full life cycle (planula, polyp, strobilation, ephyra, medusa), managing feeding, cleaning, water quality, and health monitoring at each developmental stage
- Manage water chemistry across 30+ marine reef and jellyfish systems through routine analytical testing, trend analysis, and a custom-built automated dosing scheduler; produce water quality audits for 70+ systems
- Write SOPs and implement process improvements across animal care, water chemistry, and operations
- Prepare concentrated buffer solutions, chemical additives, and artificial seawater; perform QC analysis
- Maintain, troubleshoot, and install recirculating life-support systems, including dosing equipment, pumps, filtration, plumbing, aquarium controllers, and media reactors
- Maintain live-feed cultures (*Nannochloropsis*, rotifers, *Artemia*); assess culture health, developmental stage, and morphology using digital, compound, and dissecting microscopy
- Coordinate aquatic animal transport using appropriate handling, packing, and acclimation procedures
- Train new technicians on husbandry, water chemistry, and system operations

Aquaculture Systems Technician

Jul 2024 – Jul 2025

Self-employed, Indianapolis, IN

- Built two production fish rooms from the ground up, including 20+ systems (300+ gallons total capacity), centralized plumbing and air manifolds, integrated filtration, and automated water change systems
- Managed breeding/grow-out operations for freshwater fish, amphibians, invertebrates, and live food cultures
- Designed and fabricated a recirculating axolotl (*Ambystoma mexicanum*) grow-out system
- Handled all plumbing, fabrication, electrical, and infrastructure independently with no outside contractors

Aquarium Technician

Apr 2023 – Jul 2023

Seascope Aquarium & Pet Center, Sarasota, FL

- Installed and maintained custom and prefabricated aquaria in clients' homes and businesses
- Conducted water testing, life-support system maintenance, and aquatic animal husbandry
- Assessed and treated disease in freshwater and saltwater fish and invertebrates

Aquatic Sales Associate

Nov 2021 – Jun 2022

Sea Life Fish & Aquariums, St. Petersburg, FL

- Maintained six large (500+ gal) freshwater and saltwater recirculating systems housing hundreds of species; performed water testing, feeding, cleaning, health monitoring, and basic disease response
- Troubleshoot issues with life-support systems and identified, treated, and monitored unhealthy animals through collaboration with a small (3–5 person) team

FIELD, AT-SEA & FISHERIES EXPERIENCE

PADI Divemaster Training Program (Liveaboard Operations)

Oct 2023 – Dec 2023

Divers Den, Cairns, QLD, Australia

- Lived and worked aboard a Great Barrier Reef liveaboard vessel for 3 months while completing PADI Divemaster certification (200+ logged dives total, including night dives)
- Performed dive deck operations including gear setup, tank handling, and equipment preparation under time pressure in a continuously operating marine environment
- Communicated and coordinated with vessel crew, dive professionals, and guests in at-sea conditions
- Followed established safety and operational protocols across daily dive operations

Quality Control

Jul 2023 – Aug 2023

Alaska General Seafoods, Naknek, AK

- Performed QC sampling and grading on a processing line handling 1 million+ pounds of sockeye daily
- Held QC standards through 16 to 20 hour shifts, seven days a week, at peak run
- Collaborated with a 17-member team to maintain quality standards across high-throughput processing

Field Research, Eckerd College

Jan 2020 – Apr 2022

- *R/V Weatherbird II, Florida Institute of Oceanography, Gulf of Mexico (Apr 2022)*: one-day shark research expedition with Eckerd faculty involving longline/drumline deployment, specimen tagging, tissue sampling, and morphometric and environmental data collection in coordinated team-based sampling
- *Volunteer Researcher, Cockroach Bay Preserve State Park, FL (Aug 2020)*: assisted a research team tracking mangrove mortality and growth rates through extended field sampling sessions; prepared transects and maintained data integrity across 8+ hour sampling periods
- *Belize Tropical Marine Ecology Field Course (Jan 2020)*: conducted daily snorkel surveys and transect work; designed and carried out a behavioral study on damselfish territoriality with a partner; collected coral mucus microbiome samples in the field and cultured bacteria in an off-grid setting

TEACHING EXPERIENCE

Teaching Assistant, Comparative Animal Physiology

Feb 2022 – May 2022

Eckerd College, St. Petersburg, FL

- Prepared and staged weekly laboratory sessions for a 24-student upper-level physiology course, including equipment setup, materials organization, and pre-lab testing of protocols
- Diagnosed and resolved instrument and protocol failures in real time during lab sessions
- Graded lab reports and coached students on data presentation, interpretation, and scientific writing

Tutor (Marine Science, Japanese, Chemistry)

Aug 2020 – Dec 2021

Eckerd College & LOVE Learning, St. Petersburg, FL

- Tutored undergraduates one-on-one across three subject areas, diagnosing conceptual gaps and building independent problem-solving
- Coordinated with fellow tutors to align explanations and approaches for shared students

SKILLS

Molecular Biology: DNA/RNA extraction, cleanup, and quantification (NanoDrop); PCR, PCR purification, and PCR troubleshooting; gel electrophoresis (agarose gel casting, imaging, and analysis); molecular cloning (restriction enzyme digestion, ligation, bacterial transformation, colony PCR, plasmid preparation and isolation); split-intein AAV vector system development; PCR-based genotyping for strain verification; RNase-free technique

Microbiology & Cell Culture: Aseptic technique, laminar flow hood operation, autoclaving, and sterilization; bacterial culture (plating, colony selection, liquid culture, glycerol stock preparation); media, agar, and antibiotic-selection plate preparation; microbial strain maintenance and contamination monitoring (endosymbiotic dinoflagellate strains in *Exaiptasia*); microalgal culture (*Nannochloropsis*); environmental microbial sampling and off-grid field culture (coral mucus microbiome, Belize); BSL-2 mammalian cell culture supporting *in vitro* validation and AAV vector preparation workflows; light microscopy (compound, digital) for culture health, contamination, and morphology assessment

Natural Product & Analytical Chemistry (course-level, Eckerd biochemistry coursework): Compound extraction and fractionation; thin-layer chromatography (TLC); antibacterial assays; rotary evaporation; ^1H NMR spectroscopy; gas chromatography; UV/Vis spectroscopy

Computational & Data Analysis: Marine eDNA bioinformatics data analysis and troubleshooting; CoralNet machine-learning image classification (model training); Microsoft Excel (automation, custom tooling, and data tracking); R and RStudio (course-level exposure)

Water Chemistry & Analytical Operations: Quantitative water quality panel (temperature, salinity, pH, alkalinity, Ca, Mg, NH_3 , NO_2^- , NO_3^- , PO_4^{3-}); artificial seawater (ASW) preparation; concentrated buffer and chemical additive preparation with QC verification; trend analysis and large-scale auditing and reporting (70+ systems)

Animal Models, In Vivo Imaging & Histology: Murine subretinal microinjection protocol development; mouse colony management across four inherited retinal disease models, including genotyping coordination; *in vivo* phenotyping (spectral domain OCT, fundus imaging, electroretinography); cryostat sectioning; immunohistochemistry

Marine Organism Culture & Husbandry: Full life-cycle jellyfish culture (*Aurelia aurita*); marine fish and invertebrate husbandry; live-feed culture (rotifers, *Artemia*); freshwater fish, amphibian, and invertebrate husbandry and breeding; disease identification, treatment, and monitoring; safe handling, packing, transport, and acclimation of aquatic animals

Aquaculture Systems & Life Support: Recirculating aquaculture system (RAS) maintenance, troubleshooting, and installation (20 to 2,000 gal); production fish room design and fabrication (20+ systems); centralized plumbing and air manifolds; integrated filtration; automated water change systems; dosing equipment, pumps, aquarium controllers, and media reactors

Field, At-Sea & Diving Operations: Transect and quadrat survey methods; species identification using dichotomous keys; specimen tagging and tissue sampling; longline, drumline, gill net, and seine net deployment; Niskin bottle and Secchi disk handling; PADI Divemaster with 200+ logged dives including night dives; extended liveaboard vessel operations (3-month Great Barrier Reef program); dive deck operations and vessel crew coordination

CERTIFICATIONS & MEMBERSHIPS

- **American Society of Pharmacognosy:** Member since 2026
- **PADI Divemaster (Dec 2023):** 200+ logged dives
- **AALAS Learning Library (2022):** animal research safety, colony management, aseptic technique, and controlled substances training