

Curriculum Vitae

MERCER ROBERT BRUGLER

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EDUCATIONAL BACKGROUND

American Museum of Natural History (AMNH): New York, New York (Jan 2011 - present)

- *Gerstner Scholar and Postdoctoral Fellow*, AMNH Molecular Systematics Laboratory
- Mentor:** Dr. Estefania Rodriguez (Assistant curator of the Cnidaria)
Project: Development of genetic tools for sea anemones: delineating species boundaries using novel nuclear markers & phylogenetic reconstruction of the order Actiniaria using newly-sequenced complete mitochondrial genomes

University of Louisiana at Lafayette: Lafayette, Louisiana (2004-2011)

- *Doctor of Philosophy*, Environmental and Evolutionary Biology
- Dissertation:** Molecular evolution in black corals (Cnidaria: Anthozoa: Hexacorallia): Implications for antipatharian systematics
Advisor: Dr. Scott C. France
Cumulative GPA: 4.00

College of Charleston: Charleston, South Carolina (2001-2004)

- *Master of Science*, Marine Science/Biology
- Thesis:** The complete mitochondrial DNA sequence of the black coral *Chrysopathes formosa* (Antipatharia) and six non-contiguous mitochondrial genes of the tube anemone *Ceriantheopsis americanus* (Ceriantharia): Implications for cnidarian phylogeny
Advisor: Dr. Scott C. France
Cumulative GPA: 3.813

University of Miami: Coral Gables, Florida (1997-2001)

- *Bachelor of Science*
- Major (Minor):** Marine Science/Biology (Chemistry)
Saltwater Semester Project: Diurnal effects on fish abundance and diversity in the seagrass beds of Bimini, Bahamas, and Long Key, Florida (unpublished)
Cumulative GPA: 3.77

RESEARCH INTERESTS

- Evolution and diversity of marine invertebrates, with particular interest in cnidarians
- Deep-sea biology
- Effects of dispersal and gene flow on the genetic structure of deep-sea populations
 - Current focus: extreme environments (Antarctica; chemosynthetic vents and seeps)
- Molecular systematics and evolutionary history of the Class Anthozoa (Phylum Cnidaria)
 - Current focus: sea anemones (actinarians) and black corals (antipatharians)
- Evolution of mitochondrial (mt) gene order, gene content, and genome architecture
- Tools: morphology, mt and nuclear DNA, molecular morphometrics, and mt gene order

PUBLICATIONS

- Sanchez JA, **Brugler MR**, Miller K, Umana C, Dueñas LF, Opresko DM, *in prep.* A phylogenetic reconstruction of the Antipatharia (black corals) based on the predicted secondary structure of nuclear ITS2.
- Thoma JN, **Brugler MR**, France SC, *in prep.* The complete mitochondrial genome of the scleraxonian *Paragorgia coralloides* (Cnidaria: Anthozoa: Octocorallia): Novel genome rearrangement via intramitochondrial recombination.
- Brugler MR**, France SC, Opresko DM, *in prep.* A historical review of the order Antipatharia with presentation of novel DNA-based phylogenetic reconstructions: Implications for black coral systematics (Cnidaria: Anthozoa: Hexacorallia).
- Brugler MR**, France SC, Opresko DM, *in prep.* Mitochondrial genomics of the black coral family Leiopathidae Haeckel, 1896.
- Wagner D, **Brugler MR**, Opresko DM, France SC, Montgomery AD, Toonen RJ, 2010. Using morphometrics, *in situ* observations and genetic characters to distinguish among commercially valuable Hawaiian black coral species; a redescription of *Antipathes grandis* Verrill, 1928 (Antipatharia: Antipathidae). Invertebrate Systematics 24: 271-290.
- Thoma JN, Pante EG, **Brugler MR**, France SC, 2009. Deep-sea octocorals and antipatharians show no evidence of seamount-scale endemism in the NW Atlantic. Marine Ecology Progress Series 397: 25-35.
- Van der Ham J, **Brugler MR**, France SC, 2009. Exploring the utility of an indel-rich, mitochondrial intergenic region as a molecular barcode for bamboo corals (Octocorallia: Isididae). Marine Genomics 2 (3-4): 183-192.
- Brugler MR**, France SC, 2008. The mitochondrial genome of a deep-sea bamboo coral (Cnidaria, Anthozoa, Octocorallia, Isididae): genome structure and putative origins of replication are not conserved among octocorals. Journal of Molecular Evolution 67: 125-136.
- Daly M, **Brugler MR**, Cartwright P, Collins AG, Dawson MN, Fautin DG, France SC, McFadden CS, Opresko DM, Rodriguez E, Romano S, Stake J, 2007. The phylum Cnidaria: A review of phylogenetic patterns & diversity three hundred years after Linnaeus. Zootaxa 1668: 127-182.
- Brugler MR**, France SC, 2007. The complete mitochondrial genome of the black coral *Chrysopathes formosa* (Cnidaria:Anthozoa:Antipatharia) supports classification of antipatharians within the subclass Hexacorallia. Molecular Phylogenetics and Evolution 42(3): 776-788.

GRANTS / FELLOWSHIPS

- Gerstner Family Foundation Scholarship (AMNH). Received March 1, 2011. Amount: \$50,000
- Grant to attend the 4th International Symposium on Deep-Sea Corals: Wellington, New Zealand. Amount: NZ \$4,000
- Subcontract from Continental Shelf Associates (contact: Stephen Viada). Title: Mitochondrial genome studies of the black coral *Leiopathes*. Received January 11, 2008. Amount: \$4,570
- Louisiana's Board of Regent's NSF EPSCoR Links with Industry, Research Centers, and National Laboratories (LINK) program. Received June 1, 2007. Amount: \$2,000. Contract no. NSF(2007)-LINK-24
- Louisiana Board of Regents 4-year Support Fund Fellowship. Received March 1, 2004. Grant no. LEQSF(2004-2009)-GF-21
- Slocum-Lunz Foundation Grant. Received May 19, 2003. Amount: \$600
- Joanna Deepwater Fellowship Award. Received April 8, 2003. Amount: \$3,033

MUSEUM RESEARCH EXPERIENCE

- National Institute of Water and Atmospheric Research (NIWA) - Invertebrate Collection: Wellington, New Zealand. Priority: species identifications and subsampling for genetic voucher preservation. December 6-9, 2008 (funded by the sponsors of the 4th International Symposium on Deep-Sea Corals)
- Smithsonian Institution's National Museum of Natural History: Washington, D.C. Priority: species descriptions and SEM analyses of black corals. June 12-21, 2008 (funded by Continental Shelf Associates) and June 16-July 2, 2007 (funded by the BoR EPSCoR LINK grant).

FIELD EXPERIENCE

- The Drake; Cruise 11-03; '*Historic perspectives on climate & biogeography from deep-sea corals in the Drake Passage*,' Participating scientist; *R/VIB Nathaniel B Palmer*; May 9-June 11, 2011.
- Flower Garden Banks National Marine Sanctuary; Cruise DFH-11; '*Flower Garden Banks ROV surveys: ground-truthing bathymetry data and collecting antipatharians for genetic analysis*,' Participating scientist; *M/V Spree*; September 11-16, 2005.
- New England Seamounts; Cruise 05-03, Leg 2; '*Deep North Atlantic Stepping Stones*,' Participating scientist; *R/V Ronald Brown / ROVs Hercules & Argus*; August 2-September 4, 2005.
- New England Seamounts; Cruise 04-04; '*Mountains in the Sea II - New England Seamount Chain Expedition*,' Participating scientist; *R/V Ronald Brown / ROVs Hercules & Argus*; May 8-24, 2004.
- New England Seamounts; Cruise AT-8; '*Mountains in the Sea - Exploring the New England Seamount Chain*,' Participating scientist; *R/V Atlantis / DSV Alvin*; Alvin dive (Dive 3906, July 18th, 1644 meters depth, Bear Seamount); July 11-19, 2003.
- New England Seamounts; Cruise AT7-35; '*Collaborative Research: Ocean Ventilation Rates and Rapid Climate Change Recorded by Deep-Sea Corals: An Alvin and ABE Program to the New England Seamounts*,' Participating scientist; *R/V Atlantis / DSV Alvin*; May 26-June 17, 2003.
- Guaymas Basin; Cruise 07, Leg 11; '*The Fate of NH₄⁺ in Hydrothermal Plumes*,' Participating scientist; *R/V Atlantis / DSV Alvin*; Alvin dive (Dive 3778, May 4th, 2011 meters depth); April 26-May 11, 2002.
- Bimini, Bahamas; 'Saltwater Semester' undergraduate project: Rosenstiel School of Marine and Atmospheric Science, University of Miami, Florida. Participating scientist; *R/V Coral Reef II*; April 2-8, 2000.

PROFESSIONAL ACTIVITIES

REFEREE

- ICES Journal of Marine Science (1)
- Marine Ecology Progress Series (1)
- Molecular Phylogenetics and Evolution (2)
- The Italian Journal of Zoology (1)
- AMNH Lerner Gray Marine Research Grants (1)

PRESENTATIONS / MEETINGS / WORKSHOPS / LECTURES

- **Invited speaker.** TRUST Summer Institute in Life Science (comprised of teachers from Brooklyn, Lehman and Hunter College). Held on August 10, 2011 at the Gottesman Center for Science Teaching and Learning (AMNH).
Oral presentation: *Why is biodiversity important?*
- **Richard Gilder Graduate School Comparative Biology Seminar Series.** February 14, 2011.
Oral presentation: *Molecular evolution in black corals (Cnidaria: Anthozoa: Hexacorallia: Antipatharia)*
- **Invited speaker.** Coral: Symbol, Substance & Significance. Held on October 29-31, 2009 at The Graduate School, The City University of New York: NY. Hosted by Initiatives in Art & Culture.
Oral presentation: *What is a coral?*
- **Coral Identification Seminar/Workshop.** Held on December 8, 2008 at the National Institute of Water and Atmospheric Research (NIWA): Wellington, New Zealand. Speakers included Stephen Cairns (Scleractinia and Stylasteridae), Dennis Opresko and Tina Molodtsova (Antipatharia), & Juan Sanchez, Les Watling, Asako Matsumoto and Scott France (Octocorallia).
- **2008 4th International Symposium on Deep-Sea Corals.** Held from December 1-5, 2008 in Wellington, New Zealand, and hosted by NIWA.
Poster presentations:
 - 1) *Mitochondrial genome studies of the black coral family Leiopathidae Haeckel, 1896*
 - 2) *Deep-sea corals show no evidence of endemism on northwestern Atlantic seamounts (co-author with Thoma JN, Pante E, and France SC)*
- **UL Lafayette Biology Department Seminar.** September 25, 2008.
Oral presentation: *Progress in antipatharian (black coral) phylogenetics and mitogenomics*
- **2008 Cnidarian Tree of Life Annual Meeting.** Held from July 19-24, 2008 at the Hotel Los Arcos: La Paz, Mexico.
Oral presentation: *Progress in antipatharian phylogenetics and mitogenomics*
- **Invited lectures, Biology 121 (introductory biology for non-majors).** June 23-25, 2008.
Topics: Glycolysis and cellular respiration; DNA and inheritance. UL Lafayette: Lafayette, LA.
- **8th Annual Department of Biology Graduate Student Symposium.** Held on November 16, 2007 at the University of Louisiana at Lafayette: Lafayette, LA.
Oral presentation: *Black coral phylogenetics: utilizing molecular morphometrics of the internal transcribed spacer 2 (ITS2, rDNA)*
- **A Short-Course in Taxonomy and Ecology of Gorgonians and Black Corals.** Held on July 23-August 2, 2007 at the Smithsonian Tropical Research Institute's Bocas del Toro research station: Bocas del Toro, Panama; hosted by Dr. Rachel Collin (collinr@si.edu).
Oral presentations:
 - 1) *Order Antipatharia (black corals): Analysis of mitochondrial variation and the development and application of novel genetic markers*
 - 2) *SEM photomicrographs of deep-sea black coral spines*

- **7th Annual Department of Biology Graduate Student Symposium.** Held on October 13, 2006 at the University of Louisiana at Lafayette: Lafayette, LA.
Oral presentation: *Analyzing complete mitochondrial genomes: advantages of gene order and genome content when inferring ancient evolutionary relationships*
- **2006 Cnidarian Tree of Life Annual Meeting.** Held from June 28-29, 2006 at SUNY Stony Brook: Stony Brook, NY.
- **2006 Evolution.** Held from June 23-27, 2006 at SUNY Stony Brook: Stony Brook, NY.
Poster presentation (co-author): *Deep-sea bamboo corals break rank: Mitochondrial gene order is not conserved among octocorals (Cnidaria Anthozoa: Octocorallia: Isididae)*
Oral presentation: *Have we discovered a "fountain of variation?" An analysis of non-coding regions within the black coral (Cnidaria: Anthozoa) mitochondrial genome*
- **2005 3rd International Symposium on Deep-Sea Corals.** Held from November 28-December 2, 2005 at the Rosenstiel School of Marine and Atmospheric Science: Miami, FL.
Poster presentation (co-author): *Distribution and abundance of black corals (Antipatharia) in relation to depth and topography on the New England Seamounts (Northwest Atlantic)*
Oral presentation (co-author): *Low sequence variability within anthozoan mitochondrial genomes: Are antipatharian non-coding regions the exception?*
- **8th Annual Sigma Xi Student Research Symposium (UL Lafayette Chapter).** Held on March 14, 2005 at the University of Louisiana at Lafayette: Lafayette, LA.
Oral presentation: *The mitochondrial genome of an antipatharian (black coral) and ceriantharian (tube anemone): Implications for Cnidarian phylogeny* (received 1st place award)
- **2005 Graduate Student Symposium.** Held from January 28-30, 2005 at LUMCON (Louisiana Universities Marine Consortium): Cocodrie, LA.
Oral presentation: *The mitochondrial genome of an antipatharian (black coral) and ceriantharian (tube anemone): Implications for Cnidarian phylogeny*
- **5th Annual Department of Biology Graduate Student Symposium.** Held from October 21-22, 2004 at the University of Louisiana at Lafayette: Lafayette, LA.
Oral presentation: *The mitochondrial genome of an antipatharian (black coral) and ceriantharian (tube anemone): Implications for Cnidarian phylogeny* (received 1st place award)
- **10th Deep-Sea Biology Symposium.** Held from August 25-29, 2003 at Southwestern Oregon Community College: Coos Bay, OR.
Poster presentation: *Do antipatharians belong in the subclass Ceriantipatharia? Inferring phylogeny from mitochondrial gene order of a deep-sea black coral*
- **Marine Biology Graduate Student Research Colloquium** (Graduate Program in Marine Biology, College of Charleston, Grice Marine Laboratory). Held from February 21-22, 2003 at the Department of Natural Resources: Charleston, S.C.
Oral presentation: *Sequencing the complete mitochondrial genome of an antipatharian (black coral) and a ceriantharian (tube anemone) for use in phylogenetics of the class Anthozoa*
- **Annual Meeting of the South Eastern Population Ecology and Genetics Group.** Held from September 20-22, 2002 at Duke Marine Laboratory: Beaufort, N.C.
Oral presentation (co-author): France SC, LePard A, Barkes MC, Hoover L, Brugler MR, College of Charleston: Charleston, S.C.
Analyses of mitochondrial genes of deep-sea corals: low mutation rates and conserved ORF provide evidence for a functional DNA mismatch repair gene

ASSOCIATIONS / JOURNAL CLUBS (CURRENT AND DATED)

- **Graduate Student Organization** - University of Louisiana at Lafayette
- **Molecular Evolution Journal Club** - Bi-weekly participation (run by Dr. Patricia Rosel, NOAA)
- **NERD Group** - Weekly participation: New Evolution Reading and Discussion group
- **MBGSA** - Former member of the Marine Biology Graduate Student Association at Grice Marine Lab: Charleston, S.C.

COMMUNITY SERVICE / OUTREACH

- Oral presentation to 22 donors of the AMNH. Presentation title: What are sea anemones? Event title: Behind-the-scenes in the Invertebrate Zoology Department: Science-at-work tour and luncheon. May 4, 2011.
- Oral presentation to 15 high school interns working at the AMNH (Saltz Internship Program). Title: What is a coral? March 21, 2011.
- Oral presentation to 200+ 7th and 8th grade students at Milton Elementary/Middle School (Lafayette, LA.). Title: Exploring Deep-Sea Coral Communities. April 4, 2008.
- Louisiana Region VI Science Fair Judge (Environmental Science, senior division). March 1, 2008.
- Comeaux High School 11th grade science fair judge (Lafayette, LA.). February 15, 2008.
- Provided three oral presentations to 10th-grade science classes (Lafayette High School, Lafayette, LA.). Title: Exploring Deep-Sea Coral Communities. December 11, 2007.
- Hosted three 10th grade high school students from Comeaux High School (Lafayette, LA.). They loaded, ran, and visualized DNA on an agarose gel, viewed a PowerPoint presentation on the deep-sea, and were introduced to deep-sea invertebrates, with emphasis on corals. April 25, 2007.
- Louisiana Region VI Science Fair Judge (Cellular & Molecular Biology, junior & senior division). March 3, 2007.
- Oral presentation on the deep-sea environment, Comeaux High School biology & chemistry classes, grades 11-12, Lafayette, LA. December 4, 2006.
- Louisiana Region VI Science Fair Judge (Environmental Science, senior division, grades 9-12). March 4, 2006.
- Designed and led the 'Disease Detective' event for the 2005 Science Olympiad held at UL Lafayette. February 19, 2005.
- Hosted an 8th grade student (Nathaniel Faulk) from L.J. Alleman Middle School; introduced Nathaniel to deep-sea corals and basic molecular lab techniques. February 4, 2005.

TEACHING / RESEARCH EXPERIENCE

Instructor - 'Biological Principles and Issues I' for non-majors (Fall 2010; Spring & Summer 2009)
-University of Louisiana at Lafayette - BIOL 121 (150 students [FA10]; 259 [SP09]; 85 [SU09])
-Textbook: *Biology, Life on Earth with Physiology* (8th & 9th ed.) by Audesirk, Audesirk and Byers
-Contacts: Pegge Alciatore (pla7994@louisiana.edu) and Lewis Deaton (led9784@louisiana.edu)

Research Assistant (Spring 2010; Spring and Summer 2004)

-University of Louisiana at Lafayette
-*Job Description*: Performing molecular work on deep-sea anthozoans for Dr. Scott C. France

Instructor - 'Fundamentals of Biology I' for biology majors (Fall 2009)

-University of Louisiana at Lafayette - BIOL 110 (305 students)
-Textbook: *Biology* (1st ed.) by Brooker, Widmaier, Graham and Stiling
-Contact: Pegge Alciatore

Teaching Assistant - Advanced Invertebrate Zoology Laboratory (Fall 2008 and 2006)
-University of Louisiana at Lafayette - Biology 319/519
-Contacts: Drs. Scott C. France and Raymond Bauer (rtbauer@louisiana.edu)

Research Assistant (Fall 2003)

-College of Charleston - Grice Marine Laboratory
-*Job Description*: Maintaining Hollings Marine Lab project database and Grice Marine Lab wet-lab -
-Contact: Dr. Louis Burnett (burnettl@cofc.edu)

Research Assistant (Summer 2003)

-College of Charleston - Grice Marine Laboratory
-*Job Description*: Performing molecular work on deep-sea anthozoans for Dr. Scott C. France

Teaching Assistant - Human Physiology Laboratory (Fall 2001 - Spring 2003)

-College of Charleston - Biology 201
-Contact: Dr. Duncan Munro (munrod@cofc.edu)

Teaching Assistant - Evolution & Biodiversity Workshop (Fall 1998)

-University of Miami - Biology 374
-Contact: Dr. Dana Krempels (dana@miami.edu)

TRAINING / MENTORING EXPERIENCE

Taught genetic techniques and data analysis to Mary Allison Manning (undergraduate, UL Lafayette), Didi Kpaduwa (undergraduate, UL Lafayette), Steve Allen (technician for Dr. Scott C. France), Jana Thoma (graduate student, UL Lafayette), Eric Pante (graduate student, UL Lafayette), Joris van der Ham (graduate student / post-doc, UL Lafayette), and Marisol Mendoza (visiting undergraduate from the Benemérita Universidad Autónoma de Puebla [Mexico]; AMNH).

MEMBERSHIPS / ASSOCIATIONS

- **College of Charleston: Charleston, South Carolina:** Sigma Xi - The Scientific Research Society
- **University of Miami: Coral Gables, Florida:** Honors Program, Resident Assistant (Stanford Residential College), Mu Alpha Theta (Freshman Honor Society), Golden Key National Honor Society, Rho Rho Rho Marine Science Honor Society, Phi Kappa Phi National Honor Society

JOURNAL SUBSCRIPTIONS

Nature, Science, Evolution, Systematic Biology, American Scientist, Marine Technology Reporter

RELEVANT COURSEWORK

DOCTORAL DEGREE

Advanced Microscopy (SEM), Advanced Problems in Zoology, Deep-Sea Biology, Environmental Change (Coastal Plant Ecology), Evolutionary Ecology, Evolutionary Processes, Molecular Biology, Molecular Evolution, Statistical Ecology, Analytical Techniques, Systematic Methods

MASTER'S DEGREE

Biometry, Ecology of Marine Organisms, Graduate Core Seminar, Marine Invertebrate Zoology, Physical Oceanography, Physiology and Cell Biology of Marine Organisms, Population Genetics, Bioethics, Deep-Sea Biology, and Evolution of Marine Diseases

SKILLS / ABILITIES

FIELD / LAB SKILLS

SCUBA diving (PADI: advanced open-water certified, NAUI: nitrox certified); Knowledge of basic lab chemistry, reagent preparation, DNA extraction and isolation of animal tissue, polymerase chain reaction (PCR), thermal cyclers, gel electrophoresis, fluorometry, PCR purification, cycle sequencing, DNA sequencing using Applied Biosystems (ABI) and Beckman chemistry, gas chromatography (GC), high pressure/performance liquid chromatography (HPLC), spectrometry, and GC-mass spectrometry. Can operate Beckman Coulter CEQ 8000 and ABI 3100/3130xl DNA sequencers; also proficient with the scanning electron microscope (Hitachi S-3000N Thermionic SEM; AMRAY 1810).

SOFTWARE

Proficient on both Mac and PC operating systems; MS Word, Excel, and PowerPoint; File Maker Pro 5; Applied Biosystems and Beckman Coulter CEQ 8000 Genetic Analysis System software; various phylogenetic analysis software programs (*e.g.*, Sequencher, SeqApp, Se-Al, BioEdit, PAUP*, Clustal-X, MAFFT, Muscle, MrBayes, Phylobayes, RAxML, PhyML) and databases (GenBank).

PERTINANT PAST EMPLOYMENT

The Dallas World Aquarium, *Aquarist and Life Support* (May - August, 2000 and 2001)

Contact: Daryl Richardson, 1801 North Griffin, Dallas, TX. 75202; (214) 720-2224

U.S. Army Corps of Engineers - Lewisville Aquatic Ecosystem Research Facility, *Restoration and Maintenance* (December, 1998 - January, 1999 and May - August, 1999)

Contact: Michael Smart, RR3 Box 446, Lewisville, TX. 75056; (972) 436-2215

REFERENCES

Dr. Scott C. France
*Master's & Doctoral
Advisor*

University of Louisiana at Lafayette
Dept. of Biology - Billeaud Hall
P.O. Box 42451
Lafayette, LA. 70504

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Lafayette, LA. 70504

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GRADUATE RECORD EXAMINATION (GRE)

Verbal: 560 (75th percentile), Quantitative: 730 (77th), Analytical: 640 (64th), Analytical Writing: 4.5 (47th), Biology Subject Exam: 670 (63rd)

DISSERTATION CHAPTERS

- Examination of the level of genetic variation present in the black coral mitochondrial (mt) genome using sequence data from the two largest intergenic regions and *cox1*
 - Anthozoans in general have shown unusually slow mt DNA evolution; however, antipatharian mtDNA has not been surveyed
- Utilization of the mt sequences obtained from the first objective, in addition to sequence data from the complete nuclear rDNA cistron (18S-ITS1-5.8S-ITS2-28S), to construct a phylogeny of the order Antipatharia
- Development of novel species-specific genetic markers for inter- and intraspecific level resolution
 - Little is currently known about the genetic population structure of deep-sea corals and the extent to which they maintain interbreeding populations
- Morphological descriptions of novel deep-sea taxa
- Video analysis of deep-diving submersible transect data to characterize and subsequently predict the distribution and abundance of deep-sea corals in relation to habitat and environmental variables
- Sequencing of six complete *Leiopathes* (black coral) mt genomes to characterize genetic variation at the whole genome level (as compared to single gene sequences) and determine what degree of genetic variability correlates with morphologically-defined species