

CURRICULUM VITAE - NANCY KNOWLTON

PERSONAL DATA

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EDUCATION

1967-69 Smith College, Biology

1969-71 Harvard University, A.B. in Biology, *summa cum laude*

1972-78 University of California at Berkeley, Ph.D. in Zoology

POSITIONS

1978 Post-doctoral fellow with Dr. G. A. Parker
University of Liverpool and Cambridge University

1979-83 Assistant Professor of Biology, Yale University

1984 Associate Professor of Biology, Yale University

1985-2006 Staff Scientist, Smithsonian Tropical Research Institute

2007 Senior Scientist, Smithsonian Tropical Research Institute

1990-91 Visiting Scholar, Wolfson College and Department of Zoology
University of Oxford

1996-97 Visiting Scholar, Zoology Institute, University of Basel

1996-2007 Professor, Scripps Institution of Oceanography, University of
California at San Diego

2001-2007 Director, Scripps Center for Marine Biodiversity and Conservation

2004-2007 John Dove Isaacs Chair in Natural Philosophy, UCSD

2007-present Senior Scientist, Smithsonian Tropical Research Institute
Emeritus

2007-present Adjunct Professor, Scripps Institution of Oceanography, University
of California San Diego

2007-present Sant Chair in Marine Science, National Museum of Natural
History, Smithsonian Institution

MAJOR AWARDS AND GRANTS

1973-76 NSF Pre-doctoral Fellowship

1976 NSF Doctoral Dissertation Improvement Grant

1978 NATO Post-doctoral Fellowship

1979-82 NSF, Psychobiology

1982-85 NSF, Population Biology

1983 National Geographic Society Grant

1986-00, 2010 Smithsonian Scholarly Studies Grants (8)

1994-95	Office of Naval Research Grant
1996-99	Mellon Foundation (through STRI)
1997-99	NSF, Biological Oceanography (Co-PI)
1998-02	NSF, Biological Oceanography
2000-01	NOAA, NURP (Co-PI)
2000-02	NSF, International Programs (Brazil)
2000-05	NSF, Biological Oceanography (Co-PI)
2002-04	Sloan Foundation (Known, Unknown, Unknowable Program)
2003-08	NSF, Interdisciplinary Graduate Education and Research Training
2003-2006	NSF, Systematic Biology
2004-2005, 2009	SI, Marine Science Network
2005-2009	Sloan Foundation (Census of Marine Life, Coral Reefs)
2009-2010	Sloan Foundation (Census of Marine Life, Coral Reefs)

PROFESSIONAL ACTIVITIES AND HONORS

1981	Co-host, Eighth Annual Benthic Ecology Conference
1981-84, 88-90	Board of Editors, American Scientist
1985-88	Consulting Editor, American Scientist
1989-92	NSF Panelist, Animal Learning and Behavior
1993-96	Organizing Committee, 8th International Coral Reef Symposium
1994	Biodiversity Visiting Group, Natural History Museum (London)
1994	Keynote Speaker, Tester Memorial Graduate Symp., Univ. Hawaii
1995	Keynote speaker, Biodiversity and Sustainable Use of Coastal Waters, Swedish Committee on Biological Diversity
1995-97	Associate Editor, Evolution
1995-98	Council Delegate, AAAS Section on Biological Sciences
1996-98	Committee on Council Affairs, AAAS
1997	Elected Fellow, AAAS
1997-1998	Expert advisor, search for Professor in Evolutionary Biology, University of Uppsala
1999	Aldo Leopold Leadership Fellow
2000	Panelist, National Oceanographic Partnership Program (OBIS)
2001	Spring Population Biology Distinguished Visitor, UC Davis
2001	Panelist, National Undersea Research Program (CMRC), NOAA
2001	Panelist, Packard Foundation Interdisciplinary Science Program
2000-2010	National Geographic, Committee on Research and Exploration
2001-2008	National Geographic, Conservation Trust Advisory Board
2001-2006	Editorial Board, Biological Bulletin
2001-2004	Marine Advisory Panel, Conservation International
2002-2010	Chair, Synthesis Panel, World Bank Coral Reef Targeted Research
2002-2005	Co-Host, Alfred P. Sloan Foundation Symposia on Marine Biodiversity: the Known, the Unknown and the Unknowable
2002-2004	U.S. National Committee for the Census of Marine Life
2003	Kane Lectureship, Kewalo Marine Laboratory, Univ. Hawaii
2003	Plenary Speaker, Annual Conference, US 9 th District Circuit Court
2003-present	International Review Committee, Biodiversity Center, Academia

	Sinica, Taiwan (chair since 2009)
2004	Paul Illg Memorial Lecturer, Friday Harbor Laboratories
2005	Whiteley Center Fellow, Friday Harbor Laboratories
2005	Co-Host, Smithsonian and Sloan Foundation Meeting, Molecular Methods for Coral Reefs
2006	Plenary Speaker, Ocean Sciences Meeting, Honolulu, Hawaii
2006- present	Board of Advisors, The Ocean Foundation (Mark Spaulding)
2006-present	Editorial Board, Annual Review of Marine Science
2007	Glaser Lectureship, Florida International University
2007-present	Lead Advisor, America's Ocean Challenge
2008-present	Board of Directors, AAAS
2009	Panelist, Ocean Exploration grants, NOAA
2009-2011	Pew Marine Fellows Advisory Committee
2009	Department of State Guest Speaker, Indonesian Embassy and Embassy of East Timor, and official US delegate to World Ocean Conference in Manado, Indonesia
2009	Co-organizer, Ocean Conservation Success Stories Symposia (AAAS, International Marine Conservation Convention-NMNH)
2009-present	Board of Advisors, ASSEMBLE (European Marine Biological Laboratories consortium)
2009	Peter Benchley Award for Science in Service of Conservation
2010-present	Board of Directors, Coral Reef Alliance
2010-2011	NMNH Curator, Hyperbolic Crochet Coral Reef Exhibit
2010-present	Chair, Editorial Board, Ocean Portal

ARTICLES

- Knowlton, N. 1974. A note on the evolution of gamete dimorphism. Journal of Theoretical Biology 46: 283-285.
- Knowlton, N. and G. A. Parker. 1979. An evolutionary stable strategy approach to indiscriminate spite. Nature 279: 419-421.
- Knowlton, N. 1979. Reproductive synchrony, parental investment, and the evolutionary dynamics of sexual selection. Animal Behaviour 27: 1022-1033.
- Knowlton, N. 1980. Sexual selection and dimorphism in two demes of a symbiotic, pair-bonding snapping shrimp. Evolution 34: 161-173.
- Parker, G. A. and N. Knowlton. 1980. The evolution of territory size - some ESS models. Journal of Theoretical Biology 84: 445-476.
- Woodley, J. D., E. A. Chornesky, P. A. Clifford, J. B. C. Jackson, L. S. Kaufman, N. Knowlton, J. C. Lang, M. P. Pearson, J. W. Porter, M. C. Rooney, K. W. Rylaarsdam, V. J. Tunnicliffe, C. M. Wahle, J. L. Wulff, A. S. G. Curtis, M. D. Dallmeyer, B. P. Juup, M. A. R. Koehl, J. Neigel, and E. M. Sides. 1981. Hurricane Allen's impact on Jamaican coral reefs. Science 214: 749-755.
- Knowlton, N., J. C. Lang, M. C. Rooney, and P. Clifford. 1981. Evidence for delayed mortality in hurricane-damaged Jamaican staghorn corals. Nature 294: 251-252.
- Knowlton, N. 1982. Parental care and sex role reversal. Pages 203-222 in Current Problems in Sociobiology (Kings College Sociobiology Group, eds.), Cambridge University Press.

- Curtis, A. S. G., J. Kerr, and N. Knowlton. 1982. Graft rejection in sponges: genetic structure of accepting and rejecting populations. Transplantation 33: 127-133.
- Knowlton, N. and B. D. Keller. 1982. Symmetric fights as a measure of escalation potential in a symbiotic, territorial snapping shrimp. Behavioral Ecology and Sociobiology 10: 289-292.
- Knowlton, N. and B. D. Keller. 1983. A new, sibling species of snapping shrimp associated with the Caribbean sea anemone *Bartholomea annulata*. Bulletin of Marine Science 33: 353-362.
- Knowlton, N. and S. R. Greenwell. 1984. Male sperm competition avoidance mechanisms: the influence of female interests. Pages 61-84 in Sperm Competition and the Evolution of Animal Mating Systems (R. L. Smith, ed.), Academic Press.
- Knowlton, N. and B. D. Keller. 1985. Two more sibling species of alpheid shrimps associated with the Caribbean sea anemones *Bartholomea annulata* and *Heteractis lucida*. Bulletin of Marine Science 37: 893-904.
- Knowlton, N. 1986. Field studies of life cycles: focusing on individuals. Pages 209-215 in Indian Ocean: Biology of Benthic Marine Organisms (M.-F. Thompson, R. Sarojini and R. Nagabhushanam, eds.), Oxford and IBH Publications.
- Knowlton, N. 1986. Cryptic and sibling species among the decapod Crustacea. Journal of Crustacean Biology 6: 356-363.
- Knowlton, N. and B. D. Keller. 1986. Larvae which fall far short of their potential: highly localized recruitment in an alpheid shrimp with extended larval development. Bulletin of Marine Science 39: 213-223.
- Knowlton, N. 1988. Coral bleaching in Panama and considerations for the future. Pages 35-37 in Mass Bleaching of Coral Reefs in the Caribbean: A Research Strategy (J. Ogden and R. Wicklund, eds.), National Undersea Research Report 88-2.
- Knowlton, N., J. C. Lang, and B. D. Keller. 1989. Fates of staghorn coral isolates on hurricane- damaged reefs in Jamaica: the role of predators. Proceedings of the 6th International Coral Reef Symposium 2: 83-88.
- Knowlton, N., J. C. Lang, and B. D. Keller. 1990. Case study of natural population collapse: post-hurricane predation on Jamaican staghorn corals. Smithsonian Contributions to Marine Science 31: 1-25.
- Knowlton, N. and D. E. K. Mills. 1992. The systematic importance of color and color pattern: evidence for complexes of sibling species of snapping shrimp (Caridea: Alpheidae: *Alpheus*) from the Caribbean and Pacific coasts of Panama. Proceedings of the San Diego Society of Natural History 18: 1-5.
- Knowlton, N. 1992. Thresholds and multiple stable states in coral reef community dynamics. American Zoologist 32: 674-682.
- Knowlton, N., E. Weil, L. A. Weigt, and H. M. Guzman. 1992. Sibling species in *Montastraea annularis*, coral bleaching, and the coral climate record. Science 255: 330-333.
- Knowlton, N. 1993. Sibling species in the sea. Annual Review of Ecology and Systematics 24: 189-216.
- Knowlton, N., L. A. Weigt, L. A. Solorzano, D. E. K. Mills and E. Bermingham. 1993. Divergence in proteins, mitochondrial DNA, and reproductive compatibility across the Isthmus of Panama. Science 260: 1629-1632.

- Knowlton, N. and J. B. C. Jackson. 1993. Inbreeding and outbreeding in marine invertebrates. Pages 200-249 in The Natural History of Inbreeding and Outbreeding (N. W. Thornhill, ed.), University of Chicago Press.
- Knowlton, N. and J. B. C. Jackson. 1994. New taxonomy and niche partitioning on coral reefs: jack of all trades or master of some? Trends in Ecology and Evolution 9: 7-9.
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- Knowlton, N. 1994. A tale of two seas. Natural History 6/94: 66-68
- Weil, E. and N. Knowlton. 1994. A multi-character analysis of the Caribbean coral *Montastraea annularis* (Ellis and Solander, 1786) and its two sibling species, *M. faveolata* (Ellis and Solander, 1786) and *M. franksi* (Gregory, 1895) Bulletin of Marine Science 55:151-175.
- Rowan, R. and N. Knowlton. 1995. Intraspecific diversity and ecological zonation in coral-algal symbiosis. Proceedings of the National Academy of Sciences 92: 2850-2853.
- Knowlton, N. 1996. Trench warfare on the shore: inter-clonal aggression in sea anemones. Trends in Ecology and Evolution 11: 271-272.
- Knowlton, N. and L. A. Weigt. 1997. Species of marine invertebrates: a comparison of the biological and phylogenetic species concepts. In Species: the Units of Biodiversity, Systematics Association (UK) Special Volume Series 54 (M. F. Claridge, H. A. Dawah & M. R. Wilson, eds.), pp. 199-219, Chapman and Hall.
- Knowlton, N., J. L. Mate, H. M. Guzman, R. Rowan, and J. Jara. 1997. Direct evidence for reproductive isolation among the three species of the *Montastraea annularis* complex in Central America (Panama, Honduras). Marine Biology 127: 705-711.
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- Lopez, J.V. and N. Knowlton. 1997. Discrimination of sibling species in the *Montastraea annularis* complex using multiple genetic loci. Proceedings of the 8th International Coral Reef Symposium 2: 1613-1618.
- Baker, A. C., R. Rowan and N. Knowlton. 1997. Symbiosis ecology of two Caribbean acroporid corals. Proceedings of the 8th International Coral Reef Symposium 2: 1295-1300.
- Doebeli, M. and N. Knowlton. 1998. The evolution of interspecific mutualisms. Proceedings of the National Academy of Sciences 95: 8676-8680.
- Knowlton, N. 1998. Hard decisions and hard science: research needs for coral reef management. In Coral Reefs: Challenges and Opportunities for Sustainable Management (M. Hatziolas, A.J. Hooten & M. Fodor, eds.), pp. 183-187. World Bank, Washington, DC.
- Knowlton, N. and L. A. Weigt. 1998. New dates and new rates for divergence across the Isthmus of Panama. Proceedings of the Royal Society: Biological Sciences 265:2257-2263.
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- Williams, S. T., N. Knowlton and L. A. Weigt. 1999. Indo-Pacific molecular biogeography of the coral-dwelling snapping shrimp *Alpheus lottini* (Decapoda: Caridea: Alpheidae) In Sheppard CRC and Seaward MRD (eds) Ecology of the Chagos Archipelago. Occasional Publications of the Linnean Society, 2. Linnean Society London, pp 195-206.
- Killingback, T., M. Doebeli and N. Knowlton. 1999. Variable investment, the continuous prisoner's dilemma, and the origin of cooperation. Proceedings of the Royal Society of London B 266: 1723-1728.
- Knowlton, N. 2000. Molecular genetic analyses of species boundaries in the sea. Hydrobiologia 420: 73-90.
- Knowlton, N. and J. B. C. Jackson. 2001. The ecology of coral reefs. In Marine Community Ecology (M. D. Bertness, S. Gaines and M. E. Hay, eds.). Sinauer, Sunderland, MA, pp. 395-422.
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- Williams, S. T., N. Knowlton, L. A. Weigt and J. A. Jara. 2001. Evidence for three major clades within the snapping shrimp genus *Alpheus* inferred from nuclear and mitochondrial gene sequence data. Molecular Phylogenetics and Evolution 20: 375-389.
- Knowlton, N. 2001. Who are the players on coral reefs and does it matter? The importance of coral taxonomy for coral reef management. Bulletin of Marine Science 69: 10-13.
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- Toller, W. W., R. Rowan and N. Knowlton. 2001. Repopulation of zooxanthellae in the Caribbean corals *Montastraea annularis* and *M. faveolata* following experimental and disease-associated bleaching. Biological Bulletin 201: 360-373.

- Toller, W. W., R. Rowan and N. Knowlton. 2002. Genetic evidence for a protozoan (phylum Apicomplexa) associated with corals of the *Montastraea annularis* species complex. Coral Reefs 21: 143-146.
- Rohwer, F., V. Seguritan, F. Azam, and N. Knowlton. 2002. High diversity and species-specific distribution of coral-associated bacteria. Marine Ecology Progress Series 243: 1-10.
- Williams, S. T., N. Knowlton, J. Jara, and E. Gomez. 2003. The marine Indo-West Pacific break: contrasting the resolving power of mitochondrial and nuclear genes. Integrative and Comparative Biology. 42: 941-952.
- Knowlton, N. and F. Rohwer. 2003. Multispecies microbial mutualisms on coral reefs: the host as habitat. American Naturalist 162 (Suppl): S51-S62.
- Fukami, H., A. F. Budd, G. Paulay, A. Solé-Cava, C. A. Chen, K. Iwao, and N. Knowlton. 2004. Conventional taxonomy obscures deep divergence between Pacific and Atlantic corals. Nature 427: 832-835.
- Levitan, D., H. Fukami, J. Jara, D. Kline, T. McGovern, K. McGhee, C. Swanson, and N. Knowlton. 2004. Mechanisms of reproductive isolation among sympatric broadcast-spawning corals. Evolution 58: 308-323.
- Fukami, H., A. F. Budd, D. R. Levitan, J. Jara, R. Kersanach, and N. Knowlton. 2004. Geographical differences in species boundaries among members of the *Montastraea annularis* complex based on molecular and morphological markers. Evolution 58: 324-337.
- Knowlton, N. 2004. Ocean health and human health. Environmental Health Perspectives 112: A262 <http://ehis.niehs.nih.gov/docs/2004/112-5/editorial.html>
- Knowlton, N. 2004. Multiple “stable” states and the conservation of marine ecosystems. Progress in Oceanography. 60: 387-396.
- Fukami, H. and N. Knowlton. 2005. Analysis of complete mitochondrial DNA sequences of three members of the *Montastraea annularis* species complex (Cnidaria, Anthozoa, Scleractinia). Coral Reefs 24: 410-417.
- Kline, D, Kuntz, N., Breitbart, M, Knowlton, N., and F. Rohwer. 2006. Role of elevated organic carbon levels and microbial activity in coral mortality. Marine Ecology Progress Series 314: 119-125.
- Kline, D. I, Bryan, J., Kisflaudy, E., Rohwer, G., Nostropaur, F., Grayson, J., Knowlton, N., and Rohwer, F. 2006. The aquatic automated dosing and maintenance system (AADAMS). Limnology and Oceanography: Methods 4: 184-192.
- Knowlton, N. 2006. Coral reef coda: what can we hope for? Pp 538-549 in Coral Reef Conservation (I. Cote and J. Reynolds, eds.), Cambridge Univ. Press.
- Garren, M., S. M. Walsh, A. Caccone, and N. Knowlton. 2006. Patterns of association between *Symbiodinium* and members of the *Monstaraea annularis* species complex on spatial scales ranging from within colonies to between geographic regions. Coral Reefs 25: 503-512.
- Sala, E. and N. Knowlton. 2006. Global marine biodiversity trends. Annual Review of Environment and Resources 31: 93-122.
- Mittelbach, G.G., D. Schemske, H.V. Cornell, A.P. Allen, J.M. Brown, M. Bush, S.P. Harrison, A.H. Hurlbert, N. Knowlton, H.A. Lessios⁸, C.M. McCain⁴, A.R. McCune⁹, L.A. McDade, M.A. McPeck, T.J. Near, T.D. Price, R.E. Ricklefs, K. Roy, D.F. Sax, D. Schluter, J.M. Sobel, and M. Turelli. 2007. Evolution and the

- latitudinal diversity gradient: speciation, extinction, and biogeography. Ecol. Let. 10: 315-331.
- Fukami, H., C. A. Chen, C.-Y. Chiou, and N. Knowlton. 2007. Novel group I introns encoding a putative homing endonuclease in the mitochondrial *coxI* gene of scleractinian corals. Journal of Molecular Evolution 64: 591-600.
- Anker, A., C. Hurt and N. Knowlton. 2007. Three transisthmian snapping shrimps (Crustacea: Decapoda: Alpheidae: *Alpheus*) associated with innkeeper worms (Echiura: Thalassematidae) in Panama. Zootaxa 1626: 1-23.
- Anker, A., C. Hurt and N. Knowlton. 2007. Revision of the *Alpheus nuttingi* (Schmitt) species complex (Crustacea: Decapoda: Alpheidae), with description of a new species from the tropical eastern Pacific. Zootaxa 1577: 41-60.
- Hoegh-Guldberg, O., P. J. Mumby, A. J. Hooten, R. S. Steneck, P. Greenfield, E. Gomez, C. D. Harvell, P. F. Sale, A. J. Edwards, K. Caldeira, N. Knowlton, C. M. Eakin, R. Iglesias-Prieto, N. Muthiga, R. H. Bradbury, A. Dubi, and M. E. Hatziolos. 2007. Coral reefs under rapid climate change and ocean acidification. Science 318: 1737-1742.
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- Ruckelshaus, M., T. Klinger, N. Knowlton, and D.P. DeMaster. 2008. Marine ecosystem-based management in practice: Considering resilience in a broader context. Bioscience 58: 53-63.
- Nunes, F., H. Fukami, S. V. Vollmer, R. D. Norris and N. Knowlton. 2008. Re-evaluation of the systematics of the endemic corals of Brazil by molecular data. Coral Reefs 27: 423-432.
- Knowlton, N. 2008. Coral reefs. Current Biology 18: R18-R21.
- Knowlton, N. and J. B. C. Jackson. 2008. Shifting baselines, local impacts, and global change on coral reefs. PLoS Biology 6: e54, 6 pp.
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- Anker, A. C. Hurt and N. Knowlton. 2008. Revision of the *Alpheus formosus* Gibbes, 1850 complex, with redescription of *A. formosus* and description of a new species from the tropical western Atlantic (Crustacea: Decapoda: Alpheidae). Zootaxa 1707: 1-22.
- Anker, A., C. Hurt and N. Knowlton. 2008. Revision of the *Alpheus websteri* Kingsley, 1880 complex (Crustacea: Decapoda: Alpheidae), with revalidation of *A. arenensis* (Chace, 1937). Zootaxa 1694: 51-68.

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- Nunes, F., R.D. Norris and N. Knowlton. 2009. Implications of isolation and low genetic diversity in peripheral populations of an amphi-Atlantic coral. Molecular Ecology 18: 4283-4297.
- Plaisance, L, Knowlton, N., Paulay, G. and Meyer, C. 2009. Reef-associated crustacean fauna: biodiversity estimates using semi-quantitative sampling and DNA barcoding. Coral Reefs 28: 977-986.
- Knowlton, N. In Press. First steps as a scientist – preface. In: In Pursuit of Natural History: Selected Readings and Commentaries. M. H. Graham, J. Parker and P. K. Dayton, Eds. Univ. Chicago.
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- Plaisance, L, M.J. Caley, R.E. Brainard, and N. Knowlton. In Review. The diversity of coral reefs: what is at risk?

BOOKS, EDITED VOLUMES

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