CURRICULUM VITAE

Nipam H. Patel

Director, Marine Biological Laboratory, Woods Hole, MA
Professor, University of Chicago

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Education and Academic Positions:

Director
Marine Biological Laboratory, Woods Hole, MA
Sept. 4, 2018 – present

Professor
University of Chicago
Dept of Organismal Biology and Anatomy, and Dept Molecular Genetics and Cell Biology
Sept 4, 2018 – present

Professor
University of California, Berkeley
Dept. of Molecular & Cell Biol. and Dept. of Integrative Biology
William Power Endowed Chair
Faculty Curator, Essig Museum of Entomology
June 15, 2003 – Sept. 3, 2018

Department Co-Chair, Dept. of Molecular Cell Biology, 2016 - 2018

Investigator, Howard Hughes Medical Institute
March 1995 – August 2010

Department Co-Chair, Dept. of Integrative Biology, UC Berkeley, 2007 – 2008

National Institute of Genetics, Shizuoka, Japan
Adjunct Professor
2007 – 2010

University of Chicago
Professor, Dept. of Organismal Biology and Anatomy
March 1995 – June 2003

Carnegie Institution; Dept. of Embryology
Staff Associate: April 1991 – March 1995

Australian National University
Research School of Biological Sciences
Visiting Fellow: Jan – March 1991

Stanford University
Dept. of Biological Sciences
Advisor: Dr. Corey S. Goodman
Ph.D. received Jan. 1990

Princeton University
Dept. of Biology
Advisor: Dr. Malcolm S. Steinberg
A.B. received June 1984

Awards and Fellowships

Kowalevsky Award 2021 (for distinguished contributions in Evolutionary Developmental Biology)
William Power Endowed Chair, UC Berkeley, 2012-2018
Elected Fellow, American Association for the Advancement of Science, 2008
Schubert Endowed Chair, UC Berkeley, 2003 – 2008
McKnight Scholars Neuroscience Fellowship Award, 1992 – 1995
Damon Runyon–Walter Winchell Fellow, 1991 – 1992
NSF Predoctoral Fellowship, 1984 – 1987

Government Advisory Committees

NSF-IOS Committee of Visitors, 2018
NHGRI Comparative Genome Evolution Working Group, 2004 – 2007
NIH Developmental Biology Expert Panel, 2006
Community Sequencing Program Review Panel, DOE/JGI, 2005 and 2006.

Other Professional Activities

Member, PEW Charitable Trust National Advisory Committee, 2018 - present
Graduate School Stowers Institute for Medical Research Advisory Board, 2021-present
Scientific Advisory Board, Division of Basic Sciences, Fred Hutchinson Cancer Research Center, 2020-present
Member, Education Committee, Woods Hole MBL, 2016-2018
Board of Directors, Society for Developmental Biology, 2013-2016.
Scientific Advisory Board, Whitney Laboratory for Marine Science, University of Florida; 2010 - 2015
Co-Director, Woods Hole Embryology Course; 2007 - 2011

Scientific Advisory Board, The Regeneration Project, University of Florida, McKnight Brain Institute; 2007 - 2009.
Scientific Content Director, Society for Developmental Biology Website; 2005 - 2008
National Academies Committee on the Impact of High-end Computing; 2006 – 2008
Co-Director, Cold Spring Harbor Drosophila Neurobiology Course; 1996 - 1998
NSF/Sloan Molecular Evolution Postdoctoral Fellowship Panel; 1995 - 1997

Journal Editorial Boards

Board of Reviewing Editors (2016-2018) – *eLife*
Editor (2009 – 2018) – *Development*
Editorial Board (2009 – present*) – EvoDevo*
Editorial Board (2005 – 2009) – *PloS Biology*
Editorial Board (2007 – present) – *Developmental Biology*
Editorial Board (1996 - present) – *Development Genes and Evolution*
Editorial Board (1999 - present) – *Evolution and Development*
Editorial Board (2003 – 2009) – *American Naturalist*
Editorial Board (1999 – 2007) – *Arthropod Structure and Development*
Editorial Board (1997 - 2005) – *J. Experimental Zoology*

PUBLICATIONS

Alberstat, E. J., Chung, K., Sun, D. A., Ray, S., & Patel, N. H. (2022). Combinatorial interactions of Hox genes establish appendage diversity of the amphipod crustacean Parhyale hawaiensis. BioRxiv, 2022.03.25.485717. doi:10.1101/2022.03.25.485717 (in revision ELife)

Sun, D. A., Takahashi, Y., Chang, R. J., & Patel, N. H. (2022). Distinct regulation of Hox genes by Ploycomb Group genes in a crustacean. *BioRxiv*, 2022.03.27.485719. doi: 10.1101/2022.03.27.485719 (in revision eLife)

Bruce, H. S., & Patel, N. H. (2022). The Daphnia carapace and the origin of novel structures. *Current Biology* doi: 10.1016/j.cub.2022.06.073

Sun, D. A., Bredeson, J., Bruce, H. S., & Patel, N. H. (2022). Identification and classification of cis-regulatory elements in the amphipod crustacean *Parhyale hawaiensis*. *Development*, *149*(11), doi: 10.1242/dev.200793

McCarthy, J. B., Kelly, S. R., VanHook, A. M., Marques-Souza, H., Serano, J. M., & Patel, N. H. (2022). Expression of Abdominal-B in the brine shrimp, Artemia franciscana, expands our evolutionary understanding of the crustacean abdomen. *Developmental Biology*. doi:10.1016/j.ydbio.2022.06.011

Pinna, C., Vilbert, M., Borensztajn, S., Willy Daney de Marcillac, W., Florence Piron-Prunier, F., Pomerantz, A.F., Patel, N. H., Berthier, S., Andraud, C., Doris Gomez, D., and Elias, M.

(2021). Mimicry can drive convergence in structural and light transmission features of transparent wings in Lepidoptera. eLife, doi:10.7554/eLife.69080.sa2

Gomez D, Pinna C, Pairraire J, Arias M, Barbut J, Pomerantz A, Daney de Marcillac W, Berthier S, Patel N, Andraud C, Elias M. (2021). Transparency in butterflies and moths: structural diversity, optical properties and ecological relevance. *Ecological Monographs*, e01475. doi.org/10.1002/ecm.1475

Pomerantz AF, Siddique RH, Cash EI, Kishi Y, Pinna C, Hammar K, Gomez D, Elias M, Patel NH. 2021. Developmental, cellular, and biochemical basis of transparency in the glasswing butterfly *Greta oto*. *J Exp Biol* 224, jeb237917. doi:10.1242/jeb.237917

Bruce, H. S. & Patel, N. H. (2020). Knockout of crustacean leg patterning genes suggests that insect wings and body wall evolved from ancient leg segments. *Nature Ecology & Evolution. 4, 1703–1712.* doi: 0.1038/s41559-020-01349-0

Thayer, R. C., Allen, F. I., & Patel, N. H. (2020). Structural color in Junonia butterflies evolves by tuning scale lamina thickness. *eLife* 2020;9:e52187 doi: 10.7554/eLife.52187

Wilts, B. D., Clode, P. L., Patel, N. H., & Schröder-Turk, G. E. (2019). Nature's functional nanomaterials: Growth or self-assembly? *MRS Bulletin*, *44*(2), 106–112. doi:10.1557/mrs.2019.21

Allen, F. I., Velez, N. R., Thayer, R. C., Patel, N. H., Jones, M. A., Meyers, G. F., & Minor, A. M. (2019). Gallium, neon and helium focused ion beam milling of thin films demonstrated for polymeric materials: study of implantation artifacts. *Nanoscale*, *11*(3), 1403–1409. doi:10.1039/C8NR08224C

Farboud, B., Jarvis, E., Roth, T. L., Shin, J., Corn, J. E., Marson, A., Meyer, B. J., Patel, N. H., & Hochstrasser, M. L. (2018). Enhanced Genome Editing with Cas9 Ribonucleoprotein in Diverse Cells and Organisms. *Journal of Visualized Experiments*, (135), e57350. doi:10.3791/57350

Krehenwinkel, H., Pomerantz, A., Henderson, J. B., Kennedy, S. R., Lim, J. Y., Swamy, V., Shoobridge, J. D., Patel, N. H., Gillespie, R. G., & Prost, S. (2018). Nanopore sequencing of long ribosomal DNA amplicons enables portable and simple biodiversity assessments with high phylogenetic resolution across broad taxonomic scale. *GigaScience*, 8(5), doi: 10.1093/gigascience/giz006

Mazo-Vargas, A., Concha, C., Livraghi, L., Massardo, D., Wallbank, R. W. R., Zhang, L., Papador, J. D., Martinez-Najera, D., Jiggins, C. D., Kronforst, M. R., Breuker, C. J., Reed, R. D., Patel, N. H., McMillan, W. O., & Martin, A. (2017). Macroevolutionary shifts of WntA function potentiate butterfly wing-pattern diversity. *Proceedings of the National Academy of Sciences of the United States of America*, *114*(40), 10701–10706. doi:10.1073/pnas.1708149114, PMID: 28923954

Serano, J. M., Martin, A., Liubicich, D. M., Jarvis, E., Bruce, H. S., La, K., Browne, W. E., Grimwood, J., & Patel, N. H. (2016). Comprehensive analysis of Hox gene expression in the amphipod crustacean Parhyale hawaiensis. *Developmental Biology*, *409*(1), 297–309. doi:10.1016/J.YDBIO.2015.10.029

Martin, A., Serano, J. M., Jarvis, E., Bruce, H. S., Wang, J., Ray, S., Barker, C. A., O'Connell, L. C., & Patel, N. H. (2016). CRISPR/Cas9 Mutagenesis Reveals Versatile Roles of Hox Genes in Crustacean Limb Specification and Evolution. *Current Biology*, *26*(1), 14–26. doi:10.1016/J.CUB.2015.11.021

Kao, D., Lai, A. G., Stamataki, E., Rosic, S., Konstantinides, N., Jarvis, E., Di Donfrancesco, A., Pouchkina-Stancheva, N., Sémon, M., Grillo, M., Bruce, H., Kumar, S., Siwanowicz, I., Le, A., Lemire, A., Eisen, M. B., Extavour, C., Browne, W. E., Wolff, C., Averof, M., Patel, N. H., Sarkies, P., Pavlopoulos, A., & Aboobaker, A. (2016). The genome of the crustacean Parhyale hawaiensis, a model for animal development, regeneration, immunity and lignocellulose digestion. *ELife*, *5*. doi:10.7554/eLife.20062

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Stahl, B. A., Gross, J. B., Speiser, D. I., Oakley, T. H., Patel, N. H., Gould, D. B., & Protas, M. E. (2015). A Transcriptomic Analysis of Cave, Surface, and Hybrid Isopod Crustaceans of the Species Asellus aquaticus. *PLOS ONE*, *10*(10), e0140484. doi:10.1371/journal.pone.0140484

Rebeiz, M., Patel, N. H., & Hinman, V. F. (2015). Unraveling the Tangled Skein: The Evolution of Transcriptional Regulatory Networks in Development. *Annual Review of Genomics and Human Genetics*, *16*(1), 103–131. doi:10.1146/annurev-genom-091212-153423

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Dinwiddie, A., Null, R., Pizzano, M., Chuong, L., Leigh Krup, A., Ee Tan, H., & Patel, N. H. (2014). Dynamics of F-actin prefigure the structure of butterfly wing scales. *Developmental Biology*, *392*(2), 404–418. doi:10.1016/j.ydbio.2014.06.005, PMID: 24930704

Martin, A., McCulloch, K. J., Patel, N. H., Briscoe, A. D., Gilbert, L. E., & Reed, R. D. (2014). Multiple recent co-options of Optix associated with novel traits in adaptive butterfly wing radiations. *EvoDevo*, *5*(1), 7. doi:10.1186/2041-9139-5-7

Hannibal, R. L., & Patel, N. H. (2013). What is a segment? *EvoDevo*, *4*(1), 35. doi:10.1186/2041-9139-4-35, PMID: 24345042

Chaw, R. C., & Patel, N. H. (2012). Independent migration of cell populations in the early gastrulation of the amphipod crustacean Parhyale hawaiensis. *Developmental Biology*, *371*(1), 94–109. doi:10.1016/J.YDBIO.2012.08.012

Hannibal, R. L., Price, A. L., & Patel, N. H. (2012). The functional relationship between ectodermal and mesodermal segmentation in the crustacean, Parhyale hawaiensis. *Developmental Biology*, *361*(2), 427–438. doi:10.1016/j.ydbio.2011.09.03, PMID: 22037675

Hannibal, R. L., Price, A. L., Parchem, R. J., & Patel, N. H. (2012). Analysis of snail genes in the crustacean Parhyale hawaiensis: insight into snail gene family evolution. *Development Genes and Evolution*, *222*(3), 139–151. doi:10.1007/s00427-012-0396-6

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Cheng, Y.-J., Fang, S., Tsaur, S.-C., Chen, Y.-L., Fu, H.-W., Patel, N. H., & Ting, C.-T. (2012). Reduction of germ cells in the Odysseus null mutant causes male fertility defect in Drosophila melanogaster. *Genes & Genetic Systems*, *87*(4), 273–276. PMID: 23229314

Shimeld, S. M., Donoghue, P. C. J., & McGregor, A. P. (2012). Evolutionary crossroads in developmental biology: cyclostomes (lamprey and hagfish). *Development*, *139*(12), 2091–2099. doi:10.1242/dev.074716, PMID: 22619386

Protas, M. E., Trontelj, P., & Patel, N. H. (2011). Genetic basis of eye and pigment loss in the cave crustacean, Asellus aquaticus. *Proceedings of the National Academy of Sciences of the United States of America*, *108*(14), 5702–5707. doi:10.1073/pnas.1013850108, PMID: 21422298

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Parchem, R. J., Poulin, F., Stuart, A. B., Amemiya, C. T., & Patel, N. H. (2010). BAC library for the amphipod crustacean, Parhyale hawaiensis. *Genomics*, *95*(5), 261–267. doi:10.1016/j.ygeno.2010.03.005, PMID: 20298775

Price, A. L., Modrell, M. S., Hannibal, R. L., & Patel, N. H. (2010). Mesoderm and ectoderm lineages in the crustacean Parhyale hawaiensis display intra-germ layer compensation. *Developmental Biology*, *341*(1), 256–266. doi:10.1016/J.YDBIO.2009.12.006

Liu, P. Z., Patel, N. H., Vorwerk, K., & Carroll, S. B. (2010). giant is a bona fide gap gene in the intermediate germband insect, Oncopeltus fasciatus. *Development (Cambridge, England)*, *137*(5), 835–844. doi:10.1242/dev.045948, PMID: 20147384

Patel, N. H., & Liu, P. Z. (2009). Segmentation. In *Encyclopedia of Insects* (pp. 909–912). Elsevier. doi:10.1016/b978-0-12-374144-8.00240-x

Grande, C., & Patel, N. H. (2009). Nodal signalling is involved in left–right asymmetry in snails. *Nature*, *457*(7232), 1007–1011. doi:10.1038/nature07603, PMID: 19098895

Pavlopoulos, A., Kontarakis, Z., Liubicich, D. M., Serano, J. M., Akam, M., Patel, N. H., & Averof, M. (2009). Probing the evolution of appendage specialization by Hox gene misexpression in an emerging model crustacean. *Proceedings of the National Academy of Sciences of the United States of America*, *106*(33), 13897–13902. doi:10.1073/pnas.0902804106, PMID: 19666530

Liubicich, D. M., Serano, J. M., Pavlopoulos, A., Kontarakis, Z., Protas, M. E., Kwan, E., Chatterjee, S., Tran, K. D., Averof, M., & Patel, N. H. (2009). Knockdown of Parhyale Ultrabithorax recapitulates evolutionary changes in crustacean appendage morphology. *Proceedings of the National Academy of Sciences of the United States of America*, *106*(33), 13892–13896. doi:10.1073/pnas.0903105106, PMID: 19666517

Patel, N. H. (2009). Asymmetry with a twist. *Nature*, *462*(7274), 727–728. doi:10.1038/462727a

Grande, C., & Patel, N. H. (2009). Lophotrochozoa get into the game: the nodal pathway and left/right asymmetry in bilateria. *Cold Spring Harbor Symposia on Quantitative Biology*, *74*, 281–287. doi:10.1101/sqb.2009.74.044, PMID: 20413706

Rehm, E. J., Hannibal, R. L., Chaw, R. C., Vargas-Vila, M. A., & Patel, N. H. (2009). The crustacean Parhyale hawaiensis: a new model for arthropod development. *Cold Spring Harbor Protocols*, *2009*(1), pdb.emo114. doi:10.1101/pdb.emo114, PMID: 20147009

Rehm, E. J., Hannibal, R. L., Chaw, R. C., Vargas-Vila, M. A., & Patel, N. H. (2009). Fixation and dissection of Parhyale hawaiensis embryos. *Cold Spring Harbor Protocols*, *2009*(1), pdb.prot5127. doi:10.1101/pdb.prot5127, PMID: 20147022

Rehm, E. J., Hannibal, R. L., Chaw, R. C., Vargas-Vila, M. A., & Patel, N. H. (2009). Injection of Parhyale hawaiensis blastomeres with fluorescently labeled tracers. *Cold Spring Harbor Protocols*, *2009*(1), pdb.prot5128. doi:10.1101/pdb.prot5128, PMID: 20147023

Rehm, E. J., Hannibal, R. L., Chaw, R. C., Vargas-Vila, M. A., & Patel, N. H. (2009). In situ hybridization of labeled RNA probes to fixed Parhyale hawaiensis embryos. *Cold Spring Harbor Protocols*, *2009*(1), pdb.prot5130. doi:10.1101/pdb.prot5130, PMID: 20147025

Rehm, E. J., Hannibal, R. L., Chaw, R. C., Vargas-Vila, M. A., & Patel, N. H. (2009). Antibody staining of Parhyale hawaiensis embryos. *Cold Spring Harbor Protocols*, *2009*(1), pdb.prot5129. doi:10.1101/pdb.prot5129, PMID: 20147024

Protas, M. E., & Patel, N. H. (2008). Evolution of Coloration Patterns. *Annual Review of Cell and Developmental Biology*, *24*(1), 425–446. doi:10.1146/annurev.cellbio.24.110707.175302

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Price, A. L., & Patel, N. H. (2008). Investigating divergent mechanisms of mesoderm development in arthropods: the expression ofPh-twist andPh-mef2 inParhyale hawaiensis. *Journal of Experimental Zoology Part B: Molecular and Developmental Evolution*, *310B*(1), 24–40. doi:10.1002/jez.b.21135

VanHook, A. M., & Patel, N. H. (2008). Crustaceans. *Current Biology*, *18*(13), R547–R550. doi:10.1016/J.CUB.2008.05.021

Patel, N. H. (2008). Genomes and evolution: multidimensional approaches to understanding diversity. *Current Opinion in Genetics & Development*, *18*(6), 469–471. doi:10.1016/J.GDE.2008.11.003

Parchem, R. J., Perry, M. W., & Patel, N. H. (2007). Patterns on the insect wing. *Current Opinion in Genetics & Development*, *17*(4), 300–308. doi:10.1016/J.GDE.2007.05.006

Patel, N. H. (2006). Evolutionary biology: How to build a longer beak. *Nature*, *442*(7102), 515–516. doi:10.1038/442515a

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Babbitt, C. C., & Patel, N. (2005). Relationships within the Pancrustacea: Examining the influence of additional Malacostracan 18S and 28S rDNA. In S. Koenemann & R. A. Jenner (Eds.), *Crustacea and Arthropod Relationships* (pp. 275–294). Davis, CA: Tayor & Francis.

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Oakley, T. H., Gu, Z., Abouheif, E., Patel, N. H., & Li, W.-H. (2005). Comparative Methods for the Analysis of Gene-Expression Evolution: An Example Using Yeast Functional Genomic Data. *Molecular Biology and Evolution*, *22*(1), 40–50. doi:10.1093/molbev/msh257

Bergman, C. M., & Patel, N. (2004). Identifying changes in cis-regulatory evolution: approaches and implications. In A. Moya & E. Font (Eds.), *Evolution: From Molecules to Ecosystems* (pp. 48–58). Oxford, UK: Oxford University Press.

Gerberding, M., & Patel, N. (2004). Gastrulation in Crustaceans: Germ Layers and Cell Lineages. In C. D. Stern (Ed.), *Gastrulation: From Cells to Embryo* (pp. 79–89). Cold Spring Harbor, New York: Cold Spring Harbor Laboratory Press.

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Giorgianni, M. W., & Patel, N. H. (2004). Patterning of the branched head appendages in Schistocerca americana and Tribolium castaneum. *Evolution and Development*, *6*(6), 402–410. doi:10.1111/j.1525-142X.2004.04049.x

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Davis, G. K., & Patel, N. H. (2003). Playing by pair-rules? *BioEssays : News and Reviews in Molecular, Cellular and Developmental Biology*, *25*(5), 425–429. doi:10.1002/bies.10278, PMID: 12717812

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