

Cheryl Y. Hayashi
Senior Vice President and Provost of Science
American Museum of Natural History

Highest Degree Earned

Ph.D.

Area of Specialization

Evolutionary and Functional Genomics of Spider Silk

Academic Preparation

1996 Ph.D., Biology, Yale University
1993 M.Phil., Biology, Yale University
1990 M.S., Biology, Yale University
1988 B.S., Biology, Yale University

Academic Positions

7/2021 – current Senior Vice President and Provost of Science, American Museum of Natural History (AMNH)
1/2017 – present Leon Hess Director of Comparative Biology Research, Curator and Professor of Invertebrate Zoology, AMNH
7/2017 – 6/2021 Director, Institute for Comparative Genomics, AMNH
3/2018 – current Adjunct Professor, City University of New York PhD Program in Biology
2/2018 – current Research Affiliate, New York Genome Center
1/2017 – current Adjunct Professor of Biology, University of California, Riverside
7/2008 – 12/2016 Professor of Biology, University of California, Riverside
7/2006 – 6/2008 Associate Professor of Biology, University of California, Riverside
4/2001 – 6/2006 Assistant Professor of Biology, University of California, Riverside
1/1996 – 3/2001 Postdoctoral Researcher, University of Wyoming

Graduate and Postdoctoral Training

Graduate Advisees

Amanda **Markee**, AMNH, Ph.D. student
Joseph **Arguelles**, AMNH, Ph.D. awarded 2025
Margaret **O'Brien**, AMNH, Ph.D. awarded 2022
Casey **Richart**, SDSU/UC Riverside, Ph.D. awarded 2018, co-advised with M. Hedin
Cynthia **Dick**, UC Riverside, Ph.D. awarded 2018, co-advised with D. Reznick
Sandra **Correa-Garhwal**, UC Riverside, Ph.D. awarded 2018
Shahan **Derkarabetian**, SDSU/UC Riverside, Ph.D. awarded 2017, co-advised with M. Hedin
James **Starrett**, UC Riverside, Ph.D. awarded 2012

Matthew **Collin**, UC Riverside, Ph.D. awarded 2010

PhD Dissertation Committees

UC Riverside: Evolution, Ecology, & Evolutionary Biology – Sandra **Correa-Garhwal** (chair),
Cynthia **Dick** (co-chair), Layla **Hiramatsu**, Kevin **Jagnandan**, Michael **McGowen**, Kenjiro
Quides, Robin **Tinghitella**

UC Riverside: Genetics, Genomics & Bioinformatics – Matthew **Collin** (chair), Robert **Hannon**,
Amanda **Hollowell**, James **Starrett** (chair)

UC Riverside: Chemical & Environmental Engineering – Chris **Salinas**

San Diego State University/UC Riverside: Joint Doctoral Program in Evolutionary Biology – Ketan
Patel, Shahan **Derkarabetian** (co-chair), Casey **Richart** (co-chair), Andrew **Gottscho**

AMNH Richard Gilder Graduate School – Alexandra **Walling**, Margaret **O'Brien** (chair), Joseph
Arguelles (chair), Amanda **Markee** (chair)

City University of New York – Melina **Giakoumis**

Postdoctoral Scholars

- 2019 – 2024 Sandra **Correa-Garhwal**, present: Assistant Professor, Suffolk University
2017 – 2021 Richard **Baker**, present: Research Scientist, AMNH
2014 – 2016 Matthew **Collin**, present: Field Application Specialist, Qiagen,
2012 – 2017 R. Crystal **Chaw**, present: Dept. Associate (Intro Bio Lab Organizer), Reed College
2012 – 2014 James **Starrett**, present: Research Scientist, UC Davis
2010 – 2011 Jie **Wei**, present: Associate Professor, Liaoning University, China
2009 – 2012 Yonghui **Zhao**, present: Research Scientist, Nanjing Agricultural University
2005 – 2009 Laura **Baldo**, present: Senior Lecturer, University of Barcelona, Spain
2005 – 2009 Nadia **Ayoub**, present: Professor, Washington and Lee University, VA
2004 – 2007 Jessica **Garb**, present: Associate Professor, Univ. of Massachusetts, Lowell
2004 – 2005 Brook **Swanson**, present: Professor, Gonzaga University, WA
2003 – 2004 Todd **Blackledge**, present: Professor, University of Akron, OH

Special Recognition/Awards

- 2010 TED talk: *The magnificence of spider silk*. Theme of TED2010 was “Ideas worth spreading.” Long Beach, CA.
- 2010 Harold Keables Chair of English – “brings a distinguished writer and teacher to ‘Iolani School to work with students and faculty across the curriculum.”
- 2007 MacArthur Fellowship – From the John D. and Catherine T. MacArthur Foundation to “individuals who show exceptional creativity in their work and the prospect for still more in the future.” (description from www.macfound.org)
- 2007-2012 Chancellor’s Chair Award – From the UC Riverside Chancellor’s Office to “recognize professors of outstanding merit, who have shown strong evidence of an exciting and highly visible research program.”
- 2007-2010 University Scholar Award – From the UC Riverside Office of the Executive Vice Chancellor and Provost to “recognize early career tenured faculty of outstanding merit.”

Extramural Grants

Current

- National Science Foundation (\$598,311) REU Site: Systematics, Evolution and Conservation for the 21st Century. May 2023 – April 2026. Hayashi is co-PI on this award to AMNH.
- National Science Foundation (\$176,198) IntBIO: Collaborative Research: Silk Protein Innovation and Novelty (SPIN) : integrating across disciplines to decipher silk fiber evolution. August 2022 – July 2027. Hayashi is co-PI on this award to AMNH.
- National Science Foundation (\$540,146) IntBIO: Collaborative Research: Evolutionary and Functional Trade-offs in Extreme Sensory Capabilities of a Remarkable Clade of Nocturnal Predator. August 2021 –July 2026. Hayashi is co-PI on this award to AMNH.
- National Science Foundation (\$472,408) ICBR: Establishment of an Ancient DNA and Paleoproteomics Laboratory at the American Museum of Natural History. January 2021 – December 2025. Hayashi is PI on this award to AMNH.
- National Science Foundation (\$150,922) Collaborative Research: Behavior and Evolution of the Novel Self-Curing Bioadhesive of Moth-Specialist Spiders. November 2020 – October 2025. Hayashi is PI on this award to AMNH, J. Long is PI on separate award to Vassar College.

Concluded

- Simons Foundation (\$822,046) Evolution of Genome Architecture and Gene Families in Microbial Eukaryotes. August 2021 –July 2024. Hayashi was co-PI on this award to AMNH.
- National Science Foundation (\$615,612) REU SITE: Systematics, Evolution and Conservation for the 21st Century. March 2020 – February 2024. Hayashi was PI, J. Ware co-PI on this award to AMNH.
- National Science Foundation (\$359,384) Collaborative Research: Integrating Molecular and Material Evolution of Spider Aqueous Glues. August 2018 – August 2023. Hayashi was PI on this award to AMNH, N. Ayoub and B. Opell were PIs on separate awards to Washington and Lee University and Virginia Polytechnic University, respectively.
- National Science Foundation (\$399,258) CC* Compute: High Performance Campus Computing for Institutional Research at the American Museum of Natural History. July 2019 – June 2022. Hayashi was co-PI on this award to AMNH.
- Air Force Office of Scientific Research (\$7,500,000) Convergent Evolution to Engineering: Multiscale Structures and Mechanics in Damage Tolerant Functional Bio-composite and Biomimetic Materials. October 2014 – October 2018. Hayashi was co-PI on this multidisciplinary university research initiative award to UCR, lead PI D. Kisailus.
- National Science Foundation (\$17,310) Dissertation Research: Examining Evidence for Phenotypic and Genetic Convergence in the Guppy (*Poecilia reticulata*). July 2017 – June 2018. Co-PI Cynthia Dick, student.
- Army Research Office (\$450,000) Genomic Profiling of Spider Silk Glands across Development and Evolution. May 2015 – April 2018. PI Hayashi, co-PI R. Chaw.
- US Department of Energy (\$135,000) Spider Silk MaSp1 and MaSp2 Proteins as Carbon Fiber Precursors. September 2014 – August 2016. Hayashi was sole PI on this UCR subcontract from Utah State University, lead PI R. Lewis.

Army Research Office (\$149,900) Ultra-high Thermal Conductivity of Spider Silk Protein Study with Controlled Structure-Change and Composition. July 2012 – September 2015. Hayashi was sole PI on this UCR subcontract from Iowa State University, PI X. Wang.

Army Research Office (\$419,388) Functional Genomics of Spider Silk Glands: Integration of Gene Discovery, Expression Profiles, and Biomaterial Production. September 2011 – January 2016. Hayashi was sole PI.

National Science Foundation (\$200,713) Collaborative Research: Functional Genomics of Spider Silk Synthesis and Fiber Performance within the Western Black Widow and among Cob-Web Weaving Spiders. June 2010 – May 2015. Hayashi is PI on this award to UCR, N. Ayoub was PI on separate award to Washington and Lee University.

Office of Naval Research (\$149,900) Functional Protein Structure in Spider Silk for Ultra-High and Exceptionally Tunable Thermal Conductivity. April 2012 – March 2015. Hayashi was sole PI on this UCR subcontract from Iowa State University, PI X. Wang.

Army Research Office (\$50,000) Rapid Characterization of Spider Silk Genes via Exon Capture. May 2014 – January 2015. Hayashi was sole PI.

National Science Foundation (\$15,000) Dissertation Research: Spider Silk Evolution Across Ancient and Recent Phylogenetic Divergences. July 2009 – June 2012. Co-PI James Starrett, student.

Army Research Office (\$211,504) High-Yield Plant Based Manufacturing of Bioengineered Spider Silk (Phytosilk). September 2008 – August 2010. Hayashi was sole PI on this UCR subcontract from Phase II STTR award to Orbitec, Madison, WI.

Army Research Office (\$332,160) Bioprospecting for High Performance Fibers: Comparative Studies of Spider Silks and Genomes. October 2006 – September 2010. Hayashi was sole PI.

Army Research Office (\$46,560) High-Yield Plant Based Manufacturing of Bioengineered Spider Silk (Phytosilk). August 2006 – January 2007. Hayashi was PI and L. Walling was co-PI on this UCR subcontract from Phase I STTR award to Orbitec, Madison, WI.

National Science Foundation (\$182,230) Collaborative Research: Phylogeny, Behavior, and Silk Evolution of Webspinners (Embioptera), a Little-Known Insect Order. September 2005 – August 2008. Hayashi was PI on this award to UCR, J. Edgerly was PI on separate award to Santa Clara University, K. Miller was PI on separate award to University of New Mexico.

National Science Foundation (\$259,038) Integrative Studies of *Wolbachia*-Eukaryotic Interactions: Genomes to Communities and Back. October 2003 – September 2008. Hayashi was a collaborator on this NSF FIBR award to University of Rochester, PI J. Werren.

National Science Foundation (\$257,875) Silk Protein Evolution and Spider Phylogenetics: an EST Approach. September 2003 – August 2007. Hayashi was sole PI.

Army Research Office (\$301,741) Characterizing Diverse Spider Capture Silks for Use in High-Performance Biomimetic Materials. August 2002 – February 2006. Hayashi was sole PI.

Department of Defense (\$118,250) Dynamic Nano-Force Tensile Tester for Ultrathin Filaments. May 2002 – May 2003. Hayashi was sole PI.

Army Research Office (\$400,000) Sequence Requirements of Spider Silk Elastic Proteins. July 1998 – June 2001. Hayashi was co-PI, R. Lewis was PI.

National Science Foundation (\$300,000) Sequence Variations in Spider Dragline Silk Proteins. August 1998 – July 2001. Hayashi was co-PI, R. Lewis was PI.

National Science Foundation (\$10,000) Dissertation Improvement Grant. May 1994 – May 1996.

Publications

- Correa-Garhwal, S.M., Stafstrom, J.A., Baker, R.H., **Hayashi, C.Y.**, Hoy, R.R., Reeve, H.K. and Garb, J.E., 2025. Silk gland morphology of the net casting spider *Deinopis spinosa* (Araneae: Deinopidae). *The Journal of Arachnology*, 53(1), pp.20-25. <https://doi.org/10.1636/JoA-S-23-012>
- Ridruejo, A., Pacios, L.F., Arguelles, J., **Hayashi, C.Y.**, Elices, M., Guinea, G.V. and Pérez-Rigueiro, J., 2025. Elastomeric behavior of the Bombyx mori fibroin (GAGAGS) n tandem motifs. *Journal of the Mechanical Behavior of Biomedical Materials*, p.107002. <https://doi.org/10.1016/j.jmbbm.2025.107002>
- VanDyck, M.W., Long Jr, J.H., Baker, R.H., **Hayashi, C.Y.** and Diaz Jr, C., 2024. Special Prey, Special Glue: NMR Spectroscopy on Aggregate Glue Components of Moth-Specialist Spiders, Cyrtarachninae. *Biomimetics*, 9(5), p.256. <https://doi.org/10.3390/biomimetics9050256>
- Reinhardt, J.A., Baker, R.H., Zimin, A.V., Ladias, C., Paczolt, K.A., Werren, J.H., **Hayashi, C.Y.** and Wilkinson, G.S., 2023. Impacts of sex ratio meiotic drive on genome structure and function in a stalk-eyed fly. *Genome Biology and Evolution*, 15(7), p.evad118. <https://doi.org/10.1093/gbe/evad118>
- Frandsen, P.B., Hotaling, S., Powell, A., Heckenhauer, J., Kawahara, A.Y., Baker, R.H., **Hayashi, C.Y.**, Ríos-Touma, B., Holzenthal, R., Pauls, S.U. and Stewart, R.J., 2023. Allelic resolution of insect and spider silk genes reveals hidden genetic diversity. *Proceedings of the National Academy of Sciences*, 120(18), p.e2221528120. <https://doi.org/10.1073/pnas.2221528120>
- Ayoub, N.A., DuMez, L., Lazo, C., Luzaran, M., Magoti, J., Morris, S.A., Baker, R.H., Clarke, T., Correa-Garhwal, S.M., **Hayashi, C.Y.** and Friend, K., 2023. Orb weaver aggregate glue protein composition as a mechanism for rapid evolution of material properties. *Frontiers in Ecology and Evolution*, 11, p.1099481. <https://doi.org/10.3389/fevo.2023.1099481>
- Arguelles, J., Baker, R.H., Perez-Rigueiro, J., Guinea, G.V., Elices, M., **Hayashi, C.Y.** 2023. Relating spidroin motif prevalence and periodicity to the mechanical properties of major ampullate spider silks. *Journal of Comparative Physiology B* 193(1), pp.25-36. <https://doi.org/10.1007/s00360-022-01464-3>
- Baker, R.H., Corvelo, A., **Hayashi, C.Y.** 2022. Rapid molecular diversification and homogenization of clustered major ampullate silk genes in *Argiope* garden spiders. *PLoS Genetics* 18(12), p.e1010537. <https://doi.org/10.1371/journal.pgen.1010537>
- Pacios, L.F., Arguelles, J., **Hayashi, C.Y.**, Guinea, G.V., Elices, M., Perez-Rigueiro, J. 2022. Differences in the Elastomeric Behavior of Polyglycine-Rich Regions of Spidroin 1 and 2 Proteins. *Polymers* 14(23), p.5263. <https://doi.org/10.3390/polym14235263>
- Correa-Garhwal, S.M., Baker, R.H., Clarke, T.H., Ayoub, N.A., **Hayashi, C.Y.** 2022. The evolutionary history of cribellate orb-weaver capture thread spidroins. *BMC Ecology and Evolution* 89 (2022). <https://doi.org/10.1186/s12862-022-02042-5>
- Babb, P.L., Gregorič, M., Lahens, N.F., Nicholson, D.N., **Hayashi, C.Y.**, Higgins, L., Kuntner, M., Agnarsson, I., Voight, B.F. 2022. Characterization of the genome and silk-gland transcriptomes of Darwin's bark spider (*Caerostris darwini*). *PloS one* 17:p.e0268660. <https://doi.org/10.1371/journal.pone.0268660>
- Jorge, I., Ruiz, V., Lavado-García, J., Vázquez, J., **Hayashi, C.**, Rojo, F.J., Atienza, J.M., Elices, M., Guinea, G.V., Pérez-Rigueiro, J. 2022. Expression of spidroin proteins in the silk glands of golden orb-weaver spiders. *Journal of Experimental Zoology Part B: Molecular and Developmental Evolution* 338:241-253. <https://doi.org/10.1002/jez.b.23117>
- Diaz Jr, C., Baker, R.H., Long Jr, J.H., **Hayashi, C.Y.** 2022. Connecting materials, performance and evolution: a case study of the glue of moth-catching spiders (Cyrtarachninae). *Journal of Experimental Biology* 225 (Suppl_1): jeb243271. <https://doi.org/10.1242/jeb.243271>

- Ayoub, N.A., Friend, K., Clarke, T., Baker, R., Correa-Garhwal, S.M., Crean, A., Dendev, E., Foster, D., Hoff, L., Kelly, S.D., Patterson, W., **Hayashi, C.Y.**, Opell, B.D. 2021. Protein composition and associated material properties of cobweb spiders' gumfoot glue droplets. *Integrative and Comparative Biology* 61:1459-1480. <https://doi.org/10.1093/icb/icab086>
- Chaw, R.C., Clarke III, T.H., Arensburger, P., Ayoub, N.A., **Hayashi, C.Y.** 2021. Gene expression profiling reveals candidate genes for defining spider silk gland types. *Insect Biochemistry and Molecular Biology* 135:103594. <https://doi.org/10.1016/j.ibmb.2021.103594>
- Correa-Garhwal, S.M., Babb, P.L., Voight, B.F., **Hayashi, C.Y.** 2021. Golden orb-weaving spider (*Trichonephila clavipes*) silk genes with sex-biased expression and atypical architectures. *G3* 11:p.jkaa039. <https://doi.org/10.1093/g3journal/jkaa039>
- Scharff, N., Coddington, J.A., Blackledge, T.A., Agnarsson, I., Framenau, V.W., Szűts, T., **Hayashi, C.Y.** and Dimitrov, D. 2020. Phylogeny of the orb-weaving spider family Araneidae (Araneae: Araneoidea). *Cladistics* 36:1-21. <https://doi.org/10.1111/cla.12382>
- Dugger, T.W., Sarkar, S., Correa-Garhwal, S.M., Zhernenkov, M., Zhang, Y., Kolhatkar, G., Mohan, R., Cruz, L., Lubio, A.D., Ruediger, A., **Hayashi, C.Y.** Urich, K.E., Kisailus, D.J. 2020. Ultrastructures and Mechanics of Annealed *Nephila clavipes* Major Ampullate Silk. *Biomacromolecules* 21:1186-1194. <https://pubs.acs.org/doi/abs/10.1021/acs.biomac.9b01615>
- Correa-Garhwal, S.M., Clarke, T.H., Janssen, M., Crevecoeur, L., McQuillan, B.N., Simpson, A.H., Vink, C.J., **Hayashi, C.Y.** 2019. Spidroins and Silk Fibers of Aquatic Spiders. *Scientific reports* 9:1-12. <https://doi.org/10.1038/s41598-019-49587-y>
- Dugger, T., Sarkar, S., Correa-Garhwal, S., Shishebour, M., Zhernenkov, M., Zhang, Y., Kolhatkar, G., Mohan, R., Cervantes, A.L., Ruediger, A., Zavattieri, P., **Hayashi, C.**, Kisailus, D. 2019. Graphitization and Strength of Annealed Silks and Polymer Fibers. *Abstracts of Papers of the American Chemical Society* v. 258.
- Dick, C., Arendt, J., Reznick, D.N., **Hayashi, C.Y.** 2018. The developmental and genetic trajectory of coloration in the guppy (*Poecilia reticulata*). *Evolution & development* 20:207. <https://doi.org/10.1111/ede.12268>
- Correa-Garhwal, S. M., Chaw, R. C., Dugger, T., Clarke III, T. H., Chea, K. H., Kisailus, D., **Hayashi, C. Y.** 2018. Semi-aquatic spider silks: Transcripts, proteins, and silk fibers of the fishing spider, *Dolomedes triton* (Pisauridae). *Insect Molecular Biology*. <https://doi.org/10.1111/imb.12527>
- Dick, C., Reznick, D.N., **Hayashi, C.Y.** 2018. Sex-biased expression between guppies varying in the presence of ornamental coloration. *PeerJ* 6:e5782. <https://doi.org/10.7717/peerj.5782>
- Correa-Garhwal, S.M., Chaw, R.C., Clarke III, T.H., Alaniz, L.G., Chan, F.S., Alfaro, R.E., **Hayashi, C.Y.** 2018. Silk genes and silk gene expression in the spider *Tengella perfuga* (Zoropsidae), including a potential cribellar spidroin (CrSp). *PLoS ONE* 13:e0203563. <https://doi.org/10.1371/journal.pone.0203563>
- Dick, C., Hinh, J., **Hayashi, C.Y.**, Reznick, D.N. 2018. Convergent evolution of coloration in experimental introductions of the guppy (*Poecilia reticulata*). *Ecology and evolution* 8:8999-9006. <https://doi.org/10.1002/ece3.4418>
- Zaheri, A., Fenner, J.S., Russell, B.P., Restrepo, D., Daly, M., Wang, D., **Hayashi, C.**, Meyers, M.A., Zavattieri, P.D., Espinosa, H.D. 2018. Revealing the mechanics of helicoidal composites through additive manufacturing and beetle developmental stage analysis. *Advanced Functional Materials* 28:1803073. <https://doi.org/10.1002/adfm.201803073>
- Zhang, Y., Huang, W., **Hayashi, C.**, Gatesy, J. and McKittrick, J. 2018. Microstructure and mechanical properties of different keratinous horns. *Journal of The Royal Society Interface* 15:20180093. <https://doi.org/10.1098/rsif.2018.0093>

- Collin, M., Clarke III, T.H., Ayoub, N.A., **Hayashi, C.Y.** 2018. Genomic perspectives of spider silk genes through target capture sequencing: conservation of stabilization mechanisms and homology-based structural models of spidroin terminal regions. *International Journal of Biological Macromolecules* 113:289-840. <https://doi.org/10.1016/j.ijbiomac.2018.02.032>
- Chaw, R.C., Collin, M., Wimmer, M., Helmrick, K.L., **Hayashi, C.Y.** 2018. Egg case silk gene sequences from *Argiope* spiders: Evidence for multiple loci and a loss of function between paralogs. *G3: Genes, Genomes, Genetics* 8:231-238. <https://doi.org/10.1534/g3.117.300283>
- Starrett, J., **Hayashi, C.Y.**, Derkarabetian, S., Hedin, M. 2018. Cryptic elevational zonation in trapdoor spiders (Araneae, Antrodiaetidae, *Aliatypus janus* complex) from the California southern Sierra Nevada. 2018. *Molecular Phylogenetics and Evolution* 118:403-413. <https://doi.org/10.1016/j.ympev.2017.09.003>
- Chaw, R.C., **Hayashi, C.Y.** 2018. Dissection of silk glands in the Western black widow *Latrodectus hesperus*. *Journal of Arachnology* 46: 15-161. http://www.americanarachnology.org/JoA_free/JoA_v46_n1/ arac-46-1-159.pdf
- Schwager, E.E., Sharma, P.P., Clarke, T., Leite, D.J., Wierschin, T., ... McGregor, A.P. 2017. The house spider genome reveals an ancient whole-genome duplication during arachnid evolution. *BMC Biology* 15:62. <https://doi.org/10.1186/s12915-017-0399-x>
- Clarke, T.H., Garb, J.E., Haney, R.A., Chaw, R.C., **Hayashi, C.Y.**, Ayoub, N.A. 2017. Evolutionary shifts in gene expression decoupled from gene duplication across functionally distinct spider silk glands. *Scientific Reports* 7:8393. <https://doi.org/10.1038/s41598-017-07388-1>
- Babb, P.L., Lahens, N.F., Correa-Garhwal, S.M. Nicholson, DN., Kim, E.J., Hogenesch, J.B., Kuntner, M., Higgins, L., **Hayashi, C.Y.**, Agnarsson, I., Voight, B.F. 2017. The *Nephila clavipes* genome highlights the diversity of spider silk genes and their complex expression. *Nature Genetics* 49:895-903. <https://doi.org/10.1038/ng.3852>
- Correa-Garhwal, S.M., Chaw, R.C., Clarke III, T.H., Ayoub, N.A., **Hayashi, C.Y.** 2017. Silk gene expression of theridiid spiders: Implications for male-specific silk use. *Zoology* 122:107-114.
- Vienneau-Hathaway, J.M., Brassfield, E.R., Lane, A.K., Collin, M.A., Correa-Garhwal, S.M., Clarke III, T.H., Schwager, E.E., Garb, J.E., **Hayashi, C.Y.**, Ayoub, N.A. 2017. Duplication and concerted evolution of MiSp-encoding genes underlie the material properties of minor ampullate silks of cobweb weaving spiders. 2017. *BMC Evolutionary Biology* 17:78.
- Chaw, R.C., Sasaki, C.S., **Hayashi, C.Y.** 2017. Complete gene sequence of spider attachment silk protein (PySp1) reveals novel linker regions and extreme repeat homogenization. *Insect Biochemistry and Molecular Biology* 81:80-90.
- Yang, R., Zaheri, Z., Gao, W., **Hayashi, C.**, Espinosa, H.D. 2017. AFM identification of beetle exocuticle: Bouligand structure and nanofiber anisotropic elastic properties. *Advanced Functional Materials* 27:1603993.
- Chaw, R., P. Arensburger, T. Clarke, N. Ayoub, and **C. Hayashi.** 2016. Candidate egg case silk genes for the spider *Argiope argentata* from differential gene expression analyses. *Insect Molecular Biology* 25:757-768. doi: 10.1111/imb.12260
- Springer MS, Emerling CA, Fugate N, Patel R, Starrett J, Morin PA, **Hayashi C**, and Gatesy J. 2016. Inactivation of cone-specific phototransduction genes in rod monochromatic cetaceans. *Front. Ecol. Evol.* 4:61. doi: 10.3389/fevo.2016.00061
- Richart, C.H., **Hayashi, C.Y.**, Hedin, M. 2016. Phylogenomic analyses resolve an ancient trichotomy at the base of Ischyropsalidoidea (Arachnida, Opiliones) despite high levels of gene tree conflict and unequal minority resolution frequencies. *Molecular Phylogenetics and Evolution*, 95:171-182.

- Springer, M.S., Starrett, J., Morin, P.A., Lanzetti, A., **Hayashi**, C., and Gatesy, J. 2016. Inactivation of C4orf26 in toothless placental mammals. *Molecular Phylogenetics and Evolution*, 95:34-45.
- Collin, M.A., Clarke, T.H., Ayoub, N.A., and **Hayashi**, C.Y. 2016. Evidence from multiple species that spider silk glue component ASG2 is a spidroin. *Scientific Reports*, 6.
- Haney, R.A., T.H. Clarke, R. Gadgil, R. Fitzpatrick, C.Y. **Hayashi**, N.A. Ayoub, and J.E. Garb. 2016. Effects of gene duplication, positive selection, and shifts in gene expression on the evolution of the venom gland transcriptome in widow spiders. *Genome Biology and Evolution*, 8:228-242.
- Chaw, R.C., Correa-Garhwal, S.M., Clarke, T.H., Ayoub, N.A., Hayashi, C.Y. 2015. Proteomic evidence for components of spider silk synthesis from black widow silk glands and fibers. *Journal of Proteome Research* 14:4223-4231.
- Clarke, T., J. Garb, **C. Hayashi**, P. Arensburger, and N. Ayoub. 2015. Spider transcriptomes identify ancient large-scale gene duplication event potentially important in silk gland evolution. *Genome Biology and Evolution* 7:1856-1870.
- Vetter, R.S., Tarango, J., Campbell, K.A., Tham, C., **Hayashi**, C.Y., and Choe, D.H. 2015. Efficacy of several pesticide products on brown widow spider (Araneae: Theridiidae) egg sacs and their penetration through the egg sac silk. *Journal of Economic Entomology*, tov288.
- Padilla, D., T. Daniel, P. Dickinson, D. Grünbaum, **C. Hayashi**, D. Manahan, J. Marden, B. Swalla, and B. Tsukimura. 2014. Addressing grand challenges in organismal biology: the need for synthesis. *BioScience* 64:1178-1187.
- Haney, R., N. Ayoub, T. Clarke, **C. Hayashi**, and J. Garb. 2014. Dramatic expansion of the black widow toxin arsenal uncovered by multi-tissue transcriptomics and venom proteomics. *BMC Genomics* 15:366.
- Clarke, T., J. Garb, **C. Hayashi**, R. Haney, A. Lancaster, S. Corbett, and N. Ayoub. 2014. Multi-tissue transcriptomics of the black widow spider reveals expansions, co-options, and functional processes of the silk gland gene toolkit. *BMC Genomics* 15:365.
- Xu, S., Z. Xu, J. Starrett, **C. Hayashi**, and X. Wang. 2014. Cross-plane thermal transport in micrometer-thick spider silk films. *Polymer* 55:1845-1853.
- Chaw, R., Y. Zhao, J. Wei, N. Ayoub, R. Allen, K. Atrushi, and **C. Hayashi**. 2014. Intragenic homogenization and multiple copies of prey-wrapping silk genes in *Argiope* garden spiders. *BMC Evolutionary Biology* 14:31.
- Lane, A., **C. Hayashi**, G. Whitworth, and N. Ayoub. 2013. Complex gene expression in the dragline silk producing glands of the Western black widow (*Latrodectus hesperus*). *BMC Genomics* 14:846.
- Perea, G., C. Riekkel, G. Guinea, R. Madurga, R. Dava, M. Burghammer, **C. Hayashi**, M. Elices, G. Plaza, and J. Pérez-Riguero. 2013. Identification and dynamics of polyglycine II nanocrystals in *Argiope trifasciata* flagelliform silk. *Scientific Reports* 3:article 3061.
- Starrett, J., M. Hedin, N. Ayoub, and **C. Hayashi**. 2013. Hemocyanin gene family evolution in spiders (Araneae), with implications for phylogenetic relationships and divergence times in the infraorder Mygalomorphae. *Gene* 524:175-186.
- Garb, J. and **C. Hayashi**. 2013. Molecular evolution of alpha-latrotoxin, the exceptionally potent vertebrate neurotoxin in black widow spider venom. *Molecular Biology and Evolution* 30:999-1014.
- Starrett, J. and **C. Hayashi**. 2013. Mosaic evolution of silk genes in *Aliatypus* trapdoor spiders (Mygalomorphae, Antrodiaetidae). *Journal of Molecular Evolution* 76:216-227.
- Ayoub, N., J. Garb, A. Kuelbs, and **C. Hayashi**. 2013. Ancient properties of spider silks revealed by the complete gene sequence of the prey-wrapping silk protein (AcSp1). *Molecular Biology and Evolution* 30:589-601.

- Hedin, M., J. Starrett, and C. **Hayashi**. 2012. Crossing the uncrossable: novel trans-valley biogeographic patterns revealed in the genetic history of low-dispersal mygalomorph spiders (Antrodiaetidae, *Antrodiaetus*) from California. *Molecular Ecology* 22:508-526.
- Miller, K., C. **Hayashi**, M. Whiting, G. Svenson, and J. Edgerly. 2012. The phylogeny and classification of Embioptera. *Systematic Entomology* 37:550-570.
- Starrett, J., J. Garb, A. Kuelbs, U. Azubuikwe, and C. **Hayashi**. 2012. Early events in the evolution of spider silk genes. *PLoS ONE* 7:e38084.
- Guinea, G., M. Elices, G. Plaza, G. Perea, R. Daza, C. Riekel, F. Agulló-Rueda, C. **Hayashi**, Y. Zhao, and J. Pérez-Riguero. 2012. Minor ampullate silks from *Nephila* and *Argiope* spiders: tensile properties and microstructural characterization. *Biomacromolecules* 13:2087-2098.
- Collin, M., J. Edgerly, and C. **Hayashi**. 2011. Comparison of fibroin cDNAs from web-spinning insects: insight into silk formation and function. *Zoology* 114:239-246.
- Satler, J., J. Starrett, and C. **Hayashi**, and M. Hedin. 2011. Inferring species trees from gene trees in a radiation of California trapdoor spiders (Araneae, Antrodiaetidae, *Aliatypus*). *PLoS ONE* 6:e25355.
- Baldo, L., A. de Queiroz, M. Hedin, C. **Hayashi**, and J. Gatesy. 2011. Nuclear-mitochondrial sequences as witnesses of past interbreeding and population diversity in the jumping bristletail *Mesomachilis*. *Molecular Biology and Evolution* 28:195-210.
- Zhao, Y., N. Ayoub, and C. **Hayashi**. 2010. Chromosome mapping of dragline silk genes in the genomes of widow spiders (Araneae, Theridiidae). *PLoS ONE* 5:e12804.
- Garb, J., N. Ayoub, and C. **Hayashi**. 2010. Untangling spider silk evolution with spidroin terminal domains. *BMC Evolutionary Biology* 10: 243.
- Pérez-Riguero, J., G. Plaza, F. Torres, A. Hajar, C. **Hayashi**, G. Perea, M. Elices, G. Guinea. 2010. Supercontraction of dragline silk spun by lynx spiders (Oxyopidae). *International Journal of Biological Macromolecules* 46:555-557.
- Collin, M., K. Mita, F. Sehnel, and C. **Hayashi**. 2010. Molecular evolution of lepidopteran silk proteins: insight from the ghost moth, *Hepialus californicus*. *Journal of Molecular Evolution* 70:519-529.
- Casem, M., M. Collin, N. Ayoub, C. **Hayashi**. 2010. Silk gene transcripts in the developing tubuliform glands of the Western black widow, *Latrodectus hesperus*. *Journal of Arachnology* 38:99-103.
- Sutherland, T., J. Young, S. Weisman, C. **Hayashi**, D. Merritt. 2010. Insect silk: one name, many materials. *Annual Review of Entomology* 55:171-188.
- Gorb, S., S. Niederegger, C. **Hayashi**, A. Summers, W. Votsch, P. Walther. 2009. Silk production from tarantula feet questioned reply. *Nature* 461:E9-10.
- Collin, M., E. Camama, B. Swanson, J. Edgerly, C. **Hayashi**. 2009. Comparison of embiopteran silks reveals tensile and structural similarities across taxa. *Biomacromolecules*. 10:2268-2274.
- Ayoub, N. and C. **Hayashi**. 2009. Spiders (Araneae). in *The Timetree of Life*, S.B. Hedges and S. Kumar, Eds. (Oxford University Press), pg. 255-259.
- Blackledge, T., N. Scharff, J. Coddington, T. Szüts, J. Wenzel, C. **Hayashi**, I. Agnarsson. 2009. Reconstructing web evolution and spider diversification in the molecular era. *Proceedings of the National Academy of Sciences USA* 106:5229-5234.
- Collin, M., J. Garb, J. Edgerly, C. **Hayashi**. 2009. Characterization of the silk spun by the embiopteran, *Antipaluria urichi*. *Insect Biochemistry and Molecular Biology* 39:75-82.
- Szumik, C., J. Edgerly, C. **Hayashi**. 2008. Phylogeny of embiopterans (Insecta). *Cladistics* 24:1-13.
- Vink, C., M. Hedin, M. Bodner, W. Maddison, C. **Hayashi**, and J. Garb. 2008. Actin 5C, a promising nuclear gene for spider phylogenetics. *Molecular Phylogenetics and Evolution* 48:377-382.

- Ayoub, N., **C. Hayashi**. 2008. Multiple recombining loci encode MaSp1, the primary constituent of dragline silk, in widow spiders (*Latrodectus*: Theridiidae). *Molecular Biology and Evolution* 25:277-286.
- Baldo, L., N. Ayoub, **C. Hayashi**, J. Russell, J. Stahlhut, J. Werren. 2008. Insight into the routes of *Wolbachia* invasion: high levels of horizontal transfer in the spider genus *Agelenopsis* revealed by *Wolbachia* strain and mitochondrial DNA diversity. *Molecular Ecology* 17:557-569.
- Garb, J., T. DiMauro, R. Lewis, **C. Hayashi**. 2007. Expansion and intragenic homogenization of spider silk genes since the Triassic: evidence from Mygalomorphae (tarantulas and their kin) spidroins. *Molecular Biology and Evolution* 24:2454-2464.
- Swanson, B., T. Blackledge, **C. Hayashi**. 2007. Spider capture silk: performance implications of variation in an exceptional biomaterial. *Journal of Experimental Zoology* 307A:654-666.
- Ayoub, N., J. Garb, R. Tinghitella, M. Collin, **C. Hayashi**. 2007. Blueprint for a high-performance biomaterial: full-length spider silk genes. *PLoS ONE* 2:e514.
- Ayoub, N., J. Garb, M. Hedin, **C. Hayashi**. 2007. Utility of the nuclear protein-coding gene, elongation factor-1 gamma (*EF-1g*), for spider systematics, emphasizing family level relationships of tarantulas and their kin (Araneae: Mygalomorphae). *Molecular Phylogenetics and Evolution* 42:394-409.
- Swanson, B., T. Blackledge, A. Summers, **C. Hayashi**. 2006. Spider dragline silk: correlated and mosaic evolution in high-performance biological materials. *Evolution* 60:2539-2551.
- Baldo, L., J. Dunning Hotopp, K. Jolley, S. Bordenstein, S. Biber, R. Choudhury, **C. Hayashi**, M. Maiden, H. Tettelin, J. Werren. 2006. Multilocus sequence typing system for the endosymbiont *Wolbachia pipientis*. *Applied and Environmental Microbiology* 72:7098-7110.
- Blackledge, T., **C. Hayashi**. 2006. Unraveling the mechanical properties of composite silk threads spun by cribellate orb-weaving spiders. *Journal of Experimental Biology* 209:3131-3140.
- Gorb, S., S. Niederegger, **C. Hayashi**, A. Summers, W. Vötsch, P. Walther. 2006. Silk-like secretion from tarantula feet. *Nature* 443:407.
- Blackledge, T., **C. Hayashi**. 2006. Silken toolkits: biomechanics of silk fibers spun by the orb web spider *Argiope argentata* (Fabricius 1775). *Journal of Experimental Biology* 209:2452-2461.
- Garb, J., T. DiMauro, V. Vo, **C. Hayashi**. 2006. Silk genes support the single origin of orb-webs. *Science* 312:1762. (featured on pg. 1730 of the journal)
- Swanson, B., T. Blackledge, J. Beltrán, **C. Hayashi**. 2006. Variation in the material properties of spider dragline silk across species. *Applied Physics A* 82:213-218.
- Motriuk-Smith, D., A. Smith, **C. Hayashi**, R. Lewis. 2005. Analysis of the conserved N-terminal domains in major ampullate silk proteins. *Biomacromolecules* 6:3152-3159.
- Garb, J., **C. Hayashi**. 2005. Modular evolution of egg case silk genes across orb-weaving spider superfamilies. *Proceedings of the National Academy of Sciences USA*. 102:11379-11384.
- Blackledge, T., J. Swindeman, **C. Hayashi**. 2005. Quasistatic and continuous dynamic characterization of the mechanical properties of silk from the black widow spider *Latrodectus hesperus*. *Journal of Experimental Biology* 208:1937-1949.
- Vink, C., S. Thomas, P. Paquin, **C. Hayashi**, M. Hedin. 2005. The effects of preservatives and temperatures on arachnid DNA. *Invertebrate Systematics* 19:99-104.
- Blackledge, T., A. Summers, **C. Hayashi**. 2005. Gumfooted lines in black widow cobwebs and the mechanical properties of spider capture silk. *Zoology* 108:41-46.
- Blackledge, T., R. Cardullo, **C. Hayashi**. 2005. Polarized light microscopy, variability in spider silk diameters, and the mechanical characterization of spider silk. *Invertebrate Biology* 124:165-173.

- Hayashi, C.**, T. Blackledge, R. Lewis. 2004. Molecular and mechanical characterization of aciniform silk: uniformity of iterated sequence modules in a novel member of the spider silk fibroin gene family. *Molecular Biology and Evolution* 21:1950-1959.
- Gatesy, J., R. Baker, **C. Hayashi**. 2004. Inconsistencies in arguments for the supertree approach: supermatrices versus supertrees of Crocodylia. *Systematic Biology* 53:342-355.
- Gatesy, J., G. Amato, M. Norell, R. DeSalle, **C. Hayashi**. 2003. Combined support for wholesale taxic atavism in gavialine crocodylians. *Systematic Biology* 52:403-422.
- Becker, N., E. Oroudjev, S. Mutz, J. Cleveland, P. Hansma, **C. Hayashi**, D. Makarov, H. Hansma. 2003. Molecular nanosprings in spider capture silk. *Nature Materials* 2:278-283.
- Huang, L., H. Wang, **C. Hayashi**, B. Tian, D. Zhao, Y. Yan. 2003. Single-strand spider silk templating for the formation of hierarchically ordered hollow mesoporous silica fibers. *Journal of Materials Chemistry* 13:666-668.
- Oroudjev, E., **C. Hayashi**, J. Soares, S. Arcidiacono, S. Fossey, H. Hansma. 2003. Nanofiber formation in spider dragline-silk as probed by atomic force microscopy and molecular pulling. *Material Research Society Proceedings* 738:273-279.
- Gatesy, J., C. Matthee, R. DeSalle, **C. Hayashi**. 2002. Resolution of a supertree/supermatrix paradox. *Systematic Biology* 51:652-664.
- Hayashi, C.** 2002. Evolution of spider silk proteins: insights from phylogenetic analyses. Chapter in R. DeSalle, G. Giribet, W. Wheeler (eds.) *Molecular Systematics and Evolution: Theory and Practice*. Birkhauser, Berlin. p. 209-224.
- Gatesy*, J., **C. Hayashi***, D. Motriuk, J. Woods, R. Lewis. 2001. Extreme diversity, conservation, and convergence of spider silk fibroin sequences. *Science* 291:2603-2605. (*equal contribution)
- Hayashi, C.**, R. Lewis. 2001. Spider flagelliform silk: lessons in protein design, gene structure, and molecular evolution. *BioEssays* 23:750-756.
- Hayashi, C.**, R. Lewis. 2000. Molecular architecture and evolution of a modular spider silk protein gene. *Science* 287:1477-1479.
- Hayashi, C.**, N. Shipley, R. Lewis. 1999. Hypotheses that correlate the sequence, structure, and mechanical properties of spider silks. *International Journal of Biological Macromolecules* 24:271-275.
- Wheeler, W., **C. Hayashi**. 1998. The phylogeny of extant chelicerate orders. *Cladistics* 14:173-192.
- Hayashi, C.**, R. Lewis. 1998. Evidence from flagelliform silk cDNA for the structural basis of elasticity and modular nature of spider silks. *Journal of Molecular Biology* 275:773-784.
- Gatesy, J., **C. Hayashi**, M. Cronin, P. Arctander. 1996. Evidence from milk casein genes that cetaceans are close relatives of hippopotamid artiodactyls. *Molecular Biology and Evolution* 13:954-963.
- Gatesy, J., **C. Hayashi**, R. DeSalle, E. Vrba. 1994. Rate limits for mispairing and compensatory change: the mitochondrial ribosomal DNA of antelopes. *Evolution* 48:188-196.
- Wheeler, W., P. Cartwright, **C. Hayashi**. 1993. Arthropod phylogeny: a combined approach. *Cladistics* 9:1-39.

Invited Scientific Presentations

- Hayashi, C. 2025 (July 6) Dynamic evolution of the spider silk gene family. Gordon Research Conference, Silk Proteins and the Transition to Biotechnologies. Bryant University, Smithfield, RI.
- Hayashi, C. 2025 (May 7) *Dynamic evolution of the spider silk gene family*. Simons Foundation Presidential Lecture Series, Mechanisms of Evolution. Simons Foundation, New York, NY.

- Hayashi, C. 2022 (May 20) *Caught in the web: my journey to unravel the complexity of spider silk*. Stanford University, virtual.
- Hayashi, C. 2021 (Mar. 1), *Evolutionary genomics of spider silk*, plenary talk at Advances in Genome Biology and Technology (AGBT) 2021, virtual.
- Hayashi, C. 2020 (Jan. 27), *Evolutionary and functional genomics of spider silks*, North Carolina State University, Raleigh, NC.
- Hayashi, C. 2019 (Dec. 11), *Evolutionary and functional genomics of spider silks*, Queens College, Queens, NY.
- Hayashi, C. 2019 (Nov. 14), *Secrets of Spider Webs*, Butler University, Indianapolis, IN.
- Hayashi, C. 2019 (Apr. 11), *Caught in the Web: Unraveling the Complexity of Spider Silk Genes*, Auburn University, Auburn, AL.
- Hayashi, C. 2019 (Feb. 16), *The Science of Spider Silk*, Topical Lecture, AAAS, Washington, D.C.
- Hayashi, C. 2018 (Dec. 11), *Caught in the Web: Unraveling the Complexity of Spider Silk Genes*, New York Genome Center, New York, NY.
- Hayashi, C. 2018 (Nov. 5), *Evolutionary and functional genomics of spider silks*, University of Maryland, College Park, MD.
- Hayashi, C. 2018 (Oct. 8), Carpenter-Cohn Lecture in Comparative Biology: *Evolutionary and functional genomics of spider silks*, San Diego State University, CA.
- Hayashi, C. 2018 (Apr. 26), *Diversification of spider silks: evolutionary and functional perspectives*, Brooklyn College, Brooklyn, NY.
- Hayashi, C. 2017 (Nov. 6), *Diversification of spider silks: evolutionary and functional perspectives*. Temple University, Philadelphia, PA.
- Hayashi, C. 2017 (Oct. 19), *Diversification of spider silks: evolutionary and functional perspectives*. University of Chicago, Chicago, IL.
- Hayashi, C. 2017 (Aug. 2), Genomic profiling of spider silk glands across development and evolution. NASA Ames, Mountain View, CA.
- Hayashi, C. 2017 (April 12), *Diversification of spider silks: evolutionary and functional perspectives*. Stony Brook University, Stony Brook, NY.
- Hayashi, C. 2016 (Aug 20), *Evolution of spider silk: diversification of the spidroin gene family*. Arachnological Society of Japan, University of Tokyo, Japan.
- Hayashi, C. 2015 (Oct. 23), *Evolution of spider silk*. Saddleback College, Mission Viejo, CA.
- Hayashi, C. 2015 (Jun. 19), *The science of spider silk: amazing but true*. Marine Biological Laboratory Friday Evening Lecture, Woods Hole, MA.
- Hayashi, C. 2015 (May 27), *Integrative molecular evolution: functional diversification of the spider silk gene family*. American Museum of Natural History, New York, NY.
- Hayashi, C. 2014 (Nov. 20), *Spider silk: evolution of diverse, high-performance biomolecules*. Brookhaven National Laboratory, Brookhaven, NY.
- Hayashi, C. 2014 (Jun. 19), *Molecular evolution of spider silk: genetics of functional repetitive DNA*. AAAS, Pacific Division Conference. University of California, Riverside.
- Hayashi, C. 2014 (Feb. 27), *Spider silk: evolution of diverse, high-performance biological polymers*. University of California, Davis.
- Hayashi, C. 2012 (Nov. 13), *Spider silk biology and biotechnology: fact, fiction, and future*. Annual Meeting of the Entomological Society of America, Knoxville, TN.

- Hayashi, C. 2012 (Jun. 11). *Molecular characterization and evolution of spider silk proteins*. University of Washington, Seattle.
- Hayashi, C. 2012 (Feb. 23). *Spider silks: evolution of an amazing natural material*. University of the Andes, Bogotá, Colombia.
- Hayashi, C. 2011 (Jul. 28). *Spider silks: insights from genomics and transcriptomics*. New York Academy of Sciences, New York, NY.
- Hayashi, C. 2011 (Jun. 10). *Spider silks: functional and evolutionary insights into high-performance materials*. Arthropod Genomics Conference. Kansas City, MO.
- Hayashi, C. 2011 (May 11). *My love-hate relationship with repetitive DNA*. University of Kansas, Lawrence.
- Hayashi, C. 2011 (May 10). *Form, function, and evolution of spider silk genes*. Invited to deliver a seminar in honor of eminent entomologist and National Academy member, Charles Michener. University of Kansas, Lawrence.
- Hayashi, C. 2011 (Nov. 29). *Genetics of spider silks*. American Museum of Natural History, New York, NY.
- Hayashi, C. 2010 (Mar. 9). *Evolutionary genetics and biomechanics of spider silks*. Invited to be the 2009-2010 Mindlin speaker for the Dept. of Biology, University of Washington, Seattle. This Mindlin endowment highlights women in science.
- Hayashi, C. 2009 (Mar. 10). *The genetics of spider silk: functional repetitive DNA*. International Conference of the American Association of Textile Chemists and Colorists, Myrtle Beach, FL.
- Hayashi, C. 2008 (Dec. 5). *Biodiversity of spiders and spider silks*. University of Wyoming, Laramie.
- Hayashi, C. 2008. (Nov. 18). *Spider silks: genetics, performance, and evolution*. Annual Meeting of the Entomological Society of America, Reno, NV.
- Hayashi, C. 2008 (Feb. 4). *Spider silk: inspiration for new biomaterials through innovative collaboration*. The Institute for Triple Helix Innovation, Honolulu, HI.
- Hayashi, C. 2007 (Dec. 3). *Molecular and mechanical diversity of spider silk*. Georgia Institute of Technology, Atlanta.
- Hayashi, C. 2007 (Sep. 14). *Spider silk: molecular and mechanical diversity*. University of Stellenbosch, South Africa.
- Hayashi, C. 2007 (Aug. 9). *Evolution of spider silks*. Institute of Entomology, Ceske Budejovice, Czech Republic.
- Hayashi, C. 2006 (May 17). *Spider silks: evolution of material properties and repetitive sequence motifs*. California State University, Fullerton.
- Hayashi, C. 2006 (Feb. 21). *Spider silks: evolutionary analyses of silk sequences and material properties*. Colorado State University, Fort Collins.
- Hayashi, C. 2006 (Feb. 16). *Spider silks: gene family evolution and diversity of material properties*. University of California, Irvine.
- Hayashi, C. 2005 (Apr. 1). *Molecular biology of spider silk*. SemBioSys, Calgary, Canada.
- Hayashi, C. 2005 (Mar. 30). *Spider silk: design, performance, and evolution*. California Institute of Technology, Pasadena.
- Hayashi, C. 2005 (Mar. 22). *Natural wonders: spiders and their silk*. Featured “Four Corners” speaker at the National Textile Center’s Annual Forum. Raleigh, NC.
- Hayashi, C. 2005 (Feb. 21). *Evolution of repetitive motifs in the spider silk gene family*. University of Arizona, Tucson.

- Hayashi, C. 2004 (Nov. 16). *The evolution of complex and simple sequences in the spider silk gene family*. Annual Meeting of the Entomological Society of America. Salt Lake City, UT.
- Hayashi, C. 2004 (Sept. 8). *Characterizing the diversity of the silk gene family*. Army Research Office workshop on the production of recombinant spider silk proteins. Quedlinburg, Germany.
- Hayashi, C. 2003 (Dec. 8). *Sequence and functional diversity in the spider silk gene family*. California Institute of Technology, Pasadena.
- Hayashi, C. 2003 (Dec. 4). *Molecular evolution of the spider silk gene family*. New Mexico State University, Las Cruces.
- Hayashi, C. 2003 (Nov. 13). *Diversification of the spider silk gene family*. Clemson University, SC.
- Hayashi, C. 2003 (Oct. 29). *Molecular evolution of the spider silk gene family*. National Institute of Agrobiological Sciences, Tsukuba, Japan.
- Hayashi, C. 2003 (Apr. 3). *Modular molecular evolution of the spider silk gene family*. Brigham Young University, Provo, UT.
- Hayashi, C. 2003 (Mar. 31). *Evolution of the spider silk gene family*. University of Minnesota, St. Paul.
- Hayashi, C. 2003 (Feb. 3). *Evolution of the spider silk gene family*. University of Michigan, Ann Arbor.
- Hayashi, C. 2002 (Oct. 30). *Evolution of the spider silk gene family*. Invited by MARC Scholars. California State University, Fullerton.
- Hayashi, C. 2002 (May 29). *Diversity and conservation of sequences in the spider silk gene family*. University of California, Irvine.
- Hayashi, C. 2002 (May 24). *Diversity and conservation of sequences in the spider silk gene family*. California State University, San Bernardino.
- Hayashi, C. 2002 (May 22). *Diversity and conservation of sequences in the spider silk gene family*. University of California, Los Angeles.
- Hayashi, C. and W. Swanson. (Jan. 24). *Repetitive sequences*. University of California, Riverside.
- Hayashi, C. 2001 (Dec. 13). *Diversity and conservation of sequences in the spider silk gene family*. University of California, Santa Barbara.
- Hayashi, C. 2001 (Dec. 10). *Diversity and conservation of sequences in the spider silk gene family*. San Diego State University.
- Hayashi, C. 2001 (Nov. 30). *Diversity and conservation of sequences in the spider silk gene family*. Scripps Institution of Oceanography, University of California, San Diego.
- Hayashi, C. 2001 (Oct. 29). *Diversity and conservation of sequences in the spider silk gene family*. University of California, Riverside.
- Hayashi, C. 2001 (Aug. 24). *The modular evolution of spider silks*. University of California, Irvine.