

CURRICULUM VITAE

Carl Hirschie Johnson

Born February 18, 1954, in Washington, D.C.

PRESENT POSITION:

Stevenson Professor of Biological Sciences, Vanderbilt University, May 2011-present. (Professor, 1999-2011; Associate Professor, 1994-99; Assistant Professor, 1987-94); Professor, Vanderbilt University Medical Center, Department of Molecular Physiology and Biophysics; December 2007-present.

EDUCATION AND DEGREES AWARDED:

Ph.D., Stanford University, 1982. Dissertation co-advisers—Professors Colin Pittendrigh (deceased) and David Epel.

B.A. in Plan II (Honors Liberal Arts), University of Texas at Austin, 1976.

Undergraduate research adviser—Michael Menaker (now at University of Virginia, Charlottesville, VA).

Participated in the Physiology Course (summer, 1979) and the Analytical and Quantitative Light Microscopy Course (March, 1983) at the Marine Biological Laboratory, Woods Hole, Mass.

POSTDOCTORAL STUDIES:

Harvard University, Research Associate and Teaching Fellow in biology; supervisor—J. W. Hastings (Professor). January 1982 - August, 1987.

RESEARCH PUBLICATIONS (full-length publications only):

- 1981 **Johnson, C. H.**, and D. Epel. Intracellular pH of sea urchin eggs measured by the dimethylloxalidinedione (DMO) method. *J. Cell Biol.* 89: 284-291.
- 1982 **Johnson, C. H.**, and D. Epel. Starfish oocyte maturation and fertilization: intracellular pH is not involved in activation. *Devel. Biol.* 92: 461-469.
- 1983 Lee, H. C., **C. H. Johnson**, and D. Epel. Changes in internal pH associated with initiation of motility and acrosome reaction of sea urchin sperm. *Devel. Biol.* 95: 31-45.
- 1983 **Johnson, C. H.**, and D. Epel. Heavy metal chelators prolong motility and viability of sea urchin sperm by inhibiting spontaneous acrosome reactions. *J. Exp. Zool.* 226: 431-440.
- 1983 **Johnson, C. H.**, D. L. Clapper, M. W. Winkler, H. C. Lee, and D. Epel. A volatile inhibitor immobilizes sea urchin sperm in semen by depressing the intracellular pH. *Devel. Biol.* 98: 493-501.
- 1983 **Johnson, C. H.** Changes of intracellular pH are not correlated with the circadian rhythm

- of *Neurospora*. Plant Physiol. 72: 129-133.
- 1984 **Johnson, C. H.**, J. F. Roeber, and J. W. Hastings. Circadian changes of enzyme concentration account for rhythm of enzyme activity in *Gonyaulax*. Science 223: 1428-1430.
- 1985 **Johnson, C. H.**, S. Inoue, A. Flint, and J. W. Hastings. Compartmentalization of algal bioluminescence: autofluorescence of bioluminescent particles in the dinoflagellate *Gonyaulax* as studied with image-intensified video microscopy and flow cytometry. J. Cell Biology 100: 1435-1446.
- 1985 Nicolas, M. T., **C. H. Johnson**, J. M. Bassot, and J. W. Hastings. Immunogold labelling of organelles in the bioluminescent dinoflagellate *Gonyaulax* with anti-luciferase antibody. Cell Biol. Int. Reports 9: 797-802.
- 1985 Dube, F., T. Schmidt, **C. H. Johnson**, and D. Epel. The hierarchy of requirements for an elevated intracellular pH during early development of sea urchin embryos. CELL 40: 657-666.
- 1987 Nicolas, M. T., G. Nicolas, **C. H. Johnson**, J. M. Bassot, and J. W. Hastings. Characterization of the bioluminescent organelles in *Gonyaulax* after fast-freeze fixation and antiluciferase immunogold staining. J. Cell Biol. 105: 723-735.
- 1987 Olesiak, W., A. Ungar, **C. H. Johnson**, and J. W. Hastings. Are protein synthesis inhibition and phase-shifting of the circadian clock in *Gonyaulax* correlated? J. Biol. Rhythms 2: 121-138.
- 1989 Broda, H., **C. H. Johnson**, W. Taylor, and J. W. Hastings. Temperature dependence of phase response curves for drug-induced phase shifts. J. Biol. Rhythms 4: 327-333.
- 1989 **Johnson, C. H.**, I. Miwa, T. Kondo, and J. W. Hastings. Circadian rhythm of photoaccumulation in *Paramecium bursaria*. J. Biol. Rhythms 4: 405-415.
- 1989 **Johnson, C. H.**, and J. W. Hastings. Circadian phototransduction: phase-resetting and frequency of the circadian clock of *Gonyaulax* cells in red light. J. Biol. Rhythms 4: 417-437.
- 1990 **Johnson, C. H.** and H. Nakashima. Cycloheximide inhibits light-induced phase-shifting of the circadian clock in *Neurospora*. J. Biol. Rhythms 5: 159-167.
- 1991 Kondo, T., **C. H. Johnson**, and J. W. Hastings. Action spectrum for resetting the circadian phototaxis rhythm in the CW15 strain of *Chlamydomonas*. I. Cells in darkness. Plant Physiol. 95: 197-205.
- 1991 **Johnson, C. H.**, T. Kondo, and J. W. Hastings. Action spectrum for resetting the circadian phototaxis rhythm in the CW15 strain of *Chlamydomonas*. II. Illuminated cells.

- Plant Physiol. 97: 1122-1129.
- 1992 Byrne, T. E., M. R. Wells, and **C. H. Johnson**. Circadian rhythms of chemotaxis to ammonium and of methylammonium uptake in *Chlamydomonas*. Plant Physiol. 98: 879-886.
- 1992 **Johnson, C. H.**, and T. Kondo. Light pulses induce "singular" behavior and shorten the period of the circadian phototaxis rhythm in the CW15 strain of *Chlamydomonas*. J. Biol. Rhythms 7: 313-327.
- 1993 Kondo, T., C. A. Strayer, R. D. Kulkarni, W. Taylor, M. Ishiura, S. S. Golden, and **C. H. Johnson**. Circadian rhythms in prokaryotes: luciferase as a reporter of circadian gene expression in cyanobacteria. Proc. Natl. Acad. Sci. USA 90: 5672-5676.
- 1994 Jacobshagen, S., and **C. H. Johnson**. Circadian rhythms of gene expression in *Chlamydomonas reinhardtii*: cyclic changes of mRNA abundance of cab II, β -tubulin, and cytochrome c. Eur. J. Cell Biology 64: 142-152.
- 1994 Kondo, T., N. F. Tsinoremas, S. S. Golden, **C. H. Johnson**, S. Kutsuna, and M. Ishiura. Circadian clock mutants of cyanobacteria. Science 266: 1233-1236.
- 1994 **Johnson, C. H.**, Y. Nakaoka, and L. Miwa. The effects of altering extracellular potassium ion concentration on the membrane potential and circadian clock of *Paramecium bursaria*. J. Exp. Biol. 197: 295-308.
- 1995 Goto, K., and **C. H. Johnson**. Is the cell division cycle gated by a circadian clock? The case of *Chlamydomonas reinhardtii*. J. Cell Biology 129: 1061-1069.
- 1995 **Johnson, C. H.**, M. R. Knight, T. Kondo, P. Masson, J. Sedbrook, A. Haley, and A. Trewavas. Circadian oscillations of cytosolic and chloroplastidic free calcium in plants. Science 269: 1863-1865.
- 1995 Liu, Y, N.F. Tsinoremas, **C.H. Johnson**, N.V. Lebedeva, S.S. Golden, M. Ishiura, and T. Kondo. Circadian orchestration of gene expression in cyanobacteria. Genes and Development 9: 1469-1478.
- 1995 Liu, Y, S.S. Golden, T. Kondo, M. Ishiura, and **C.H. Johnson**. Bacterial luciferase as a reporter of circadian gene expression in cyanobacteria. J. Bacteriology 177: 2080-2086.
- 1996 Tsinoremas, N.F., M. Ishiura, T. Kondo, C.R. Andersson, K. Tanaka, H. Takahashi, **C.H. Johnson**, and S.S. Golden. A sigma factor that modifies the circadian expression of a subset of genes in cyanobacteria. EMBO Journal 15: 2488-2495.
- 1996 Liu, Y., N.F. Tsinoremas, S.S. Golden, T. Kondo, and **C.H. Johnson**. Circadian expression of genes involved in the purine biosynthetic pathway of the cyanobacterium *Synechococcus* sp. strain PCC 7942. Mole. Microbiol.20: 1071-1081.

- 1996 Mori, T., B. Binder, and **C.H. Johnson**. Circadian gating of cell division in cyanobacteria growing with average doubling times of less than 24 hours. *Proc. Natl. Acad. Sci. USA* 93: 10183-10188.
- 1996 Jacobshagen, S., K.L. Kindle, and **C.H. Johnson**. Transcription of *cabII* is regulated by the biological clock in *Chlamydomonas reinhardtii*. *Plant Mole. Biol.* 31: 1173-1184.
- 1998 Ishiura, M., S. Kutsuna, S. Aoki, H. Iwasaki, C. R. Andersson, A. Tanabe, S. S. Golden, **C. H. Johnson**, and T. Kondo. Expression of a gene cluster *kaiABC* as a circadian feedback process in cyanobacteria. *Science* 281: 1519-1523.
- 1998 Ouyang, Y., C.R. Andersson, T. Kondo, S.S. Golden, and **C.H. Johnson**. Resonating circadian clocks enhance fitness in cyanobacteria. *Proc. Natl. Acad. Sci. USA* 95: 8660-8664.
- 1999 Xu, Y., D. Piston, and **C.H. Johnson**. A bioluminescence resonance energy transfer (BRET) system: Application to interacting circadian clock proteins. *Proc. Natl. Acad. Sci. USA* 96: 151-156.
- 1999 Minko, I., S.P. Holloway, S. Nikaido, O.W. Odom, M. Carter, **C.H. Johnson**, and D.L. Herrin. *Renilla* luciferase as a vital reporter for chloroplast gene expression in *Chlamydomonas*. *Mole. and Gen. Genetics* 262: 421-425.
- 1999 Sai, J., and **C.H. Johnson**. Different circadian oscillators control Ca⁺⁺ fluxes and *Lhcb* gene expression. *Proc. Natl. Acad. Sci. USA* 96: 11659-11663.
- 2000 Nikaido, S.S., and **C.H. Johnson**. Daily and circadian variation in survival from ultraviolet radiation in *Chlamydomonas reinhardtii*. *Photochem. Photobiol.* 71: 758-765.
- 2000 Xu, Y., T. Mori, and **C.H. Johnson**. Circadian clock-protein expression in cyanobacteria: rhythms and phase-setting. *EMBO Journal* 19: 3349-57.
- 2001 Wood, N.T., A. Haley, M. Viry-Moussaïd, **C. H. Johnson**, A.H. van der Luit, and A.J. Trewavas. The calcium rhythms of different cell types oscillate with different circadian phases. *Plant Physiol.* 125: 787-796.
- 2001 Mori, T., and **C.H. Johnson**. Independence of circadian timing from cell division in cyanobacteria. *J. Bacteriol.* 183: 2439-2444.
- 2001 Xu, Y., and **C.H. Johnson**. A clock- and light-regulated gene that links the circadian oscillator to *LHCB* gene expression. *PLANT CELL* 13: 1411-1425.
- 2002 Suzuki, L., and **C.H. Johnson**. Photoperiodic Control of Germination in the Unicell *Chlamydomonas*. *Naturwissenschaften* 89:214-220.

- 2002 Schoenhard, J.A., M. Eren, **C.H. Johnson**, and D.E. Vaughan. Alternative splicing yields novel BMAL2 variants: tissue distribution and functional characterization. *Am. J. Physiol.* 283: C103-C114.
- 2002 Sai, J., and **C.H. Johnson**. Dark-stimulated calcium ion fluxes in the chloroplast stroma and cytosol. *PLANT CELL* 14: 1279–1291.
- 2002 Mori, T., S. V. Saveliev, Y. Xu, W. F. Stafford, M. M. Cox, R. B. Inman, and **C. H. Johnson**. Circadian Clock Protein KaiC forms ATP-dependent Hexameric Rings and Binds DNA. *Proc. Natl. Acad. Sci. USA* 99: 17203–17208.
- 2003 Schoenhard, J.A., Smith, L.H., Painter, C.A., Eren, M., **Johnson, C.H.**, and Vaughan, D.E. Regulation of the PAI-1 promoter by circadian clock components: differential activation by BMAL1 and BMAL2. *Journal of Molecular and Cellular Cardiology* 35: 473-481.
- 2003 Xu, Y., T. Mori, and **C.H. Johnson**. Cyanobacterial circadian clockwork: roles of KaiA, KaiB, and the *kaiBC* promoter in regulating KaiC. *EMBO Journal* 22: 2117-2126.
- 2003 Kolar, J., **C.H. Johnson**, and I. Machackova. Exogenously applied melatonin (N-acetyl-5-methoxytryptamine) affects flowering of the short-day plant *Chenopodium rubrum*. *Physiologia Plantarum* 118: 605-612.
- 2003 Izumo, M., **C.H. Johnson**, and S. Yamazaki. Circadian gene expression in mammalian fibroblasts revealed by real-time luminescence reporting: temperature compensation and damping. *Proc. Natl. Acad. Sci. USA* 100: 16089–16094.
- 2004 Min, H., Y. Liu, **C. H. Johnson**, and Susan S. Golden. Phase determination of circadian gene expression in *Synechococcus elongatus* PCC 7942. *J. Biol. Rhythms* 19: 103-112.
- 2004 Subramanian, C., B.-H. Kim, N.N. Lyssenko, X. Xu, **C.H. Johnson**, and A.G. von Arnim. The *Arabidopsis* repressor of light signaling, COP1, is regulated by nuclear exclusion; mutational analysis by bioluminescence resonance energy transfer. *Proc. Natl. Acad. Sci. USA* 101: 6798-6802.
- 2004 Woelfle, M.A., Y. Ouyang, K. Phanvijhitsiri, and **C.H. Johnson**. The adaptive value of circadian clocks: An experimental assessment in cyanobacteria. *Current Biology* 14: 1481–1486.
- 2004 Pattanayek, R., J. Wang, T. Mori, Y. Xu, **C.H. Johnson**, and M. Egli. Visualizing a circadian clock protein: crystal structure of KaiC and functional insights. *Molecular Cell* 15: 375–388.
- 2004 Xu, Y., T. Mori, R. Pattanayek, S. Pattanayek, M. Egli, and **C.H. Johnson**. Identification of Key Phosphorylation Sites in the Circadian Clock Protein KaiC by Crystallographic and Mutagenetic Analyses. *Proc. Natl. Acad. Sci. USA* 101: 13933-13938.

- 2006 Pattanayek, R., D.R. Williams, S. Pattanayek, Y. Xu, T. Mori, **C.H. Johnson**, P.L. Stewart, and M. Egli. Analysis of KaiA-KaiC protein interactions in the cyano-bacterial circadian clock using hybrid structural methods. *EMBO Journal* 25: 2017-2028.
- 2006 Subramanian, C., J.-C. Woo, X. Cai, X. Xu, S. Servick, **C.H. Johnson**, A. Nebenfuhr, and A. von Arnim. A suite of tools and application notes for *in vivo* protein interaction assays using Bioluminescence Resonance Energy Transfer (BRET). *Plant Journal* 48: 138-152.
- 2006 Izumo, M., T.R. Sato, M. Straume, and **C.H. Johnson**. Quantitative analyses of circadian gene expression in mammalian cell cultures. *PLoS Computational Biology* 2: e136.
- 2007 Mori, T., D.R. Williams, M.O. Byrne, X. Qin, H.S. Mchaourab, M. Egli, P.L. Stewart, and **C.H. Johnson**. Elucidating the Ticking of an *in vitro* Circadian Clockwork. *PLoS Biology* 5: e93.
- 2007 Fan, Y., A. Hida, D.A. Anderson, M. Izumo, and **C.H. Johnson**. Cycling of CRYPTOCHROME Proteins Is Not Necessary for Circadian-Clock Function in Mammalian Fibroblasts. *Current Biology* 17: 1091–1100. [PubMed # 17583506](#); [NIHMSID # 400586](#)
- 2007 Xu, X., M. Soutto, Q. Xie, S. Servick, C. Subramanian, A. von Arnim, and **C.H. Johnson**. Imaging Protein Interactions with BRET in Plant and Mammalian Cells and Tissues. *Proc. Natl. Acad. Sci. USA* 104: 10264-10269.
- 2007 Woelfle, M.A., Y. Xu, X. Qin, and **C.H. Johnson**. Circadian rhythms of superhelical status of DNA in cyanobacteria. *Proc. Natl. Acad. Sci. USA* 104: 18819–18824.
- 2007 Bonneau, R., M.T. Facciotti, D.J. Reiss, A.K. Schmid, M. Pan, A. Kaur, V. Thorsson, P. Shannon, M.H. Johnson, C.J. Bare, W. Longabaugh, M. Vuthoori, K. Whitehead, A. Madar, L. Suzuki, T. Mori, D.-E. Chang, J. DiRuggiero, **C.H. Johnson**, L. Hood and N.S. Baliga. A predictive model for transcriptional control of physiology in a free living cell. *CELL* 131: 1354-65.
- 2007 Xu, X., C.T. Hotta, A.N. Dodd, J. Love, R. Sharrock, Y.W. Lee, Q. Xie, **C.H. Johnson**, and A.A.R. Webb. Distinct light and clock modulation of cytosolic free Ca²⁺ oscillations and rhythmic *CHLOROPHYLL A/B BINDING PROTEIN2* promoter activity in *Arabidopsis*. *Plant CELL* 19: 3474-90.
- 2008 Pattanayek, R., Williams, DR, Pattanayek, S, Mori, T, Johnson, CH, Stewart, PL, Egli, M. Structural model of the circadian clock KaiB-KaiC complex and mechanism for modulation of KaiC phosphorylation. *EMBO J.* 27: 1767-78. [PMID: 18497745](#), [PMCID: PMC2435126](#)
- 2008 Ciarleglio, C.M., K. Ryckman, S.V. Servick, A. Hida, S. Robbins, N. Wells, J. Hicks,

- S.A. Larson, J.P. Wiedermann, K. Carver, N. Hamilton, K.K. Kidd, J.R. Kidd, J.R. Smith, J. Friedlaender, D.G. McMahon, S. Williams, M.L. Summar, and **C.H. Johnson**. Genetic Differences in Human Circadian Clock Genes Among Worldwide Populations. *J. Biol. Rhythms* 23: 330-340. [NIHMSID:NIHMS75029](#).
- 2008 Robertson, J.B., C.C. Stowers, E. Boczko, and **C.H. Johnson**. Real-time Luminescence Monitoring of Cell-cycle and Respiratory Oscillations in Yeast. *Proc. Natl. Acad. Sci. USA* 105: 17988–17993. [PMID: 19004762](#), [PMCID: PMC2584751](#)
- 2008 Vougiougiannopoulou, K., Y. Ferandin, K. Bettayeb, V. Myrianthopoulos, O. Lozach, Y. Fan, **C.H. Johnson**, P. Magiatis, A.-L. Skaltsounis, E. Mikros, and L. Meijer. Soluble 3', 6-substituted indirubins with enhanced selectivity towards glycogen synthase kinase -3 alter circadian period. *J. Med. Chem.* 51: 6421–6431. [NIHMSID:NIHMS75229](#)
- 2008 Hotta, C.T., X. Xu, Q. Xie, A.N. Dodd, **C. H. Johnson**, and A.A. Webb. Are there multiple circadian clocks in plants? *Plant Signal Behav.* 3: 342-4. [PMID: 19841666](#), [PMCID: PMC2634278](#)
- 2009 Wang, Y., J. Jia, H. Bu, Y. Zhao, Y. Xu, **C.H. Johnson**, and J. Kolar. Genetic transformation of *Nicotiana tabacum L.* by *Agrobacterium tumefaciens* carrying genes in the melatonin synthesis pathway and the enhancement of antioxidative capability in transgenic plants. *Chinese Journal of Biotechnology* (in Chinese, abstract in English) 25: 1014-1021.
- 2009 Robertson, J.B., Y. Zhang, **C.H. Johnson**. Light Emitting Diode Flashlights as Effective and Inexpensive Light Sources for Fluorescence Microscopy. *J. Microscopy* 236: 1-4. [NIHMSID:NIHMS131641](#); [PMID: 19772530](#)
- 2009 Xu, X., R. Graeff, Q. Xie, K.L. Gamble, T. Mori, **C.H. Johnson**. The *Arabidopsis* Circadian Clock Incorporates a cADPR-Based Feedback Loop. *Science* 326: 230-b (Online Technical Comment). [PMID: 19815758](#), [PMCID: PMC2934760](#)
- 2009 Xu, Y., T. Mori, X. Qin, H. Yan, M. Egli, **C.H. Johnson**. Intramolecular Regulation of Phosphorylation Status of the Circadian Clock Protein KaiC. *PLoS ONE* 4: e7509. [PMID: 19946629](#), [PMCID: PMC2778140](#)
- 2009 Pattanayek, R., T. Mori, Y. Xu, S. Pattanayek, **C.H. Johnson**, M. Egli. Structures of KaiC Circadian Clock Mutant Proteins: A New Phosphorylation Site at T426 and Mechanisms of Kinase, ATPase and Phosphatase. *PLoS ONE* 4: e7529. [PMID: 19956664](#), [PMCID: PMC2777353](#)
- 2010 Shi, S., A. Hida, O.P. McGuinness, D.H. Wasserman, S. Yamazaki, **C.H. Johnson**. Circadian Clock Gene *Bmal1* Is Not Essential; Functional Replacement with its Paralog, *Bmal2*. *Current Biology* 20: 316-321. [NIHMSID: NIHMS168172](#).
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- 2010 Qin, X., M. Byrne, T. Mori, P. Zou, D.R. Williams, H. Mchaourab, and **C.H. Johnson**. Intermolecular Associations Determine the Dynamics of the Circadian KaiABC Oscillator. *Proc. Natl. Acad. Sci. USA* 107: 14805-10. PMID: 20679240; PMCID: PMC2930409.
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- 2011 Pattanayek, R., D.R. Williams, G. Rossi, S. Weigand, T. Mori, **C.H. Johnson**, P.L. Stewart, M. Egli. Combined SAXS/EM Based Models of the *S. elongatus* Post-Translational Circadian Oscillator and its Interactions with the Output His-Kinase SasA. *PLoS ONE* 6: e23697. PMID: 21887298; PMCID: PMC3161067.
- 2012 Egli, M., T. Mori, R. Pattanayek, Y. Xu, X. Qin, and **C.H. Johnson**. Dephosphorylation of the Core Clock Protein KaiC in the Cyanobacterial KaiABC Circadian Oscillator Proceeds via an ATP Synthase Mechanism. *Biochemistry* 51: 1547–1558. PMID: 22304631; PMCID: PMC3293397.
- 2012 Zhang, Y., Q. Xie, J.B. Robertson, and **C.H. Johnson**. pHlash: A New Genetically Encoded and Ratiometric Luminescence Sensor of Intracellular pH. *PLoS ONE* 7: e43072. PMID: 22905204, PMCID: PMC3419163
- 2012 Edgar, R.S., E.W. Green, Y. Zhao, G. van Ooijen, M. Olmedo, X. Qin, Y. Xu, M. Pan, U.K. Valekunja, K.A. Feeney, E.S. Maywood, M.H. Hastings, N.S. Baliga, M. Meroow, A.J. Millar, **C.H. Johnson**, C.P. Kyriacou, J.S. O'Neill, A.B. Reddy. Peroxiredoxins are conserved markers of circadian rhythms. *Nature* 485: 459-64. PMID: 22622569; PMCID: PMC3398137
- 2013 Ma, P., M.A. Woelfle, and **C.H. Johnson**. An Evolutionary Fitness Enhancement Conferred by the Circadian System in Cyanobacteria. Special issue on "Functionality and Dynamics in Biological Systems." *Chaos, Solitons & Fractals* 50: 65-74. NIHMSID: NIHMS431113; PMID: 23626410; PMCID: PMC3633149
- 2013 Xu, Y., P. Ma, P. Shah, A. Rokas, Y. Liu, **C.H. Johnson**. Non-optimal codon usage is a mechanism to achieve circadian clock conditionality. *Nature* 495: 116-20. NIHMSID: NIHMS440833, PMID: 23417065; PMCID: PMC3593822
- 2013 Egli, M., R. Pattanayek, J. Sheehan, Y. Xu, T. Mori, J. Smith, **C.H. Johnson**. Loop-Loop Interactions Regulate KaiA-Stimulated KaiC Phosphorylation in the Cyanobacterial KaiABC Circadian Clock. *Biochemistry* 52: 1208-1220. PMID: 23351065; PMCID:

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- 2013 Shi, S., T. Ansari, O.P. McGuinness, D.H. Wasserman, **C.H. Johnson**. Circadian disruption leads to insulin resistance and obesity. *Current Biology* 23: 372-81. [NIHMS437624](#), [PMID: 23434278](#)
- 2013 Villarreal, S.A., R. Pattanayek, D.R. Williams, T. Mori, X. Qin, **C.H. Johnson**, M. Egli, and P.L. Stewart. CryoEM and Molecular Dynamics of the Circadian KaiB–KaiC Complex Indicates KaiB Monomers Interact with KaiC and Block ATP Binding Clefts. *J. Molecular Biology* 425: 3311–3324. [PMID: 23796516](#)
- 2013 Xu, Y., P.D. Weyman, M. Umetani, J. Xiong, X. Qin, Q. Xu, H. Iwasaki, and **C. H. Johnson**. Circadian Yin-Yang regulation and its manipulation to globally reprogram gene expression. *Current Biology* 23: 2365-2374. [PMID: 24210617](#)
- 2013 Robertson, J.B., C. R. Davis, and **C. H. Johnson**. Visible light alters yeast metabolic rhythms by inhibiting respiration. *PNAS* 110: 21130-21135. [PMID: 24297928](#)
- 2014 Pattanayek, R., Y. Xu, A. Lamichhane, **C.H. Johnson**, and M. Egli. An arginine tetrad as mediator of input-dependent and -independent ATPases in the clock protein KaiC. *Acta Crystallographica Section D, Biological Crystallography*, accepted.
- 2014 Yan Y, Jiang L, Aufderheide KJ, Wright GA, Terekhov A, Costa L, Qin K, McCleery WT, Fellenstein JJ, Ustione A, Robertson JB, **Johnson CH**, Piston DW, Hutson MS, Wikswa JP, Hofmeister W, Janetopoulos C. A Microfluidic-Enabled Mechanical Microcompressor for the Immobilization of Live Single- and Multi-Cellular Specimens. *Microsc Microanal*. In press.

REVIEWS AND BOOK CHAPTERS:

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- 1985 **Johnson, C. H.**, and J. W. Hastings. Bioluminescence and Chronobiology. In: [Photobiology 1984](#), Longworth, Jaffer, and Shropshire, eds. (Praeger, New York), pp. 189-193.
- 1986 **Johnson, C. H.**, and J. W. Hastings. The elusive mechanism of circadian clocks. *American Scientist* 74: 29-36.
- 1992 **Johnson, C. H.**, T. Kondo, and K. Goto. Circadian rhythms in *Chlamydomonas*. In: [Circadian Clocks from Cell to Human; Proceedings of the Fourth Sapporo Symposium on Biological Rhythms](#) (Hokkaido University Press), pp. 139-155.

- 1992 **Johnson, C. H.** Phase response curves: what can they tell us about circadian clocks? In: Circadian Clocks from Cell to Human: Proceedings of the Fourth Sapporo Symposium on Biological Rhythms (Hokkaido University Press), pp. 209-246.
- 1994 **Johnson, C. H.** Illuminating the clock: circadian photobiology. *Seminars in Cell Biology* 5: 355-362.
- 1994 Kondo, T., M. Ishiura, S.S. Golden, and **C.H. Johnson**. Circadian rhythms of cyanobacteria expressed from a luciferase reporter gene. In: Evolution of Circadian Clock, eds. T. Hiroshige and K. Honma (Hokkaido University Press, Sapporo), pp. 59-73.
- 1995 **Johnson, C. H.** Photobiology of circadian rhythms. In: CRC Handbook of Organic Photochemistry and Photobiology, Horspool and Song, eds. (CRC Press, Boca Raton, FL), pp. 1602-1610.
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- 1998 S.S. Golden, M. Ishiura, **C.H. Johnson**, and T. Kondo. Circadian rhythms in cyanobacteria. In: Microbial Responses to Light and Time. M.X. Caddick, S. Baumberg, D.A. Hodgson, and M.K. Phillips-Jones, eds. (Cambridge Univ. Press, Cambridge, U.K.), pp. 225-236.
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- 1999 **Johnson, C.H.**, and S.S. Golden. Circadian programs in cyanobacteria: adaptiveness and mechanism. *Annual Review of Microbiology* 53: 389-409.
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- 1999 Lakin-Thomas, P.L., and **C.H. Johnson**. Commentary: molecular and cellular models of circadian systems. *J. Biol. Rhythms* 14: 486-489.

- 1999 Xu, Y, D.W. Piston, and **C.H. Johnson**. Resonance energy transfer as an emerging strategy for monitoring protein-protein interactions *in vivo*: BRET vs. FRET. *Spectrum* 12: 9-14.
- 2000 Mori, T., and **C.H. Johnson**. Circadian control of cell division in unicellular organisms. In: Progress in Cell Cycle Research, Volume 4. L. Meijer, A. Jezequel, and B. Ducommun, eds. (Kluwer Academic/Plenum Press, N.Y.), pp. 185-192.
- 2001 **Johnson, C.H.**, S.S. Golden, and T. Kondo. Circadian Rhythms in Cyanobacteria. In: *Nature Encyclopedia of Life Sciences*, Nature Publishing Group, London: www.els.net.
- 2001 **Johnson, C.H.** Endogenous timekeepers in photosynthetic organisms. *Annu. Rev. Physiol.* 63: 695-728.
- 2001 DasSarma, S., S.P. Kennedy, B. Berquist, W.V. Ng, N.S. Baliga, J.L. Spudich, M.P. Krebs, J.A. Eisen, **C.H. Johnson**, L. Hood. Genomic perspective on the photobiology of *Halobacterium* species NRC-1, a phototrophic, phototactic, and UV-tolerant haloarchaeon. *Photosynthesis Res.* 70: 3-17.
- 2001 Mori, T., and **C.H. Johnson**. Circadian programming in cyanobacteria. *Sem. Cell Develop. Biol.* 12: 271-278.
- 2001 Suzuki, L., and **C.H. Johnson**. Algae know the time of day: circadian and photoperiodic programs. *J. Phycol.* 37: 1-10.
- 2001 **Johnson, C.H.**, and T. Kondo. Circadian rhythms in unicellular organisms. In: Handbook of Behavioral Neurobiology (Plenum Press). Chapter 3, pp. 61-77.
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- 2002 Xu, Y., D. Piston, and **C.H. Johnson**. BRET assays for protein-protein interactions in living cells. In: Green Fluorescent Protein: Applications and Protocols (Methods in Molecular Biology series). Editor, B.W. Hicks (Humana Press, Totowa, N.J.), pp. 121-133.
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- 2003 Xu, Y., A. Kanauchi, A.G. von Arnim, D.W. Piston, and **C.H. Johnson**. Bioluminescence resonance energy transfer: monitoring protein-protein interactions in living cells. In *Methods in Enzymology; Biophotonics* A. G. Mariott and I. Parker, eds. Volume 360, pp. 289-301.

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- 2004 **Johnson, C.H.**, J.A. Elliott, R.G. Foster, Ken-Ichi Honma, and Richard Kronauer. Fundamental properties of circadian rhythms. Chapter 3 in: Chronobiology: Biological Timekeeping. J.C. Dunlap, J.J. Loros, and P.J. DeCoursey. (Sinauer; Sunderland, MA), pp. 66-105.
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- 2004 **Johnson, C.H.** As time glows by in bacteria. *Nature* 430: 23-24.
- 2005 Mittag, M., S. Kiaulehn, and **C.H. Johnson**. The circadian clock in *Chlamydomonas reinhardtii*: What is it for? What is it similar to? *Plant Physiol.* 137: 399-409.
- 2005 **Johnson, C.H.** Testing the adaptive value of circadian systems. *Methods in Enzymology* 393: 818-837 (M.W. Young, ed.).
- 2005 Soutto M., Y. Xu, and **C. H. Johnson**. Bioluminescence RET (BRET): techniques and potential. In: Molecular Imaging: FRET Microscopy and Spectroscopy. A. Periasamy and R.N. Day, eds. (Oxford University Press, NY), pp. 260-271.
- 2005 **Johnson, C.H.** and C.P. Kyriacou. Clock evolution and adaptation: whence and whither? Chapter 10 in Endogenous Plant Rhythms (eds. A.J.W. Hall and H. McWatters), Blackwell Publishing Ltd, Oxford, pp. 237-260.
- 2006 **Johnson, C.H.**, and S.S. Golden. Circadian Rhythms in Cyanobacteria. In: *Nature Encyclopedia of Life Sciences*, Nature Publishing Group, London: www.els.net.
- 2006 **Johnson, C.H.**, R. Shingles, and W.F. Ettinger. Regulation and role of Ca⁺⁺ fluxes in the chloroplast. In: R.R. Wise and J.K. Hooper (eds). Chapter 20 in The Structure and Function of Plastids. Vol. 23. In Govindjee (series ed) *Advances in Photosynthesis and Respiration*, Kluwer Academic Press, pp. 403-416.

- 2006 **Johnson, C.H.** Reminiscences from Pittendrigh's last Ph.D. student. *Resonance* 11: 22-31.
- 2006 Woelfle, M.A. and **C.H. Johnson**. No promoter left behind: global orchestration of circadian gene expression in cyanobacteria. *Journal of Biological Rhythms* 21: 419-431. [PubMed # 17107933](#); [NIHMSID # 400588](#)
- 2007 **Johnson, C.H.** Bacterial circadian programs. IN: *Cold Spring Harbor Symposia on Quantitative Biology* (Cold Spring Harbor Press; Cold Spring Harbor, N.Y.), Volume 72, pp. 395-404.
- 2008 **Johnson, C.H.**, Y. Xu, T. Mori. A Cyanobacterial Circadian Clockwork. *Current Biology* 18: R816–R825. [NIHMSID: NIHMS77492](#).
- 2008 **Johnson, C.H.**, M. Egli, P.L. Stewart. Structural Insights into a Circadian Oscillator. *Science* 322: 697-701. [NIHMSID: NIHMS77606](#).
- 2009 **Johnson, C.H.**, and Y. Xu. The Decade of Discovery: How *Synechococcus elongatus* became a model circadian system 1990–2000. Chapter 4 in: Bacterial Circadian Programs, J.L. Ditty, S.R. Mackey, C.H. Johnson, eds. (Springer), pp. 63-86.
- 2009 Woelfle, M.A., and **C.H. Johnson**. The adaptive value of the circadian clock system in cyanobacteria. Chapter 12 in: Bacterial Circadian Programs, J.L. Ditty, S.R. Mackey, C.H. Johnson, eds. (Springer), pp. 205-221.
- 2009 **Johnson, C.H.** From skepticism to prominence: circadian clocks in bacteria. *Microbe* 4: 411-418.
- 2010 **Johnson, C.H.** Circadian Clocks and Cell Division: What's the Pacemaker? *Cell Cycle* 9: 3864-3873. [PMCID: PMC3047750](#)
- 2011 **Johnson, C.H.**, P.L. Stewart, and M. Egli. The Cyanobacterial Circadian System: from Biophysics to Bioevolution. *Annu. Rev. Biophysics* 40:143–167. [PMCID: PMC3093959](#); [NIHMSID: NIHMS291530](#)
- 2011 Xie, Q., M. Soutto, X. Xu, Y. Zhang, and **C.H. Johnson**. Bioluminescence Resonance Energy Transfer (BRET) Imaging in Plant Seedlings and Mammalian Cells. In: Methods in Molecular Imaging, K. Shah, ed. (Methods in Molecular Biology Series, Humana Press), vol. 680, pp. 3-28. [NIHMSID: NIHMS400562](#)
- 2011 Robertson, J.B., and **C.H. Johnson**. Luminescence as a Continuous Real-Time Reporter of Promoter Activity in Yeast Undergoing Respiratory Oscillations or Cell Division Rhythms. In: Yeast Genetic Networks, A. Becskei, ed. (Methods in Molecular Biology Series, Humana Press), pp. 63-79. [NIHMSID: NIHMS400566](#); [PMID: 21468985](#), [PMCID: PMC3433746](#)

- 2011 **Johnson, C.H.** Circadian Programs in Cyanobacteria. In: *Nature Encyclopedia of Life Sciences*, Nature Publishing Group, London: www.els.net.
- 2013 Gamble, K.L., D. Resuehr, and **C.H. Johnson**. Shift work and circadian dysregulation of reproduction. *Frontiers in Systems and Translational Endocrinology* 4:92. [PMID: 23966978 \[PubMed\]](#) [PMCID: PMC3736045](#)
- 2013 Egli, M., and **C.H. Johnson**. A circadian clock nanomachine that runs without transcription or translation. *Current Opinion Neurobiology* 23:732–740. [PMID: 23571120](#); [PMCID: PMC3735861](#)
- 2013 de la Iglesia, H.O. and **C.H. Johnson**. Biological Clocks: Riding the tides. *Current Biology* 23: R921-R923. [PMID: 24156810](#)
- 2014 **Johnson, C.H.** Carl Hirschie Johnson (*Current Biology* feature Q&A). *Current Biology* 24: 100-102.
- 2014 **Johnson, C. H.**, and M. Egli. Metabolic compensation and circadian resilience in prokaryotic cyanobacteria. *Annu. Rev. Biochem.*, in press.

BOOKS:

- 1990 **Johnson, C. H.** An Atlas of Phase Response Curves for Circadian and Circatidal Rhythms. Dept. of Biology, Vanderbilt University, 715 pages.
- 2009 Bacterial Circadian Programs, J.L. Ditty, S.R. Mackey, **C.H. Johnson**, eds. (Springer), 333 pages.

BOOK REVIEW:

- 1988 **Johnson, C. H.** The Mathematical Structure of the Human Sleep-Wake Cycle, by Steven Strogatz. *Bull. Math. Biol.* 50: 324-326.

PATENT:

European Patent Office (Patent # 99957096.3). "Bioluminescence Resonance Energy Transfer (BRET) System," June 16, 1999.

INVITED PRESENTATIONS (not including departmental seminars):

Gordon Conference on Chronobiology, 6/83, 6/87, 6/89, 5/95, 8/97, 7/99, 8/01, 5/03, 8/05, 5/07, 7/09, 6/11, 7/13.

Society for Research on Biological Rhythms (symposia) 5/88, 5/92, 5/94, 5/96, 5/98, 5/00, 5/02, 6/04, 5/10, 5/12 (and I also organized the Symposium session for the 2010

meeting).

Plenary Lecture, European Biological Rhythms Society (Germany), 8/13

American Society for Microbiology Annual Meetings: organized and spoke at Symposia on "Microbial Rhythms" 5/11 and "Bacterial Clocks" 6/05; invited Symposium speaker, 5/97.

American Society for Cell Biology Annual Meeting: organized and spoke in Mini-Symposium on "Clocks," 12/09.

Cold Spring Harbor Symposium on "Biological Clocks & Rhythms," Symposium Speaker, 5/07.

INSPIRE Meeting "What makes a good clock? Circadian clocks, brain function and development," Viareggio Italy, 3/13

Japan Society for Chronobiology, Plenary Speaker 9/12

4th International Symposium on Photonic Bioimaging, Sapporo, Japan 9/12

Environmental Molecular Sciences Laboratory Workshop on Cell Cycle and Rhythms 6/12

German Society for Cell Biology, Symposium Speaker 3/07.

Toronto Discovery District BioImaging Symposium, Toronto, Canada 11/06

United Kingdom Clocks Club, Manchester, U.K. 6/04.

DFG Research Group Meeting on *Chlamydomonas*, Jena, Germany, 3/04.

World Congress of Chronobiology, Sapporo, Japan, 9/03.

Gordon Conference on Photosensory Receptors 5/02.

Keystone Symposium on Bacterial Chromosomes 2/01.

American Society of Plant Physiology: Minisymposia on Biological Clocks, 6/86, 7/99.

American Society for Photobiology, invited Symposium speaker, 6/92, 7/99, 7/01, 7/02.

Mosbach Colloquium (Gesellschaft für Biochemie), Germany, 3/03

"Time and timing in biological systems," Second Symposium of the SmithKline Beecham Foundation, Munich, Germany, 11/99.

“Biological rhythms and cancer chemotherapy,” EORTC meeting, San Raphael, France, 9/00.

“Cellular regulatory mechanisms of circadian clocks,” Les Treilles, France, 9/99.

US–Japan Conference on Biological Clocks, 7/94, 12/97, 12/98.

Keynote Symposium speaker at the Society for Experimental Biology, Canterbury, U.K., 4/97.

Ninth International Symposium on Bioluminescence and Chemiluminescence, Woods Hole, MA, 10/96.

Circadian Light Reception and Regulation, Lyon, France, 5/96.

Invited Symposium Speaker, Japan Society for Plant Physiology Meeting, Kagoshima, Japan, 3/96.

EMBO Workshop on Molecular Chronobiology, Leicester, U.K., 9/92.

Fourth Sapporo Symposium on Biological Rhythms, Sapporo, Japan, 8/91.

Convention of the National Association of Biology Teachers, Nashville, TN, 11/91.

International Conferences on the Cell/Molecular Biology of *Chlamydomonas*, 5/88, 4/90, 5/92.

Cyanobacterial Workshop, San Francisco, CA, 5/93.

Annual Meeting of the Japan Society for General and Comparative Physiology, Hiroshima, Japan, 11/86.

Timberline Symposium on Biological Clocks, July 19, 1984.

Ninth International Congress on Photobiology, July 6, 1984.

MEETING ORGANIZER

Organized and ran the first and second RISER meetings (RISER = Rhythms In SouthEast Region) at Vanderbilt on May 16, 2009 and May 15, 2011, for circadian clock researchers in Tennessee, Kentucky, Georgia, and Missouri.

American Society for Microbiology, organized Symposium on Bacterial Clocks 6/05.

INVITED PRESENTATIONS AT OTHER INSTITUTIONS (including departmental seminars):

Waseda University (Japan), 6/13

Kanazawa University (Japan), 6/13
Hebei Normal University (China), 5/13
Chinese Academy of Sciences (China), 5/13
Cornell University 10/12
University of Memphis 12/11
University of Alabama Birmingham 9/11
UCLA 4/11
Conference in honor of Robert Klevecz, Beckman Institute of City of Hope Hospital 9/10
Stanford University/Hopkins Marine Station 6/09
University of Tennessee-Knoxville 11/08
Northwest University, Xi'an China 6/08
University of Michigan 4/08
University Joseph Fourier in Saint Martin d'Herès, (France) 5/07
University of Leicester (U.K.) 8/06
University of Arizona 7/06
University of Pittsburgh 4/06
Beckman Research Institute of the City of Hope, 3/06
University of North Carolina, 12/05
Mitsubishi Kagaku, Institute of Life Sciences, Japan 6/05
Kitasato Medical School, Japan 6/05
Morehouse Medical School 6/05
FRET Workshop, University of Virginia 3/05
University of Oxford (United Kingdom) 7/04
University of Leicester (United Kingdom) 7/04
University of Cardiff (United Kingdom) 7/04
University of Cambridge (United Kingdom) 6/04
University of Warwick (United Kingdom) 6/04
University of Virginia 5/04
Institute for Systems Biology 3/04
Harvard University 2/04
MBL Microbial Diversity Class, 7/02
Osamu Shimomura Symposium (MBL) 7/02
Tennessee State University 4/02
Ohio State University 3/02
Oregon Health and Science University 3/02
University of Texas 2/02
Washington University 2/02
Baylor Medical School 1/02
Univ. of Alabama at Birmingham 4/2/01
Murray State 4/6/01
Michigan State University 11/15/00
University of Montreal 10/00
Univ. of Barcelona 9/19/00
UCLA 10/99
Johns Hopkins Univ. 1/99
MTSU 11/98

Northeastern Univ. 10/98
Univ. Western Kentucky 11/98
University of Tennessee 9/97
University of Maryland 4/97
University of South Dakota 10/96

RESEARCH INTERESTS:

Circadian Rhythms, Genetics, Human Genetics, Structural Biology, Biophysics, Cell Biology

SERVICE TO THE FIELD OF CHRONOBIOLOGY:

President, Society for Research on Biological Rhythms, 5/12-5/14

Editorial Advisory Board for *Journal of Biological Rhythms*, 1995-present

Informal Associate Editor of *Photochemistry & Photobiology* specializing in clock papers, 1999-2002

Reviewer of manuscripts for other assorted journals including *Science*, *Nature*, *Cell*, *Proc. Natl. Acad. Sci.*, *J. Biological Rhythms*, *EMBO Journal*, *Journal of Biological Chemistry*, *PLoS Biology*, *Nature Structure and Molecular Biology*, *Genes & Development*, *Nature Methods*, *J. Bacteriology*, *Plant Mole. Biol.*, *Photochem. Photobiol.*, *J. Phycology*, *et al.*

Secretary, Society for Research on Biological Rhythms, 5/98-5/00.

Treasurer, Society for Research on Biological Rhythms, 5/96-5/98.

National Institute for Mental Health Workshop on 9/12/96: "Meeting the Future Needs for Neuroscientists and Behavioral Scientists in Mental Health Research"

Ad hoc reviewer for Molecular and Cellular Neurobiology Study Sections for the National Institute for Mental Health

Reviewer of various grants for the National Science Foundation, USDA, USAF, etc.

SERVICE TO VANDERBILT UNIVERSITY:

Investigator, John F. Kennedy Center for Research on Education and Human Development

Member of Vanderbilt Brain Institute

Member of Vanderbilt Institute for Chemical Biology

Member of Vanderbilt-Ingram Cancer Center

Member of Vanderbilt Diabetes Center

Ph.D. Program Faculty, Center for Human Genetics Research 2010-present

Marshall, Vanderbilt Commencement Exercises 2000-2013

Member of Board of Advisors, Vanderbilt University Center for Ethics 2006-2009

Faculty member, Vanderbilt Center for Teaching Advisory Board 2011-present

Member, Institutional Biomedical/Biological Sciences Internal Review Committee for Limited Submission Opportunity (LSO) applications, 2012-present

Member of Vanderbilt Kennedy Center's Planning Committee for VKC Science Day February 28, 2012.

Faculty Search Committees:

Blair School (1991)–Music Theory

Dept. of Biology (1992)–Developmental Biology

Dept. of Biology (1994)–Cell Biology

Dept. of Biology (1997)–Cell Biology (chair of search committee)

Dept. of Biological Sciences (1999)–Neurobiology (chair of search committee)

Dept. of Biological Sciences (2000)–Molecular Genetics

Dept. of Biological Sciences (2001)–Neurobiology

Dept. of Biological Sciences (2003)–Structural Biology

Dept. of Biological Sciences (2004)–Cell Biology

Dept. of Biological Sciences (2007)–Population Biology

Dept. of Biological Sciences (2009)–Developmental Genetics

Chair, Curriculum Committee (Biol. Sci. Dept.), 2002-2009

Lecturer in Vanderbilt Medical School's IGP course, 2002-present

Member, University Calendar Committee, 2005-2009.

Founder's Walk 2004

Lecturer in Vanderbilt Medical School (1991-1999) and Nursing School (1990).

Center for Health Services, Vice-Chair of the Board and Executive Committee (1992-1994, 1996-2000). CHS Board member, 1992-2000.

Alternative Spring Break: Faculty Participant 1989, 1990, 1991, 1992.

Member, Committee on Educational Programs (1995-98)

Parent's Weekend Lecturer: 1992, 1993.

“Raft” Debate: 1992, 1993.