

Curriculum Vitae

JOEL CARTER EISSENBERG

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LABORATORY

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EDUCATION

Ph.D., Genetics (1982) University of North Carolina-Chapel Hill
B.A. (with honors), Microbiology (1977) U. Tennessee-Knoxville

EMPLOYMENT

Professor of Biochemistry and Molecular Biology, Saint Louis University
Medical School, July 2003-present

Adjunct Professor of Pediatrics, Saint Louis University Medical School, July 2003-
present

Visiting Research Associate (sabbatical), Biochemistry and Molecular
Biophysics, Washington University Medical School, January-June 1996

Associate Professor of Biochemistry and Molecular Biology, Saint Louis
University Medical School, July 1993-June 2003

Assistant Professor of Biochemistry and Molecular Biology, Saint Louis
University Medical School, May 1987-June 1993

Monsanto Fellow in Insect Biology, Biology Dept, Washington University,
January 1987-May 1987

NIH Postdoctoral Fellow, Biology Dept, Washington University, 1983-86

Postdoctoral Research Associate (with Professor Sarah C.R. Elgin),
Biology Dept, Washington University, 1982-83

FELLOWSHIPS

Monsanto Fellow in Insect Biology
NIH Postdoctoral Fellow
NIH Predoctoral Trainee

PERSONAL DATA

Birth Date: 25 February 1955
Birthplace: Johnstown, PA
Marital Status: Married (Linda G. Eissenberg, Ph.D.); one child

PROFESSIONAL SOCIETIES

Genetics Society of America
American Genetics Association
American Society for Cell Biology
American Association for the Advancement of Science
American Society of Biochemistry and Molecular Biology

PUBLICATIONS

Research Papers (peer reviewed)

Eissenberg, J.C., and J.C. Lucchesi (1983) Chromatin structure and transcriptional activity of an X-linked heat shock gene in *Drosophila pseudoobscura*. J. Biol. Chem. 258: 13986-13991.

Eissenberg, J.C., and S.C.R. Elgin (1983) Analysis of DNA structural patterns and sequence organization at the larval cuticle locus in *Drosophila melanogaster*. Mol. Cell. Biol. 3: 1724-1729.

Steiner, E.K., **J.C. Eissenberg**, and S.C.R. Elgin (1984) A cytological approach to ordering of events in gene activation using the Sgs-4 locus of *Drosophila melanogaster*. J. Cell Biol. 99: 233-238.

Eissenberg, J.C., D.A. Kimbrell, J.W. Fristrom, and S.C.R. Elgin (1984) Chromatin structure at the 44D larval cuticle gene locus in *Drosophila*: the effect of a transposable element insertion. Nucl. Acids. Res. 12: 9025-9038.

Flick, J.T., **J.C. Eissenberg**, and S.C.R. Elgin (1986) Micrococcal nuclease as a DNA structural probe: Its recognition sequences, their genomic distribution, and correlation with DNA structural determinants. J. Mol. Biol. 190: 619-633.

Eissenberg, J.C., and S.C.R. Elgin (1986) Chromatin structure of a P-element transformed gene in *Drosophila melanogaster*. Mol. Cell. Biol. 6: 4126-4129.

Eissenberg, J.C., and S.C.R. Elgin (1987) *hsp 28^{stl}*: a P-element insertion that alters the expression of a heat shock gene in *Drosophila melanogaster*. Genetics 115: 333-340.

James, T.C., **J.C. Eissenberg**, C. Craig, V. Dietrich, A. Hobson, and S.C.R. Elgin (1989) Distribution patterns of HPI, a heterochromatin-associated chromosomal protein of *Drosophila*. Eur. J. Cell Biol. 50: 170-180.

Eissenberg, J.C., T.C. James, D.M. Foster-Hartnett, T. Hartnett, V. Ngan, and S.C.R. Elgin (1990) Mutation in a heterochromatin-specific chromosomal protein is associated with suppression of position-effect variegation in *Drosophila melanogaster*. Proc. Natl. Acad. Sci. USA, 87: 9923-9927.

Eissenberg, J.C., G.D. Morris, G. Reuter, and T. Hartnett (1992) The heterochromatin-associated protein HP-1 is an essential protein in *Drosophila* with dosage-dependent effects on position-effect variegation. Genetics 131: 345-352.

Powers, J.A., and **J.C. Eissenberg** (1993) Overlapping domains of the heterochromatin-associated protein HP1 mediate nuclear localization and heterochromatin binding. J. Cell Biol. 120: 291-299.

Saunders, W.S., C. Chue, M. Goebel, C. Craig, R.F. Clark, J.A. Powers, **J.C. Eissenberg**, S.C.R. Elgin, N.F. Rothfield, and W.C. Earnshaw (1993) Molecular cloning of a human homologue of *Drosophila* heterochromatin protein HP1 using anticentromere autoantibodies with *anti-chromo* specificity. J. Cell Sci. 104: 573-582.

Eissenberg, J.C., and T. Hartnett (1993) A heat shock-activated cDNA rescues the recessive lethality of mutations in the heterochromatin-associated protein HP1 of *D. melanogaster*. Mol. Gen. Genet. 240: 333-338.

Eissenberg, J.C., Y.-w. Ge, and T. Hartnett (1994) Increased phosphorylation of HP1, a heterochromatin-associated protein of *Drosophila*, is correlated with heterochromatin assembly. J. Biol. Chem. 269: 21315-21321.

Platero, J.S., T. Hartnett and **J.C. Eisenberg** (1995) Functional analysis of the chromodomain of HP1. *EMBO J.* 14: 3977-3986.

Lu, B.Y., C.P. Bishop, and **J.C. Eisenberg** (1996) Developmental timing and tissue specificity of heterochromatin mediated silencing. *EMBO J.* 15: 1323-1332.

*Platero, J.S., E.J. Sharp, P.N. Adler, and **J.C. Eisenberg** (1996) In vivo assay for protein-protein interactions using *Drosophila* chromosomes. *Chromosoma* 140:393-404.

Eisenberg, J.C., R. Ayyagari, X. Gomes, and P.M.J. Burgers (1997) Mutations in yeast PCNA define distinct sites for interaction with DNA polymerase δ and DNA polymerase ϵ . *Mol. Cell. Biol.* 17: 6367-6378.

Lu, B.Y., J. Ma and **J.C. Eisenberg** (1998) Developmental regulation of heterochromatin-mediated gene silencing in *Drosophila*. *Development* 125: 2223-2234.

Zhao, T., and **J. C. Eisenberg** (1999) Phosphorylation of heterochromatin protein 1 by casein kinase II is required for efficient heterochromatin binding in *Drosophila*. *J. Biol. Chem.* 274: 15095-15100.

Lu, B.Y., P. C. R. Emtage, B. J. Duyf, A.J. Hilliker, and **J.C. Eisenberg** (2000) Heterochromatin protein 1 is required for the normal expression of two heterochromatin genes in *Drosophila*. *Genetics* 155: 699-708.

Zhao, T., T. Heyduk, C.D. Allis, and **J.C. Eisenberg** (2000) Heterochromatin protein 1 (HP1) binds to nucleosomes and DNA *in vitro*. *J. Biol. Chem.* 275: 28332-28338.

Ma, J., K.-K. Hwang, H. J. Worman, J.-C. Courvalin, and **J. C. Eisenberg** (2001) Expression and functional analysis of three isoforms of human heterochromatin-associated protein HP1 in *Drosophila*. *Chromosoma* 109: 536-544.

Zhao, T., T. Heyduk, and **J. C. Eisenberg** (2001) Phosphorylation site mutations in heterochromatin protein 1 (HP1) reduce or eliminate silencing activity. *J. Biol. Chem.* 276: 9512-9518.

Hwang, K.-K., **J. C. Eisenberg**[†], and H. J. Worman[†] (2001) Transcriptional repression of euchromatic genes by *Drosophila* heterochromatin protein 1 and histone modifiers. *Proc. Natl. Acad. Sci. USA* 98:11423-11427 ([†]co-corresponding authors)

Jacobs, S.A., S.D. Taverna, Y. Zhang, S.D. Briggs, J. Li, **J.C. Eisenberg**, C.D. Allis, and S. Khorasanizadeh (2001) Specificity of HP1 chromo domain for methylated N-terminus of histone H3. *EMBO J.* 20: 5232-5241.

Gerber, M., J. Ma, K. Dean, **J.C. Eisenberg**[†], and A. Shilatifard[†] (2001) *Drosophila* ELL is associated with actively elongating RNA polymerase II on transcriptionally active sites *in vivo*. *EMBO J.* 20: 6104-6114 ([†]co-corresponding authors)

Eisenberg, J.C.[†], J. Ma, M. A. Gerber, A. C. Christensen, J. A. Kennison, and A. Shilatifard[†] (2002) dELL, an essential RNA polymerase II elongation factor with a general role in development. *Proc. Natl. Acad. Sci. USA* 99:9894-9899 ([†]co-corresponding authors)

Sun, F.-L., K. Haynes, V. Pogacic, C. L. Simpson, S. D. Lee, L. Collins, J. Wuller, **J. C. Eisenberg**, and S. C. R. Elgin (2004) Cis-acting determinants of heterochromatin formation on *Drosophila melanogaster* chromosome four. *Mol. Cell. Biol.* 24: 8210-8220.

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- Gerber, M., **J.C. Eissenberg**, S. Kong, K. Tenney, J. W. Conaway, R. C. Conaway and A. Shilatifard (2004) In vivo requirement of the RNA polymerase II elongation factor Elongin A for proper gene expression and development. *Mol. Cell. Biol.* 24: 9911-9919.
- Gerber, M.A., K. Tenney, J. W. Conaway, R.C. Conaway, **J.C. Eissenberg** and A. Shilatifard (2005) Regulation of heat shock gene expression by RNA polymerase II elongation factor, Elongin A. *J. Biol. Chem.* 280: 4017-4020.
- Eissenberg, J.C.**, M. Wong and J.C. Chrivia (2005) Human SRCAP and *Drosophila melanogaster* DOM are homologs that function in the *Notch* signaling pathway. *Mol. Cell. Biol.* 25: 6559-6569.
- Gerber, M.A., A. Shilatifard and **J.C. Eissenberg** (2005) Mutational analysis of an RNA Polymerase II elongation factor in *Drosophila melanogaster*. *Mol. Cell. Biol.* 25: 7803-7811.
- Dorsett, D., **J.C. Eissenberg**, Z. Misulovin, A. Martens, B. Redding and K. McKim (2005) Effects of sister chromatid cohesion on *cut* gene expression during wing development in *Drosophila*. *Development* 132:4743-4753
- Gause, M., **J.C. Eissenberg**, A.F. MacRae, M. Dorsett, Z. Misulovin and D. Dorsett (2006) Nipped-A, the *Drosophila* Tra 1/TRRAP subunit of the SAGA and Tip60 complex, plays multiple roles in Notch signaling during wing development. *Mol. Cell. Biol.* 26:2347-2359.
- Tenney, K., M. Gerber, A. Ilvarsonn, J. Schneider, M. Gause, D. Dorsett, **J.C. Eissenberg** and A. Shilatifard (2006) *Drosophila* Rtf1 functions in histone methylation, gene expression and *Notch* signaling. *Proc. Natl. Acad. Sci. USA* 103: 11970-11974.
- Gelsthorpe, M.E., Z. Tan, A. Phillips, **J.C. Eissenberg**, A. Miller, J. Wallace and S.I. Tsubota (2006) Regulation of the *Drosophila melanogaster* protein, Enhancer of Rudimentary, by Casein Kinase II. *Genetics* 174:265-270.
- *Camporeale, G., E. Giordano, R. Rendina, J. Zemleni[†], and **J.C. Eissenberg**[†] (2006) *Drosophila* holocarboxylase synthetase is a chromosomal protein required for normal histone biotinylation, gene transcription patterns, lifespan and heat tolerance. *J. Nutr.* 136: 2735-2742. ([†]co-corresponding authors).
- Eissenberg, J.C.**, A. Shilatifard, N. Dorokhov and D.E. Michener (2007) Cdk9 is an essential kinase in *Drosophila* that is required for heat shock gene expression, histone methylation and elongation factor recruitment. *Mol. Genet. Genomics.* 277: 101-114.
- Camporeale, G., J. Zemleni[†], and **J.C. Eissenberg**[†] (2007) Susceptibility to heat stress and aberrant gene expression patterns in holocarboxylase synthetase-deficient *Drosophila melanogaster* are caused by decreased biotinylation of histones, not of carboxylases. *J. Nutr.*, 137: 885-889. ([†]co-corresponding authors)
- Eissenberg, J.C.**, M.G. Lee, J. Schneider, A. Ilvarsonn, R. Sheikhattar and A. Shilatifard (2007) The trithorax-group gene in *Drosophila little imaginal discs* encodes a trimethylated histone H3 Lys4 demethylase. *Nature Struct. Mol. Biol.* 14: 344-346.
- Smith, E.M. J.T. Hoi, **J.C. Eissenberg**, J.D. Shoemaker, W.S. Neckameyer, A.M. Ilvarsonn, L.G. Harshman, V.L. Schlegel, and J. Zemleni (2007) Feeding *Drosophila* a biotin-deficient diet for multiple generations increases stress resistance and lifespan and alters gene expression and histone biotinylation patterns. *J. Nutr.* 137: 2006–2012.
- Gause, M., H. A Webber, Z. Misulovin, G. Haller, R.A. Rollins, **J.C. Eissenberg**, S.E. Bickel and D. Dorsett (2008) Functional links between *Drosophila* Nipped-B and cohesin in somatic and meiotic cells.

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Chromosoma 117:51-66.

Smith, E.R., M.G. Lee, B. Winter, N.M. Droz, **J.C. Eissenberg**, R. Shiekhattar and A. Shilatifard (2008) *Drosophila* UTX is a histone H3 Lys27 demethylase that co-localizes with the elongating form of RNA polymerase II. *Mol. Cell. Biol.* 28:1041-1046.

Smith, E.R., B. Winter, **J.C. Eissenberg** and A. Shilatifard (2008) Regulation of the transcriptional activity of the poised RNA Polymerase II by the elongation factor ELL. *Proc. Natl. Acad. Sci. USA*, in press.

Chew, Y.C., J.T. West, S.J. Kratzer, A.M. Ilvarsonn, **J.C. Eissenberg**, B.J. Dave, D. Klinkebiel, J.K. Christman and J. Zemleni (2008) A diet-dependent epigenetic mechanism that represses transposable elements. Manuscript submitted.

Invited Reviews

Eissenberg, J.C., I.L. Cartwright, G.H. Thomas, and S.C.R. Elgin (1985) Selected topics in chromatin structure. *Ann. Rev. Genet.* 19: 485-536.

***Eissenberg, J.C.** (1989) Position effect variegation in *Drosophila*: Towards a genetics of chromatin assembly. *BioEssays* 11: 14-17.

Eissenberg, J.C., and S.C.R. Elgin (1991) Boundary functions in the control of gene expression. *Trends Genet.* 7: 335-340.

Lu, B.Y., and **J.C. Eissenberg** (1998) Time out: developmental regulation of heterochromatic silencing in *Drosophila*. *Cell. Mol. Life Sci.* 54: 50-59.

***Eissenberg, J.C.**, and S.C.R. Elgin (2000) The HP1 protein family: getting a grip on chromatin. *Curr Op. Genet. Dev.* 10: 204-210.

Eissenberg, J.C., and A.J. Hilliker (2000) Versatility of conviction: heterochromatin as both a silencer and activator of transcription. *Genetica* 109: 19-24.

Eissenberg, J.C. (2001) Decisive factors: a transcription activator can overcome heterochromatin silencing. *BioEssays* 23: 767-771.

Eissenberg, J.C. (2001) Molecular biology of the chromo domain: an ancient chromatin module comes of age. *Gene* 275: 19-29.

Eissenberg, J.C., and L. L. Wallrath (2003) Heterochromatin, position effects, and the genetic dissection of chromatin. *Prog. Nucl. Acid Res. Mol. Biol.* 74: 275-299.

Eissenberg, J.C., and S.C.R. Elgin (2005) Antagonizing the neighbours. *Nature* 438: 1090- 1091.

Eissenberg, J.C., and S.C.R. Elgin (2006) Marking time. *Nature Genet.* 38: 276-277.

***Eissenberg, J.C.**, and A. Shilatifard (2006) Leaving a mark: the many footprints of elongating RNA Polymerase. *Curr. Op. Genet. Dev.* 16: 184-190.

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Eissenberg, J.C. (2006) Divided loyalties: transdetermination and the genetics of tissue regeneration. *BioEssays* 28:574-577.

Eissenberg, J.C., and G. Reuter (2008) Cellular mechanism for targeting heterochromatin formation in *Drosophila*. *Int. Rev. Cyt.*, manuscript in preparation.

Book chapters, short reports, book reviews, correspondence

Eissenberg, J.C., and J.C. Lucchesi (1982) Chromatin structure and dosage-compensated heat-shock genes in *Drosophila pseudoobscura*. In: "Heat Shock, from Bacteria to Man", M.J. Schlesinger, M. Ashburner, and A. Tissieres, eds. (Cold Spring Harbor Lab., New York) pp. 109-113.

Elgin, S.C.R., S.A. Amero, **J.C. Eissenberg**, G. Fleischmann, D.S. Gilmour, and T.C. James (1988) Distribution pattern of non-histone chromosomal proteins on polytene chromosomes: functional correlations. *Stadler Genetics Symp.* 18, J.P. Gustafson, R. Appels, R. Kaufman, eds. (Plenum, New York) pp. 145-156.

Eissenberg, J.C., and J.S. Ryerse (1991) *ey-2*: a recessive eyeless mutation on the second chromosome of *Drosophila melanogaster*. *Dros. Inf. Serv.* 70: 266-268.

Eissenberg, J.C. (1993) The Lazarus technique, or, Recombinant molecules back from the dead. *Focus* 15: 53-54.

Eissenberg, J.C., S.C.R. Elgin, and R. Paro (1995) Epigenetic Regulation in *Drosophila*: A conspiracy of silence. In: "Chromatin Structure and Gene Expression", S.C.R. Elgin, ed. (IRL Press: Oxford), pp.147-171.

White, R.J., **J.C. Eissenberg**, and W.S. Stark (1997) Eye color mosaicism in ocelli in variegating lines of *Drosophila melanogaster*. *Dros. Inf. Serv.* 80: 13-14.

Rudolph, T., B. Lu, T. Westphal, J. Szidonya, **J. Eissenberg**, and G. Reuter. (1999) New type of CyO and TM3 green balancers. *Dros. Inf. Serv.* 82: 99-100.

Eissenberg, J.C., S.C.R. Elgin, and R. Paro (2000) Epigenetic Regulation in *Drosophila*: unravelling the conspiracy of silence. In: "Chromatin Structure and Gene Expression, 2nd ed", J. L. Workman and S.C.R. Elgin, eds. (IRL Press: Oxford), pp. 228-251.

Eissenberg, J.C., and A.J. Hilliker (2000) Shedding new light on the dark corners of the nucleus. *Genetica* 109: 3-6.

Henikoff, S., **J.C. Eissenberg**, A.J. Hilliker, E.R. Schmidt, and L.L. Wallrath (2000) Reaching for new heights. *Genetica* 109:7-8.

Eissenberg, J.C., and S.C.R. Elgin (2001) Heterochromatin/euchromatin: alternative packaging in the nucleus. In: *Encyclopedia of Life Sciences*. London: Nature Publishing Group. <http://www.els.net/els/els/els/index.html?sessionId=fcddc65a0676e96f>

Eissenberg, J.C. (2002) Reply to Martin. *BioEssays* 24: 103.

Eissenberg, J.C. and S. Khorasanizadeh (2005) Chromo and Chromo Shadow Domains. In: "Structure and Function of Modular Protein Domains" G. Cesareni, M. Gimona, M. Sudoi and M. Yaffe, eds. (Wiley VCH), pp. 241-255.

Eissenberg, J.C. (2006) Functional genomics of histone modification and non-histone chromosomal proteins using the polytene chromosomes of *Drosophila*. *Methods* 40:360-364.

Eissenberg, J.C. (2007) Looking beyond genetics. *BioEssays* 29:609-610.

GRANT SUPPORT	2007	Supplement to "Genetic role of histone biotinylation" NSF grant MCB 0724501 Total direct costs: \$4,500 PI: Eissenberg (Co-PI: J. Zemleni)
	2006-2009	"Genetic role of histone biotinylation" NSF grant MCB 0615831 Total direct costs: \$355,102 PI: Eissenberg (Co-PI: J. Zemleni)
	2002-2005	"Functional Analysis of a Transcription Elongation Factor" NSF grant MCB 0131414 Total direct costs: \$326,224 PI: Eissenberg (Co-PI: A. Shilatifard)
	2001-2002	"Molecular Genetics of a Drosophila Transcription Elongation Factor" SLU2000 Designated Research Fund Total costs: \$8,651 PI: Eissenberg
	1998-2001	"Mechanism of Epigenetic Regulation in Drosophila" NIH grant R55 GM57005 (Shannon Award) Total direct costs: \$80,000 PI: Eissenberg
	1997-1998	"The functional significance of the Su(var)3-9 chromo domain in chromatin targeting and gene silencing" Howard Hughes Medical Institute Research Training Fellowship for Medical Students (support for Mr. Richard C. Bell) Total costs: \$26,000
	1995-1998	"Control of Heterochromatic Gene Silencing" NSF Grant MCB 9506103 Total direct costs: \$206,274 PI: Eissenberg
	1993-1995	"Molecular Genetics of Heterochromatic Position-Effects" American Cancer Society Grant DB-55 Total direct costs: \$144,000 PI: Eissenberg
	1989-1993	"Molecular Cytogenetics of Heterochromatin" NIH grant R01 GM40732 Total direct costs: \$326,385 PI: Eissenberg
	1989	"Molecular Biology of a Heterochromatin Protein Involved in Heterochromatic Position Effects" American Cancer Society Institutional Grant IN-124 Total costs: \$6,000 PI: Eissenberg
	1987-1988	"Molecular Genetics of Heterochromatin"

Biomedical Research Support Grant
Total costs: \$18,000
PI: Eissenberg