

**MICHAEL WILLIAM KLYMKOWSKY**  
Molecular, Cellular and Developmental Biology  
University of Colorado Boulder, Boulder, Colorado 80309-0347

T: 303.492.8508 F: 303.492.7744 E: [michael.klymkowsky@colorado.edu](mailto:michael.klymkowsky@colorado.edu)  
lab web site <http://klymkowskylab.colorado.edu>  
orcid: <http://orcid.org/0000-0001-5816-9771>

#### **EDUCATION:**

Ph.D., Biophysics, California Institute of Technology, 1980.  
B.S., Biophysics with high distinction, The Pennsylvania State University. 1974.

#### **ACADEMIC POSITIONS:**

Professor, 1996 - present. Molecular, Cellular & Developmental Biology  
University of Colorado, Boulder  
Visiting Professor, Science Education ETH Zurich, Switzerland  
(February 2013-July 2013, May 2019)  
Co-director, CU Teach science and mathematics teacher preparation program, initially  
funded by the National Mathematics and Sciences Institute and UC Boulder.  
now member of CU Teach advisory board (2019-present)  
Fellow, Center for the Study of Origins (2016-present),  
Founding Fellow and member of the Project Management Team, Center for STEM  
Learning, UC Boulder (2010-present)  
Associate Professor, 1990 - 1996. Molecular, Cellular & Developmental Biology  
University of Colorado, Boulder  
Assistant Professor, 1983 - 1990. Molecular, Cellular & Developmental Biology  
Post-doctoral Fellow with Lee L. Rubin, Ph.D. 1982 - 1983.  
The Rockefeller University, New York, New York.  
Post-doctoral Fellow with Dr. Martin C. Raff, MD 1980 - 1982. Medical Research  
Council Neuroimmunology Project, University College London  
Ph.D. Thesis with Robert M. Stroud, Ph.D. CalTech/UCSF 1975-1980.  
Undergraduate Research with Wallace Snipes & Alec Keith, Penn. State. 1973-1974.

#### **OTHER ACTIVITIES:**

Consultant, Soomo Learning, LLC 2021- current  
Editorial Board, PLoS One, 2010-present.  
Consultant, beSocratic project 2010-present Michigan State University  
ASSETT Fellow, UC Boulder 2019-2020.  
Faculty of 1000 (now [Faculty Opinions](#)), 2011-present.  
Project Team Participant (with Michael Stowell), Development of MCDB 1234 -  
Undergraduate Skills Center Project  
College of Arts and Sciences Promotion and Tenure committee, 2018-2021  
University of Colorado Boulder Open Education Resource exploratory committee  
2019-2020 (Open Education Ambassador)  
Visiting Faculty, ETH Zurich 2013, 2015, 2016, 2019  
Consultant, Middle High School pre-AP Biology Curriculum Project, College Board.  
2014-2015.

## OTHER ACTIVITIES, Continued

Reviewer, 2014 for NRC report "Reaching Students: What research says about Effective instruction in Undergraduate Science and Engineering.  
Member, American Society for Biochemistry and Molecular Biology Public Outreach Committee, 2011-2018  
Member, Academic Futures Committee – UC Boulder, 2018  
Member, Advisory Board Misconceptions Oriented Standards-based Assessment Resource for Teachers of High School Life Science (MOSART-HSLs) NSF DRL-1316645 (2013-2015)  
Consultant on education, evaluateSCIENCE AG, Hardturmstrasse 66, CH-8005 Zürich (August 2013)  
Program reviewer, Austrian Academy of Sciences (June 2012)  
Frequent Contributor, MadScientist Network (<http://www.madsci.org/>)  
Editorial Board, "Differentiation" 2003- 2010  
Editorial Board, "Cell Communication & Adhesion" 2001- 2010  
Editorial Board, "Cell Motility & the Cytoskeleton" 2001- 2009  
Editorial Board, "The Dynamic Cell - A CD-ROM", Springer-Verlag (1996-2000).  
Reviewer, NIH, NSF, ACS study section review panels  
Consultant for Knowledge Factor, Inc. Lafayette, CO. (2003)  
Consultant for Ontogeny, Inc. Cambridge, MA. (1999-2006)  
Consultant for Molecular Cell Biology Web Site, W.H. Freeman, publishers.(1999-2002).  
Founder, virtuallaboratory.net, inc. 1999-present (A Colorado Company)

## FELLOWSHIPS, AWARDS, HONORS:

Pennwalt Foundation Scholarship, Pennsylvania State University, 1971-1974  
Elected Phi Beta Kappa/Sigma Chi, 1974.  
Muscular Dystrophy Association Post-doctoral Fellow,  
University College London & The Rockefeller University, 1980 - 1983.  
NIH National Research Service Award/National Institute of Neurological & Communicative Disorders & Stroke. The Rockefeller University, 1983.  
Basil O'Conner Start-Up Award / March of Dimes Foundation. 1984-1986  
Pew Biomedical Scholar. 1985-1991.  
Co-Chair (1994) & Chair (1996) - Gordon Conference on Intermediate Filaments.  
Co-Chair (with J.L. Maller) 6th International Xenopus Meeting (1996).  
Co-organizer, Southwest Regional meeting of the Society for Developmental Biology, October, 2005.  
John Doctor Award, best poster in education, Society for Developmental Biology, 2006 Annual meeting.  
Mortar Board Teaching Award, UC Boulder, 2007  
Elected fellow, American Association for the Advancement of Science, 2008  
Best Should Teach Award, UC Boulder, 2009.  
2013 **Outstanding Undergraduate Science Teaching Award (2013)** from Society for College Science Teachers / National Science Teachers Association  
Discussant, Physics and Biology Education Gordon Conference, 2014.  
2014 **Boulder Faculty Assembly Teaching Excellence Award.**  
2023 Faculty Member of the Year Award for Developmental Biology, Faculty Opinion.

## **Current Funding:**

"Generating and analysis of vimentin-null human iPS Cells". Core Facility Voucher Program (CFVP FY21). \$5K. Direct cost. June 2021 to May 2023

"Developing Learning Environments that Support Molecular-level Sense making". Agency: NSF-DRL PI. Ryan Stowe and others (Michigan State University) (15 June 2019-31 May 2023) - consultant.

## **Submissions planned or pending or recently submitted:**

NSF IUSE Proposal: 2216309 Submitted 19 January 2022.  
Title: Building disciplinary literacy through socratic exchanges"Building" NSF IUSE-ESL \$300,000 requested, M.W. Klymkowsky (PI) Ann Riedl (co-PI). Submitted January 2022 - not funded.

Developing Learning Environments that Support Molecular-level Sense making E. Pls. P. Foltz, D. Caccamise and others (Klymkowsky - coPI). submitted in October 2021 - not funded.

## **Recently completed**

CU Chancellor's Award: "Evaluation of learning outcomes: comparing a introductory and discovery lab courses in MCDB." total \$10,000 (2016-2019)

"Collaborative Research: Organic Chemistry, Life, the Universe and Everything (OCLUE)", Agency: NSF DUE-1502552. M.M. Cooper, PI, M.W. Klymkowsky, Co-PI. (1 September 2015-31 August 2019) \$250,000.

"Patterns of Wnt and Hedgehog signaling in human iPSC-derived euploid and trisomic 21 cerebral organoids. Linda Crnic Institute 1 April 2016 -31 March 2017. M.W. Klymkowsky, P.I. \$50,000 direct cost.

"BeSocratic: A Free-form, Interactive System to Investigate the Development of Representational Competence" TUES Co-PI: Michael W. Klymkowsky, Ph.D. (PI Melanie Cooper) Agency: National Science Foundation 10/1/11 9/30/16 - \$550,000

"Chemistry and the Logic of Life" Co-PI: Michael W. Klymkowsky, Ph.D. Agency: National Science Foundation (1 Sept. 2008 - 31 July 2013)(DUE 0816692). The goal of this project is to develop text, interactive materials, and assessments for a novel, research informed introductory approach to general chemistry. (\$500,000 total)

Principle Collaborator on supplement to Mark Winey's NIH grant (3R01GM074746 - 06W1) for studies on centrin and other basal body and centrosomal protein's developmental roles using the *Xenopus* embryo. 1 June 2012- 30 May 2015.

"Creating a Common Thermodynamics" DUE 1122818 Co-PI Michael W. Klymkowsky (PI Edward Redish) Agency: National Science Foundation. (end 31 Aug. 2014). The goal of this project is to develop materials for a physics course dealing with topics of particular relevance to biological sciences, specifically Thermodynamics and Statistical Mechanics. (\$600,000 total).

**Blog Posts for the Public Library of Science (PLoS)** - now moved to [bioliteracy.blog](http://bioliteracy.blog)  
Science Education site: <https://blogs.plos.org/scied/> (see below)

## OPEN EDUCATIONAL RESOURCES (OER)

- Biofundamentals 2.0: Klymkowsky & Cooper.  
<https://open.umn.edu/opentextbooks/textbooks/350>  
<http://uilis.unsyiah.ac.id/oer/items/show/564>  
[https://bio.libretexts.org/Bookshelves/Cell\\_and\\_Molecular\\_Biology/Book:\\_Biofundamentals\\_\(Klymkowsky\\_and\\_Cooper\)](https://bio.libretexts.org/Bookshelves/Cell_and_Molecular_Biology/Book:_Biofundamentals_(Klymkowsky_and_Cooper))
- Chemistry, Life, the Universe & Everything. Cooper and Klymkowsky.  
<https://oer.tamtu.edu/itemRecord.php?id=713>  
<https://open.umn.edu/opentextbooks/textbooks/823>  
<https://openbooks.lib.msu.edu/clue/>
- Organic CLUE. Cooper and Klymkowsky  
<https://openbooks.lib.msu.edu/oclue/>  
[https://chem.libretexts.org/Bookshelves/Organic\\_Chemistry/OCLUE:\\_Organic\\_Chemistry\\_Life\\_the\\_Universe\\_and\\_Everything\\_\(Cooper\\_and\\_Klymkowsky\)](https://chem.libretexts.org/Bookshelves/Organic_Chemistry/OCLUE:_Organic_Chemistry_Life_the_Universe_and_Everything_(Cooper_and_Klymkowsky))

**Research Publications: ORCID ID: 0000-0001-5816-9771**

**note:** PUBMED indexed publications are numbered  
all other publications indicated by "-")

1. Cupp, J., M.W. Klymkowski (sic), J. Sands, A. Keith, & W. Snipes. 1975. Effect of lipid alkyl chain perturbations on the assembly of bacteriophage PM2. *Bioch. Biophys. Act* **389**: 345-57.
2. Ross, M.J., M.W. Klymkowsky, D.A. Agard & R.M. Stroud. 1977. Structural studies of a membrane-bound acetylcholine receptor from *Torpedo californica*. *J. Mol. Biol.* **116**:635-59.
3. Klymkowsky, M.W. & R.M. Stroud. 1979. Immunospecific identification and three-dimensional structure of a membrane-bound acetylcholine receptor from *Torpedo californica*. *J. Mol. Biol.* **128**: 319-334.
4. Klymkowsky, M.W., J.E. Heuser & R.M. Stroud. 1980. Protease effects on the structure of acetylcholine receptor membranes from *Torpedo californica* electroplaques. *J. Cell Biol.* **85**: 823-838.
5. Klymkowsky, M.W. 1981. Intermediate filaments in 3T3 cells collapse after the intracellular injection of a monoclonal anti-intermediate filament antibody. *Nature* **291**: 248-251.
6. Kistler, J., R.M. Stroud, M.W. Klymkowsky, R. LaLancette & R.H. Fairclough. 1982. Structure and function of an acetylcholine receptor. *Biophys. J.* **37**: 371-383.
7. Lane, E.B. & M.W. Klymkowsky. 1982. Epithelial tonofilaments: investigating their form and function using monoclonal antibodies. *Cold Spring Harbor Symp. Quant. Biol.* **46**: 387-402.
8. Klymkowsky, M.W. 1982. Vimentin and keratin intermediate filament systems in culture PtK<sub>2</sub> epithelial cells are interrelated. *EMBO J.* **1**: 161-165.

9. Klymkowsky, M.W., R.H. Miller & E.B. Lane. 1983. Morphology, behavior, and interaction of cultured epithelial cells after the antibody-induced disruption of keratin filament organization. *J. Cell Biol.* **96**: 494-506.
10. Klymkowsky, M.W. & D.J. Plummer. 1985. Giant axonal neuropathy: A conditional mutation affecting cytoskeletal organization. *J. Cell Biol.* **100**: 245-250.
11. Rubin LL, Chalfin NA, Adamo A, & M.W. Klymkowsky. 1985. [Cellular and secreted forms of acetylcholinesterase in mouse muscle cultures.](#) *J Neurochem.* **45**:1932-40
- Carroll, S.B., P.D. Riley, M.W. Klymkowsky, J. Van Blerkom, J. Stewart & M.P. Scott. 1986. Localization of homoeodomain-containing proteins using antibodies against synthetic oligopeptides. in *Gametogenesis & the Early Embryo.* pp.257-270. Alan R. Liss.
12. Klymkowsky, M.W., L.M. Maynell & A.G. Polson. 1987. Polar asymmetry in the organization of the cortical cytokeratin system of *Xenopus laevis* oocytes & embryos. *Development.* **100**: 543-557.
- Chu, D. & M.W. Klymkowsky. 1987. Experimental analysis of cytoskeletal function in early *Xenopus laevis* embryos. in *First Int. Symp. Cytoskeleton & Development.* ICSU press.8: 140-142.
- Klymkowsky, M.W., E. Christian, R.G. Ham, D.J. Plummer & F. Sprenger. 1988. Giant axonal neuropathy, intermediate filaments and cellular metabolism. in *Intrinsic Determinants of Neuronal Form.* Alan R. Liss, Inc., pp. 441-459.
13. Murti KG, Goorha R, & Klymkowsky MW. 1988. [A functional role for intermediate filaments in the formation of frog virus 3 assembly sites.](#) *Virology.* 162:264-9.
14. Klymkowsky, M.W. 1988. Metabolic inhibitors and intermediate filament organization in cultured human fibroblasts. *Exp. Cell Res.* **174**: 282-290.
- Dent, J.A. & M.W. Klymkowsky. 1989. Whole-mount analyses of cytoskeletal reorganization & function during oogenesis and early embryogenesis in *Xenopus*. in *The Cell Biology of Fertilization.* H. Schatten & G. Schatten, eds. *Monographs in Cell Biology.* Academic Press. pp. 63-103.
15. Dent, J.A., A.G. Polson & M.W. Klymkowsky. 1989. A whole-mount immunocytochemical analysis of the expression of the intermediate filament protein vimentin in *Xenopus*. *Development* **105**: 61-74.
16. Klymkowsky, M.W., J.B. Bachant & A. Domingo. 1989. Functions of intermediate filaments. *Cell Motil. Cytoskeleton.* **14**: 309-331.
17. Klymkowsky, M.W. & L.A. Maynell. 1989. MPF-induced breakdown of cytokeratin filament organization in the maturing *Xenopus* oocyte depends upon the translation of maternal mRNAs. *Devel. Biol.* **134**: 479-485.
18. Chu, D.T.W. & M.W. Klymkowsky. 1989. The appearance of acetylated  $\alpha$ -tubulin during early development and differentiation in *Xenopus*. *Devel. Biol.* **136**: 104-117.
19. Marazzi G, Bard F, Klymkowsky MW, & L.L. Rubin. 1989. [Microinjection of a monoclonal antibody against a 37-kD protein \(tropomyosin 2\) prevents the formation of new acetylcholine receptor clusters.](#) *J Cell Biol.* **109**:2337-44.
- Kay, B.K., J.P. Evans, E.C. Stephenson, M.L. King, M.W. Klymkowsky, D.L. Gard, J.M. Holy, R.P. Elinson, S. Strome & E.C. Raff. 1991. The cytoskeletons of gametes, eggs, & early embryos. in *Cell-cell interactions in early development.* *Soc. Devel. Biol. Symp.* 297-319.
20. Klymkowsky, M.W., L.A. Maynell & C. Nislow. 1991. Cytokeratin phosphorylation, cytokeratin filament severing, and the solubilization of the maternal mRNA Vg1. *J. Cell Biol.* **114**: 787-797.
21. Klymkowsky MW. 1991. [Intermediate filaments. Getting under the skin.](#) *Nature.* **354**:264.

22. Klymkowsky, M.W. & J. Hanken. 1991. Whole-mount staining of *Xenopus* and other vertebrates. in *Xenopus laevis: Practical uses in cell and molecular biology*. B.K. Kay & H.B. Peng, eds. *Meth. Cell Biol.* **36**: 413-435. Academic Press.
23. Maynell, L., K.A. Kirkegaard & M.W. Klymkowsky. 1992. Brefeldin A inhibits poliovirus RNA synthesis. *J. Virol.* **66**: 1985-1994.
24. Klymkowsky, M.W., D.R. Shook & L.A. Maynell. 1992. Evidence that the deep keratin filament system of the *Xenopus* embryo acts to ensure normal gastrulation. *Proc. Natl. Acad. Sci. USA* **89**: 8736-8740.
25. Dent JA, Cary RB, Bachant JB, Domingo A, & M.W. Klymkowsky. 1992. [Host cell factors controlling vimentin organization in the \*Xenopus\* oocyte](#). *J Cell Biol.* **119**:855-66.
26. Hanken J, Klymkowsky MW, Summers CH, Seufert DW & N. Ingebrigtsen. 1992. [Cranial ontogeny in the direct-developing frog, \*Eleutherodactylus coqui\* \(Anura: Leptodactylidae\), analyzed using whole-mount immunohistochemistry](#). *J. Morphol.* **211**:95-118.
27. Klymkowsky, M.W. & A. Karnovsky. 1994. Morphogenesis and the cytoskeleton: Studies of the *Xenopus* embryo. *Devel. Biol.* **126** 372-384.
28. Seufert DW, Hanken J, & M.W. Klymkowsky. 1994. [Type II collagen distribution during cranial development in \*Xenopus laevis\*](#). *Anat Embryol (Berl)*. **189**:81-9.
29. Cary, R.B. & M.W. Klymkowsky. 1994a. Desmin organization during the differentiation of the dorsal myotome in *Xenopus laevis*. *Differentiation*, **56**:31-38.
30. Cary, R.B. & M.W. Klymkowsky. 1994b. Differential organization of desmin and vimentin in muscle is due to differences in their head domains. *J. Cell Biol.*, **126**: 445-456.
31. Doedens J, Maynell LA, Klymkowsky MW, & K. Kirkegaard. 1994. [Secretory pathway function, but not cytoskeletal integrity, is required in poliovirus infection](#). *Arch Virol Suppl*; **9**:159-72.
32. Cary RB, Klymkowsky MW, Evans RM, Domingo A, Dent JA, & L.E. Backhus 1994. [Vimentin's tail interacts with actin-containing structures in vivo](#). *J Cell Sci.* **107**:1609-22.
33. Cary, R.B. & M.W. Klymkowsky. 1995. Disruption of intermediate filament organization leads to structural defects at the intersomite junction in *Xenopus* myotomal muscle. *Development*, **121**: 1041-1052.
- Klymkowsky, M.W. & R.M. Evans. 1995. Intermediate filaments in human pathology. in *Principals of Medical Biology*. E.E. Bittar and N. Bittar, editors. JAI Press, Inc. pp. 147-186.
34. Karnovsky, A. & M.W. Klymkowsky. 1995. Anterior axis duplication in *Xenopus* induced by the over-expression of the cadherin-binding proteins plakoglobin. *Proc. Natl. Acad. Sci. USA* , **92**: 4522-4526.
35. Klymkowsky, M.W. 1995. Intermediate filaments: new proteins, some answers, more questions. *Curr. Op. in Cell Biol.* **7**: 46-54.
36. Klymkowsky, M.W. & B. Parr. 1995. The body language of cells: the intimate connection between cell adhesion and behavior. *Cell* **83**:5-8.
37. Bachant, J.B. & M.W. Klymkowsky. 1996. A non-tetrameric species is the major soluble form of keratin in *Xenopus* oocytes and rabbit reticulocyte lysates. *J. Cell Biol.*, **132**: 153-165.
38. Klymkowsky, M.W. 1996. Intermediate filaments as dynamic structures. in *Intermediate filaments and cancer*, edited by Mary Hendrix, *Cancer and Metastasis Reviews* **15**: 417-428.
- Klymkowsky, M.W. 1997. Minireviews, minidogmas, and mythinformation. *Bioessays*, **19**: 537-539.
39. Merriam, J., A. Rubenstein & M.W. Klymkowsky. 1997. Cytoplasmically-anchored plakoglobin induces a WNT-like phenotype in *Xenopus*. *Devel. Biol.*, **185**: 67-81.

40. Rubenstein, A., J. Merriam & M.W. Klymkowsky. 1997. Localizing the adhesive and signaling junctions of plakoglobin. *Dev. Genet.* **20**: 91-102.
41. Hanken J, Klymkowsky MW, Alley KE, & D.H. Jennings DH. 1997. [Jaw muscle development as evidence for embryonic repatterning in direct-developing frogs.](#) *Proc Biol Sci.* **264**:1349-54.
42. Kofron M, Spagnuolo A, Klymkowsky M, Wylie C, Heasman J. 1997. [The roles of maternal alpha-catenin and plakoglobin in the early Xenopus embryo.](#) *Development.* **124**:1553-60.
- Gelderloos, J.A., L.L. Witcher, P. Cowin & M.W. Klymkowsky. 1997. Plakoglobin: the other ARM of vertebrates, in *Cell Adhesion & Intracellular Signaling*, P. Cowin & M.W. Klymkowsky, eds. Landes Bioscience, 13-30.
- Bachant, J.B. & M.W. Klymkowsky. 1997. Injection of Xenopus oocytes and embryos. in *Cells: A laboratory Manual*, ed. D.L. Spector, R. Goldman & L.A. Leinwand, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY11803. Volume 2, pp 84.1-84.7.
43. Gard, D.L. & M.W. Klymkowsky. 1998. Intermediate filaments in the Xenopus oocytes and early embryo, in *Subcellular Biochemistry 31:Intermediate filaments*, H. Herrmann, ed. Plenum., pp. 35-70.
- Carl, T. & M.W. Klymkowsky. 1999. Whole-mount visualization of endogenous and exogenous proteins in Xenopus and other organisms. in "A comparative methods approach to the study of oocytes and embryos. *Advances in Molecular Biology Series.*, J. Richter, Ed. Oxford University Press, New York. pp. 291-315.
44. Klymkowsky MW.1999. [Plakophilin, armadillo repeats, and nuclear localization.](#) *Microsc Res Tech.* **45**:43-54.
45. Carl, T.F., C. Dufton, J. Hanken & M.W. Klymkowsky. 1999. Inhibition of neural crest migration in Xenopus using anti-sense-Slug RNA. *Devel. Biol.* **213**:101-115.
46. Klymkowsky, M.W., B.O. Williams, G.D. Barish, H.E. Varmus & Y.E. Vourgourakis. 1999. Analysis of membrane-anchored plakoglobins reveals multiple mechanisms of action in Wnt signaling. *Mol. Biol., of the Cell*, **10**: 3151- 3169.
47. Zorn, A.M., G. Barish, B.O. Williams., P. Lavender, M. W. Klymkowsky\* & H E. Varmus\*. 1999. Regulation of Wnt signaling by a SOX protein: XSOX17a/β and XSox3 physically interact β-catenin. *Molecular Cell*, **4**:487-498. (\*equal contribution).
48. Klymkowsky, M.W. 1999. Weaving a tangled web: the interconnected cytoskeleton. *Nature Cell Biology*, **1**:121-123.
- Carl, T.F., Y. Vourgourakis, M. W. Klymkowsky & J. Hanken. 2000. Green fluorescent protein used to assess cranial neural crest derivatives in the frog, *Xenopus laevis*. in "*Regulatory Processes in Development: The Legacy of Sven Horstadius*". Editors: C.-O.Jacobson, L. Olsson, & T. Laurent. Portland press. Pp.167-172.
49. Williams, B.O., G.D. Barish, M. W. Klymkowsky & H. E. Varmus. 2000 A comparative evaluation of β-catenin and Plakoglobin Signaling Activity. *Oncogene.* **19**:5720-8.
50. St. Amand, A. & M.W. Klymkowsky. 2001. Cadherins and catenins, Wnts and SOXs: embryonic patterning in Xenopus. *Int. Rev. Cytol.* **203**:291-355.
- Klymkowsky, M.W. 2001. Selling cellular gels. A review of Gerald Pollack's *Cells, Gels and the Engines of Life.* *Nature Cell Biology*.3:E213.
51. Hanken J, Carl TF, Richardson MK, Olsson L, Schlosser G, Osabutey CK, & M.W. Klymkowsky. 2001. [Limb development in a "nonmodel" vertebrate, the direct-developing frog Eleutherodactylus coqui.](#) *J Exp Zool.* **291**:375-88.
52. Schweitzer SC, Klymkowsky MW, Bellin RM, Robson RM, Capetanaki Y, & R.M. Evans. 2001. [Paranemin and the organization of desmin filament networks.](#) *J Cell Sci.* **114**:1079-89.

53. Haubold K, Herrmann H, Langer SJ, Evans RM, Leinwand LA, & M.W. Klymkowsky. 2003. [Acute effects of desmin mutations on cytoskeletal and cellular integrity in cardiac myocytes](#). *Cell Motil Cytoskeleton*. **54**:105-21.
54. Klymkowsky, M.W., K. Garvin-Doxas & M. Zeilik. 2003. Bioliteracy & Teaching Efficacy: What Biologists can Learn from Physicists. *Cell Biol. Education*, **2**:155-161.
55. Zhang, C., T. Basta, E. Jensen & M.W. Klymkowsky. 2003. The  $\beta$ -catenin/VegT-regulated early zygotic gene Xnr5 is a direct target of SOX3 regulation. *Development*, **130**: 5609-5624.
56. Fawcett, S.R. & M.W. Klymkowsky. 2004 Expression of the SOX7 transcription factor during *Xenopus laevis* embryonic development. *Gene Expression Report*. **4**: 29-33.
57. Zhang, C., T. Basta, A.-L. Hernandez, P. Simpson, D. Stemple, K.B. Artinger & M.W. Klymkowsky. 2004. Repression of nodal expression by maternal B1-type SOX regulates of germ layer formation in *Xenopus* and Zebrafish. *Devel. Biol.*, **273**: 23-37.
58. Zhang, C., T. Basta, S.R. Fawcett & M.W. Klymkowsky. 2005. SOX7 is an immediate-early target of VegT and regulates Nodal-related gene expression in *Xenopus*. *Devel. Biol*, **278**: 526-541.
59. Zhang, C., T. Basta, & M.W. Klymkowsky. 2005. SOX7 and SOX18 are essential for cardiogenesis in *Xenopus*. *Dev. Dynamics*. **234**:878-891.
60. Klymkowsky, M.W. 2005.  $\beta$ -catenin and its regulatory network. *Hum. Path.* **36**:225-227.
61. Klymkowsky, M.W. 2005. Points of view: content versus process: is this a fair choice? Can nonmajors courses lead to biological literacy? Do majors courses do any better? *CBE Life Science Education*. **4**:196-198.
- Klymkowsky, M.W. 2005. Wnt signaling networks and embryonic patterning. In: Savagner P, ed. *Rise and fall of epithelial phenotype*. Austin: RG Landes Co. pp.267-288.
62. Wang, T.-W., G.P. Stromberg, J.T. Whitney, N.W. Brower, M.W. Klymkowsky & J.M. Parent. 2006. SOX3 expression identifies neural progenitors in persistent neonatal and adult mouse forebrain germinative zones. *J. Comp. Neurol.* **497**:88-100.
63. Zhang, C., Timothy F. Carl, E. Trudeau, Thomas Simmet & M.W. Klymkowsky. 2006. An NF-kB and Slug regulatory loop active in early vertebrate mesoderm. *PLoS ONE*, **1**:e106 (1-14).
64. Klymkowsky, M.W., Taylor, L.B., S.R. Spindler, & K. Garvin-Doxas. 2006. Two-dimensional, implicit confidence tests as a tool for recognizing student misconceptions. *J. College Science Teaching* **36**:44-48.
65. Klymkowsky, M.W. 2007. Teaching without a textbook: a strategy to focus learning. *CBE Life Science Education*. **6**: 190-193.
66. Zhang, C, & M.W. Klymkowsky, 2007. The Sox Axis, Nodal Signaling and Germ Layer Specification. *Differentiation*. **75**:536-45.
67. Garvin-Doxas, K., M.W. Klymkowsky & S. Elrod. 2007. Building, using, and maximizing the impact of concept inventories in the biology education: a meeting report. *CBE Life Science Educ*, **6**: 277-282.
- Garvin-Doxas, K., I. Doxas & M.W. Klymkowsky. 2007. Ed's Tools: A web-based software toolset for accelerated concept inventory construction. Proceedings of the National STEM Assessment of Student Achievement conference.
68. Cortez-Rossi, C., L. Hernandez-Lagunas, C. Zhang, I.F. Choi, L. Kwok, M.W. Klymkowsky & K.B. Artinger. 2008. Rohon-Beard sensory neurons are induced by BMP4 expressing non-neuronal ectoderm in *Xenopus laevis*. *Developmental Biology*, **314**:351-61.
69. Klymkowsky, M.W. & K. Garvin-Doxas. 2008. Recognizing Student Misconceptions through Ed's Tool and the Biology Concept Inventory. *PLoS Biology*, **6**: e3.



70. Garvin-Doxas, K. & M.W. Klymkowsky. 2008. Understanding Randomness and its impact on Student Learning: Lessons from the Biology Concept Inventory (BCI). *CBE Life Science Education*, 7:227-233.
71. Schlosser, G., T. Awtry, S.A. Brugmann, E.D. Jensen, K. Neilson, G. Ruan, A. Stammli, D. Völker, B. Yan, C. Zhang, M.W. Klymkowsky, & Sally A. Moody. 2008. Eya1 and Six1 neurogenesis in the cranial placodes in a SoxB1-dependent fashion. *Devel. Biol.* **320**:199-214.
- Klymkowsky, M.K. & E.M. Furtak. 2009. [How the incoherent state of science and mathematics education undermines biological \(and scientific\) literacy](#). Colorado Higher Education News.
- Klymkowsky, M., & M.M. Cooper. Foundational Physiochemical Concepts in the Biological Sciences. *The FASEB Journal* 23 (2009): 464-3.
72. Zhang, C. & M.W. Klymkowsky. 2009. Unexpected functional redundancy between Twist and Slug (Snail2) and their feedback regulation of NF- $\kappa$ B via Nodal and Cerberus. *Devel. Biol.* **331**:340-9.
73. Klymkowsky, M.W. & P. Savagner. 2009. Epithelial-mesenchymal transition (EMT): a cancer researcher's conceptual friend and foe. *American Journal of Pathology*. **174**:1588-93.
74. Klymkowsky M.W. 2009. [Make room for computing](#). *Science*. **326**:227 (letter).
- Klymkowsky, M.W. 2009. A guide to the productive poking, prodding and injection of cells. *Development* **136**:4070-4072.
75. Cooper, M.M., N. Grove, S. Underwood & M.W. Klymkowsky. 2010 Lost in Lewis Structures: an investigation of student difficulties in developing representational competence. *J. Chem Ed.*, DOI: **10.1021/ed900004y**.
76. Klymkowsky, M.W. 2010. Thinking about the conceptual foundations of the biological sciences. *CBE Life Science Educ.* **9**: 405-7.
77. Klymkowsky, M.W., C. Cortez-Rossi, & K.B. Artinger. 2010 [Mechanisms driving neural crest induction and migration in the zebrafish and \*Xenopus laevis\*](#). *Cell Adhesion & Migration*, **4**: 595-608.
78. Hikasa, H., J. Ezan, X. Li, M.W. Klymkowsky & S. Sokol. 2010. [Wnt-dependent phosphorylation of TCF3 leads to transcriptional derepression during vertebrate anteroposterior axis specification](#). *Dev. Cell*, **9**:521-32.
79. Klymkowsky, M.W., S. Underwood, & R.K. Garvin-Doxas. 2010. [The Biological Concepts Instrument \(BCI\), a diagnostic tool to reveal student thinking](#). arXiv:1012.4501v1
80. Shi, J., J. Power & M.W. Klymkowsky. 2010. Revealing student thinking about experimental design and the roles of control experiments. *Int. J. Teaching Biol.* **5**:<http://hdl.handle.net/10518/3647>
81. Klymkowsky, M.W. 2010. Mitochondrial activity, embryogenesis, and the dialogue between the big and little brains of the cell. invited review, *Mitochondria*, **11**:814-819.
- Klymkowsky, M.W. 2011. [Review of "Why evolution works \(and creationism fails\)](#). by M. Young & P.K. Strode. Reports of the National Center for Science Education, Jan/Feb.
82. Shi, J., C. Severson, J. Yang, D. Wedlich & M.W. Klymkowsky. 2011. Snail2 (Slug)-specific, BMP- and Wnt- dependent mesodermal induction of neural crest induction. *Development*. **138**:3135-45.
- Klymkowsky, M.W. 2011. Why is understanding evolution hard? *ASBMB Today*, Feb. issue.
- Klymkowsky M.W. 2011. Getting serious about science education. *ASBMB Today*, Mar issue.
- Klymkowsky, M.W. 2011. Teaching disconcerting scientific ideas. *ASBMB Today*, April issue.

83. Trujillo, C. & M.W. Klymkowsky. 2012 Using graph-based assessments within socratic tutorials to reveal and refine students' analytical thinking about molecular networks. *Biochem Mol Biol Educ.* **40**:100-7. doi: 10.1002/bmb.2058568.
84. Shi, J.,H. Zhang, R.D. Dowell, & M.W. Klymkowsky. 2012. sizzled function and secreted factor network dynamics. *Biology Open* **1**: 286-294.
85. Henson, K., M.M. Cooper, & M.W. Klymkowsky. 2012. Turning randomness into meaning at the molecular level using Muller's morphs. *Biology Open* **1**: doi: 10.1242/ bio.2012031
86. Cattell, M., A. Garnett, M.W. Klymkowsky, & D.M. Medioros. 2012. A maternally established SoxB1/SoxF axis is a conserved feature of chordate germ layer patterning. *Evo. Devo.* **14**: 104-115.
87. Cooper, M.M, S.M. Underwood, C. Hilley & M.W Klymkowsky. 2012. Intelligent design of a chemistry curriculum leads to dramatic improvements in students understanding of molecular structure and properties. *J. Chem. Educ.*, **89**: 1351–1357.
88. Klymkowsky, M.W. & M.M. Cooper. 2012. Now for the hard part: the path to coherent curricular design. *BAMBED* **40**: 271-272.
- Redish, E., C. Bauer, K. Carleton, T. Cooke, M.M. Cooper, C. Crouch, B. Dreyfus, B., Geller, J. Giannini, J., Svoboda-Gouvea, M.W. Klymkowsky, W. Losert, K. Moore, K. Presson, V. Sawtelle, K. Thompson, C. Turpen, 2013. NEXUS/Physics: Rethinking physics for biology and pre-med students. AAAS Vision and Change meeting poster description August 2013.
89. Cooper, M.M. & M.W. Klymkowsky. 2013. The trouble with chemical energy: why understanding bond energies requires an interdisciplinary systems approach. *CBE Life Sci. Education*, **12**:306-12. doi: 10.1187/cbe.12-10-0170.
90. Cooper, M.M. & M.W. Klymkowsky. 2013. Chemistry, Life, the Universe and Everything: a new approach to general chemistry and a model for curriculum reform, *J. Chem. Ed.*, DOI: 10.1021/ed300456y Publication Date (Web): August 21, 2013.
- Repenning, A., A. Basawapatna, & M.Klymkowsky. 2013. Making educational games that work in the classroom, International Games Innovation Conference paper.
91. Redish, E.F., C. Bauer, K.L. Carleton, T.J. Cooke, M.M. Cooper, C.H. Crouch, B.W. Dreyfus, B.Geller, J. Giannini, J. Svoboda Gouvea, M.W. Klymkowsky, W. Losert, K. Moore, J. Presson, V. Sawtelle, K. V. Thompson, C. Turpen, R.K.P. Zia. 2014. *NEXUS/Physics: An interdisciplinary repurposing of physics for biologist*. *Am. J. Phys* **82**: 368,
92. Cooper. M.M. Klymkowsky, M.W. & N.M. Becker. 2014. "Energy in Chemical Systems, an integrated approach" R.F. Chen et al. (eds.), *Teaching and Learning of Energy in K-12 Education*, 301 DOI 10.1007/978-3-319-05017-1\_\_17, © Springer International Publishing.
- Garvin-Doxas, K., M.W. Klymkowsky, I. Doxas, & W. Kintsch. 2014. Using technology to accelerate the construction of concept inventories: Latent Semantic Analysis and the Biology Concept Inventory, submitted. 6th International Conference on Computer Supported Education, CSEDU 2014, Barcelona
- Cooper, M.M., S.M. Underwood, S.Z. Bryfcyzinski, and M.W. Klymkowsky. 2014. Using technology to collect and analyze data for research on student learning. ACS meeting: <http://abstracts.acs.org/chem/247nm/program/view.php>
93. Shi, J., Y. Zhao, M. Winey & M.W. Klymkowsky. 2014. Chibby functions in *Xenopus* ciliary assembly, embryonic development, and the regulation of gene expression. *Devel. Biol.* **395**: 287–298.
- Klymkowsky, M.W. 2014. *Physics for (molecular) biology students*. invited essay for American Physical Society's Forum on Education newsletter. Fall issue.

94. Shi, J., Y. Zhao, T. Vonderfecht, M. Winey & M.W. Klymkowsky. 2015. Centrin-2 mediated regulation of FGF/FGFR gene expression in *Xenopus*. *Scientific Reports/* 10.1038/srep10283..
95. Square, T., M. Romášek, M. Cattell, D. Jandzik, M.W. Klymkowsky & D.M. Medioros. 2015. CRISPR/Cas9-mediated mutagenesis in the sea lamprey, *Petromyzon marinus*: a powerful tool for understanding ancestral gene functions In vertebrates. *Development* **142**:4180-7.
- Bryfczynski, S., Pargas, R.P., Cooper, M.M., Klymkowsky, M.W., Hester, J., & Grove, N.P. 2015. Classroom uses for beSocratic. in *The Impact of Pen and Touch Technology on Education*. Hammond, T., Valentine, S., Adler, A., & Payton, M. (Eds.) Springer.
96. Williams, L., S.M. Underwood, M.W. Klymkowsky & M.M. Cooper. 2015. Are non-covalent interactions an Achilles heel in chemistry education? A comparison of instructional approaches. *J. Chem. Ed.* **92**:1979–1987.
97. Zhao, Y., J. Shi, M. Winey & M.W. Klymkowsky. 2016. Identifying domains of EFHC1 involved in ciliogenesis and the regulation of Wnt signaling in *Xenopus laevis*. *Dev. Biol.* **411**: 257-65
- Klymkowsky, M.W., S.P. Bryfczynski & M.M. Cooper. 2016. Bringing useful insights into student thinking to course design, delivery, and evaluation using the beSocratic formative assessment system. AAAS/NSF Symposium on Envisioning the Future of Undergraduate STEM Education.
- Cooper, M.M. & M.W. Klymkowsky. 2016. Chemistry, Life, the Universe and Everything (CLUE): A engaging and conceptually coherent transformed general chemistry curriculum. AAAS/NSF Symposium on Envisioning the Future of Undergraduate STEM Education.
98. Champagne Queloz, A., K. Köhler, E. Stern, M.W. Klymkowsky & Ernst Hafen. 2016. Debunking Key and Lock Biology: Exploring the prevalence and persistence of students' misconceptions on the nature and flexibility of molecular interactions, *Science Matters*. <https://www.sciencematters.io/articles/201606000010>
- Klymkowsky, M.W., K. Kohler & M.M. Cooper. 2016. Diagnostic assessments of student thinking about stochastic processes. bioRxiv: <http://biorxiv.org/content/early/2016/05/20/053991>
99. Klymkowsky, M.W., J.D. Rentsch, E. Begovic & M.M. Cooper. 2016. The design and transformation of Biofundamentals: a non-survey introductory evolutionary and molecular biology course. *CBE Life Sci Educ* **15** ar70.
100. McClure-Begley, T. & M.W. Klymkowsky. 2017. [Nuclear roles for cilia-associated proteins](#). *Cilia*. **6**:8
101. Champagne Queloz, A., K. Köhler, E. Stern, M.W. Klymkowsky & Ernst Hafen. 2017. Diagnostic of students' misconceptions using the Biological Concepts Instrument: A method for conducting an educational needs assessment, submitted., PLoS, <https://doi.org/10.1371/journal.pone.0176906>.
102. Lai, M.B, C. Zhang, J. Shi, V. Johnson, L. Khandan, J. McVey, M.W. Klymkowsky, Z. Chen & H.J. Junge. 2017. [TSPAN12 is a Norrin Co-Receptor that Amplifies Frizzled4 Ligand Selectivity and Signaling](#). **19**:2809-2822.
- Klymkowsky, M.W. 2018. review of “Stepping in the Same River Twice: Replication in Biological Research.” edited by Ayelet Shavit and Aaron M. Ellison. *The Quarterly review of Biology*, U. Chicago Press. pp.363-364.
103. Klymkowsky, M.W. 2018. Whole-mount Immunocytochemical Methods in *Xenopus*. *Cold Spring Harbor Protocols* 2018: pdb. prot097295.

104. McClure-Begley, T.D., C.E. Ebmeier, K.E. Ball, M.W. Klymkowsky, G. Bilousova, and W.M. Old. 2018. Proteomic characterization fo Down Syndrome and normalization with drug treatment in human cerebral organoids. bioarXiv
- Klymkowsky, M.W. & K. Garvin-Doxas. 2020. Concept Inventories: Design, Application, Uses, Limitations & Next Steps. in *Active Learning*. Eds. J. Mintzes, ed. in press.
105. Cooper, M.M., R. Stowe, O. Crandell & M.W. Klymkowsky. 2019. [Organic Chemistry, Life, the Universe and Everything \(OCLUE\): A transformed organic chemistry curriculum](#) *J. Chem Ed.* 96: 1858-1872. (ACS editor's choice!)
- Oran, A., Martin, A., M.W. Klymkowsky & R. Stubbs 2019. Identifying Students' Progress and Mobility Patterns in Higher Education Through Open-Source Visualization. *SocArXiv*. June, 7.
106. Klymkowsky, 2019. [Filaments & phenotypes: cellular roles and orphan effects associated with mutations in cytoplasmic intermediate filament proteins](#). A F1000 review.
- Cooper, M.M. & M.W.Klymkowsky. 2020. [Should Organic Chemistry be Taught as a Science](#) - *J. Chem. Educ.*, 97: 1213–1214
- Cooper, M.M. & M.W. Klymkowsky. 2020. [Unnecessary obstacles hampering equity in education](#). *Science Advances* (Letter).
- Cooper, M.M. & M,W, Klymkowsky. 2020. [Curbing the malpractice of curved grades and high-stakes exams](#). *ASBMB Today*.
107. Klymkowsky, M.W. 2021. [Making mechanistic sense: are we teaching students what they need to know?](#) *Developmental Biology*, 476: 308-313.
- Klymkowsky, M.W. 2021. [How focussing on fundamental concepts changes course design in biology](#). in *Fronteiras da Biologia e da Medicina*. Eds. Manoel Luis Costa & Claudia Mermelstain. ACASO. (book chapter).
- Klymkowsky, M.W. 2022. Book review. Putting genetics in context: implications for instruction, understanding, and beliefs. *Science and Education*, DOI: <https://doi.org/10.1007/s11191-022-00326-2>.
- Cooper, M.M. & M.W. Klymkowsky. 2022. Aligning assessment goals with the current and future technologies needed to achieve them. in "Technologies in Biomedical and Life Science Education: Approaches and Evidence of Efficacy for Learning" H. Witchel & Michael Lee, eds. Springer Nature.
- Riedl, A & M.W.Klymkowsky. 2022. [How would Socrates teach science? Adapting Socratic pedagogies to build deeper understanding and inclusive learning communities](#). *ASBMB Today*, 4 August 2022.
- Oran, A., A. Martin, M.W. Klymkowsky, R. Stubbs. 2022. Identifying Students' Progress and Mobility Patterns in Higher Education Through Open-Source Visualization'. The 12th IEEE Integrated STEM Education Conference (ISEC '22) Princeton, NJ, March 26, 2022 <http://ewh.ieee.org/conf/stem> accepted presentation.
- Klymkowsky, M.W. 2023. Making sense of noise: introducing students to stochastic processes in order to better understand biological behaviors. arXiv:
108. C.G. Francovic, N.R. Williams, K. Noyes, M.W. Klymkowsky & M.M. Cooper, Instructor use of explanatory black boxes when explaining the mechanism by which ATP is used as an energy source. manuscript in revision, submission planned early 2023.
109. Underwood, S.M., A.T. Kararo, M. M. Cooper, L.A. Posey, J.H. Carmel, D.G. Herrington, R.L. Stowe, & M.W. Klymkowsky. *Characterizing Critical Components of a Transformed*

Chemistry Curriculum.submission planned early 2023.

### Works in progress:

- Walsh, S. & M.W. Klymkowsky. Building a research / training experiences around a low-cost iPSC approach.
- Repenning, L, & M.W. Klymkowsky. Enhancing Socratic interactions to improve students' analytical skills and enhancing their sense of inclusion in the scientific enterprise.
- Doxas, I., J. Meiss, S. Bottone, T. Strellich, A. Plummer, S. Dennis, K. Garvin-Doxas & M.W. Klymkowsky. Narrative as a Dynamical System.

### Course and educational materials:

SocraticChat: an interactive, web-based system: L. Repenning & M.W. Klymkowsky

CD-ROM TeachWare: The Dynamic Cell. 2000. K. Dawson, T. Devlin., M.W. Klymkowsky, U. Rochev, M. Synder, M. Steer & J. Widom, eds. Springer-Verlag.

Klymkowsky, M.W. 2000. Working with the literature web resources for Lodish et al., 4th edition, Molecular Cell Biology.

Bryfcyzinski, S., B.C. Dean, R.O. Pargas, M.M. Cooper & M.W. Klymkowsky. 2013. [Teaching data structures with BeSocratic](http://dl.acm.org/citation.cfm?doid=2445196.2445429). ACM abstract. <http://dl.acm.org/citation.cfm?doid=2445196.2445429>.

Cooper, M.M. & M.W Klymkowsky. 2015. Chemistry, Life, the Universe, and Everything. available on-line @ <https://clue.chemistry.msu.edu/clue.html>

Klymkowsky, M.W. & M.M. Cooper. 2015. Biofundamentals Introduction to molecular biology text book and associated materials. available on-line @ <http://tinyurl.com/nvfo97h>.

Cooper, M.M. & M.W Klymkowsky. 2017. Organic Chemistry, Life, the Universe, and Everything (OCLUE). available on-line @ <https://clue.chemistry.msu.edu/oclue.html>

**[bioliteracy blog Posts](#)** (by M.W. Klymkowsky): moved in 2019 from PLoS Sci-Education blog

- 2016. [Recognizing scientific literacy & illiteracy](#).
- 2016. [Biology education in the light of single cell/molecule studies](#).
- 2016. [The pernicious effects of disrespecting the constraints of science](#).
- 2016. [In an age of rampant narcissism and social cheating – the importance of teaching social evolutionary mechanisms](#).

- Garbarino, J. 2016. (edited by M.W. Klymkowsky). [What can the anti-vaccination movement teach us about improving the public's understanding of science?](#)
- 2017. [Power Posing & Science Education.](#)
- 2017. [Science, Politics & Marches.](#)
- 2017. [Go ahead and “teach the controversy:” it is the best way to defend science.](#)
- 2017. [The trivialization of science education.](#)
- 2017. [Visualizing and teaching evolution through synteny](#)
- 2017. [Is it time to start worrying about conscious human “mini-brains”?](#)
- 2017. [Reverse Dunning-Kruger effects and their impact on science education](#)
- 2017. [Humanized mice and porcized people.](#)
- 2017. [Balancing research prestige, human decency, and educational outcomes](#)
- 2017. [Making education matter in higher education](#)
- 2018. [Is a little science a dangerous thing](#)
- 2018. [Molecular machines and the place of physics in the biology curriculum](#)
- 2018. [When is a gene product a protein when is it not?](#)
- 2018. [Ideas are easy, theories are hard.](#)
- 2018. [Genes – way weirder than you thought](#) – 9 July 2018
- 2018. [Can we talk scientifically about free will?](#) – 15 September 2018.
- 2018. [On teaching genetics, social evolution & understanding the origins of racism.](#)
- 2018. [On teaching developmental biology in the 21st century.](#)
- 2018. [Aggregative and clonal metazoans.](#)
- 2019. [Establishing Cellular Asymmetries.](#)
- 2019. [Gradients and Molecular Switches.](#)

- 2019. [Is it possible to teach evolutionary biology “sensitively”?](#)
- 2019. [Science “awareness” versus “literacy” and why it matters, politically.](#)
- 2019. [Avoiding unrecognized racist implications arising from teaching genetics](#)
- 2019. [Conceptual simplicity and mechanistic complexity: the implications of un-intelligent design](#)
- 2020. [Going virtual without a net](#)
- 2020. [Thinking about biological thinking: Steady state, half-life & response dynamics.](#)
- 2020. [Higher Education Malpractice: curving grades](#)
- 2021. [Mice \(and humans\) in a maze: a useful parable for science education?](#)
- 2021. [Anti-Scientific & anti-vax propaganda \(1926 and today\).](#)
- 2022. [Sounds like science, but it ain't ...](#)
- 2022. [Making sense of noise: introducing students to stochastic processes in order to better understand biological behaviors \(and even free will\).](#)

### **Other outreach activities:**

Link to responses to [mad scientist network questions](#)

December 2020: Interview for the "Ask a Scientist" podcast - released in February 2021.

### **YouTube:**

2012 Michael Klymkowsky, University of Colorado at Boulder & Melanie Cooper, Clemson University, at the [Cyberlearning Research Summit](#) on January 18, 2012, Talk Set 5: Digital Books in Social Spaces with Educational Data Mining. See <http://cyberlearning.sri.com>

2014: Presentation from Dr. Mike Klymkowsky, MCD Biology and CU Teach. (January 27, 2014 PSP Work Meeting for the Communicating Complex Ideas Project 2013-2014.) [How to approach teaching with intellectual barriers and help your audience or students to understand it?](#) How do you structure curriculum? Who is your target audience? What is the value of creating video lessons to communicate understanding to your audience? The Communicating Complex Ideas Project is a collaboration among the Graduate Teacher Program, JMM, Communication, Film Studies, and Colorado Public Television. The project is funded by the CU Boulder Graduate School.

2016 Debate: [Science & Public/Personal Decisions About GMOs](#) (4952) Conference on World Affairs, CU Boulder, UMC Center Ballroom