

## CURRICULUM VITAE

Tyrone B. Hayes  
Department of Integrative Biology  
University of California at Berkeley  
Berkeley, California 94720-3140  
(510)643-1055 (off.), (510)643-6264 (fax)  
tyrone@berkeley.edu

### Personal History

Date and place of birth: July 29, 1967; Columbia, SC, USA

### Education

1989-93 University of California, Berkeley, CA, Ph.D. 1993, Integrative Biology. (Dissertation title: The Role of Steroids in Growth and Development in Anuran Amphibians)  
1985-89 Harvard University, Cambridge, MA, B.A. 1989, Biology (Thesis title: Sex Determination and Differentiation in the Wood Frog: An Investigation of Genetic and Environmental Mechanisms).

### Awards and Honors

2013 E.O. Wilson Award for Outstanding Science in Biodiversity Conservation, Center for Biological Diversity  
2011 Hall of Fame, Richland County School District 1, South Carolina  
2011 Inductee: History Makers (Science Makers)  
2010 EE JUST Award, American Society of Cell Biologists  
2008 Lux Award, for innovative approaches to education for low-income, under-represented students of color  
2005 National Geographic Emerging Explorer Award  
2005 Dr. Tyrone Hayes Day, January 24, 2005, Proclamation of R.T. Rybak, Mayor of the City of Minneapolis, Minnesota  
2005 Jennifer Altman Award for Integrity in Science, Jennifer Altman Foundation  
2005-11 Class of '43 endowed Chair  
2004 Richard G. Bond Memorial Lecture, Dept. of Environmental Health Sciences and School of Public Health, University of Minnesota  
2004 Leadership Award, Beyond Pesticides  
2004 President's Citation Award, American Institute of Biological Sciences  
2002 Distinguished Teaching Award (UCB)  
2001 Distinguished Mentor Award (UCB)  
1999 International Outstanding Young Investigator Award, Hiroshima Japan  
1998 Bartholomew Award, Society for Integrative and Comparative Biology  
1991 Aubrey Gorbman Best Student Paper Award (American Society of Zoologists)  
1989 Summa Cum Laude recognition for thesis work, Harvard University  
1985-90 Harvard Scholarship  
1986 National Achievement Scholarship

## **Fellowships and Grants**

2019 Marisla Grant  
2018 Ceres Foundation Grant  
2017 Ceres Foundation Grant  
2016 Ceres Foundation Grant  
2015 Ceres Foundation Grant  
2013 Beyond Pesticides Grant in Aid of Research  
2013 Marisla Grant in Aid of Research  
2012 Marisla Grant in Aid of Research  
2012 Kapor Foundation Grant  
2011 Marisla Grant in Aid of Research  
2011 Kapor Foundation Grant  
2010 Global Wallace Fund Grant  
2010 Cornell Douglas Foundation  
2010 NSF URM grant  
2010 NSF REU grant (co-PI)  
2009 Global Wallace Fund Grant  
2008 NSF REU grant (co-PI)  
2007 Kapor-Klein-David Grant  
2005 Supplement for Undergraduate Research (Park Water Foundation)  
2005 Mitchell Kapor Foundation Conference Grant  
2005 Atrazine Conference Grant, National Institute for Environmental Health Sciences  
2004 NSF SGER research grant  
2003 National Geographic/Toyota Grant  
2003 Mitchell Kapor Foundation Grant for Undergraduate Research  
2003 Park Water Foundation Grant  
2002 Homeland Foundation Grant  
2002 Rose Foundation Grant  
2002 World Wildlife Fund Grant  
2002 World Wildlife Fund Grant  
2001 Alton Jones Foundation Grant  
1999-00 Biology Faculty Award (UCB)  
1999-02 California/Hawaii Seagrant  
1998-99 National Geographic Exploration Grant  
1998-99 Novartis Contract Grant  
1998 Supplement to NSF CAREER Grant  
1997 Supplement to NSF CAREER Grant  
1996-01 NSF CAREER Grant  
1995 UREP Travel Grant (University of California, Berkeley)  
1995 NSF Starter Grant  
1993 NSF Postdoctoral Fellowship  
1993 President's Postdoctoral Fellowship (declined), University of California  
1992 Helen T. Gaige Fund Award, American Society of Ichthyologists and Herpetologists  
1991 Carl P. Kopford Grant, Museum of Vertebrate Zoology, University of California, Berkeley

1991 Mentored Research Fellowship Award  
1989-93 Berkeley GMP Fellowship, University of California, Berkeley  
1989 Summa Cum Laude recognition for thesis work, Harvard University  
1988-89 Harvard Fellowship Award, Harvard University  
1986 NSF Incentive for Excellence Award  
1986-89 Ford Foundation Undergraduate Research Grant

### **Research Experience and Employment**

2003- **Professor**, University of California, Berkeley, CA  
2000-03 **Associate Professor**, University of California, Berkeley, CA  
1999-00 **Senior Scientist**, Sokoke Inc. El Cerrito, CA 94530  
1998-00 **Consultant**, Ecorisk, Inc., Ferndale, WA 98248  
1994-00 **Assistant Professor**, University of California, Berkeley, CA  
1994 **NIH Adjunct Postdoctoral Fellow**, NIH, Bethesda, MD  
1993-94 **NSF Postdoctoral Fellow**, University of California, Berkeley, CA  
1992-93 **Graduate Student Instructor**, University of California, Berkeley, CA  
1990-93 **Research Associate**, University of California, Berkeley, CA  
1990- **Free Lance Technician and Consultant**, Biosystems, Tiburon, CA  
1989 **Field Assistant**, Conservation Agency, Wash., D.C.

### **Reviewer For**

1994- Gen. and Comp. Endocrinol., J. Exp. Zool. Physiological Zoology, Ecology, Developmental Biology, Environmental Science and Technology, Toxicological Science, Aquatic Toxicology, Environmental Health Perspectives, Molecular Toxicology, PLOS

### **Other activities**

1995- Review Panel, National Science Foundation  
1991- Lecturer, University of California, Berkeley, CA  
1990- Alumni Interviewer, Harvard University, Cambridge, MA  
1995-99 Lecturer, Biosphere 2, Columbia University (Oracle AZ, Campus)  
1996-00 Grant reviewer for Sloan Foundation  
1997-02 National Science Foundation Review Panel (Integrative Animal Biology)  
2003-06 National Science Foundation Review Panel (REU, UMEB)  
2003- Environmental Media Services (EMS)-The Environmental Health Sciences Support Network  
2003 EPA/FIFRA Scientific Advisory Panel on atrazine (consultant and presenter)  
2004 Collaborative on Health and the Environment (Board)  
2007- Toyota Land Cruiser Advisory Board

**Peer-reviewed publications (Hayes in bold, Graduate student co-authors double underscored, undergraduates underscored)**

**Hayes, T.B.** and P. Licht, *Gonadal involvement in sexual size dimorphism in the African bullfrog (*Pyxicephalus adspersus*)*. J. Exp. Zool., 1992. 264(130-135).

- Hayes, T.B., R. Chan,** and P. Licht, *Interactions of temperature and steroids in growth, development, and metamorphosis in a toad (Bufo boreas)*. J. Exp. Zool., 1993. 266: p. 206-215.
- Hayes, T.B.** and P. Licht, *Metabolism of exogenous steroids by anuran larvae*. Gen. Comp. Endocrinol., 1993. 91: p. 250-258.
- Tsai, P., **T.B. Hayes,** and P. Licht, *The role of aromatization in testosterone induced inhibition in female turtles, Trachemys scripta*. Biol. Reprod., 1993. 50: p. 144-151.
- Hayes, T.B.,** *Interdependence of corticosterone and thyroid hormones in larval growth and development in the western toad (Bufo boreas) I. Thyroid hormone dependent and independent effects of corticosterone on growth and development*. J. Exp. Zool., 1995. 271(2): p. 95-102.
- Hayes, T.B.,** *An histological examination of the effects of corticosterone in larvae of the Western toad, Bufo boreas (Anura: Bufonidae) and the Oriental Fire-Bellied Toad, Bombina orientalis (Anura: Discoglossidae)*. J. Morph., 1995. 226: p. 297-307.
- Hayes, T.B.** and **T. Gill,** *Hormonal regulation of skin gland development in toad larvae (Bufo boreas): The role of the thyroid hormones and corticosterone*. Gen. Comp. Endocrinol., 1995. 99: p. 161-168.
- Hayes, T.B.** and P. Licht, *Factors influencing testosterone metabolism by anuran larvae*. J. Exp. Zool., 1995. 271(2): p. 112-119.
- Hayes, T.B.** and **T.H. Wu,** *Interdependence of corticosterone and thyroid hormones in larval growth and development in the western toad (Bufo boreas). II. Regulation of corticosterone and thyroid hormones*. J. Exp. Zool., 1995. 271(2): p. 103-111.
- Hayes, T.B.** and **T.-H. Wu,** *The role of corticosterone in anuran metamorphosis and its potential role in stress-induced metamorphosis*. in *Proceedings of the 17th Conference of the European Society of Comparative Endocrinology*. 1995. Bönne, Germany: Neth. J. Zool.
- Hayes, T.B.,** *Steroid-mimicking environmental contaminants: Their potential role in amphibian declines*. Herpetologia Bonnensis. SEH Bonn., 1997: p. 145-150.
- Hayes, T.B.,** *Steroids as modulators of thyroid hormone activity in amphibian development*. Amer. Zool., 1997. 37(2): p. 185-195.
- Hayes, T.B.,** *Hormonal mechanisms as potential constraints on evolution: Examples from the Anura*. Amer. Zool., 1997. 37: p. 482-490.
- Hayes, T.B., T.-H. Wu,** and **T. Gill,** *Similarities in effects of DDT and corticosterone in anuran larvae: Is DDT a stressor or corticosterone mimic?* Environ. Toxicol. Chem., 1997. 16(9): p. 1948-1953.
- Hayes, T.B.,** *Sex determination and primary sex differentiation in amphibians*. J. Exp. Zool., 1998. 281: p. 373-399.
- Hayes, T.B.,** *Endocrine disruptors in amphibians: Potential impacts and the usefulness of amphibian screens for detecting endocrine disrupting compounds*. Science Journal (Kagaku), 1998. 68: p. 557-568.
- Hayes, T.B.,** *Hormonal regulation of sex differentiation in amphibians, reptiles, and birds.*, in *Encyclopedia of Reproduction*, E. Knobil and J. Neill, Editors. 1998, Academic Press: San Diego. p. 102-109.
- Licht, P., **T.B. Hayes,** P. Tsai, G. Cunha, H. Kim, M. Golbus, S. Hayward, M. Martin, R. Jaffe, and S. Glickman, *Androgens and masculinization of genitalia in the spotted hyaena (Crocuta crocuta). I. Urogenital morphology and placental androgen production during fetal life*. J. Reprod. Fert., 1998. 113: p. 105-116.

- Pearson, A.K., **T.B. Hayes**, and P. Licht, *Immunochemical identification of thyrotropes and gonadotropes in the pars distalis and pars tuberalis of the toad (*Bufo boreas*) with reference to ontogenetic changes*. Gen. Comp. Endocrinol., 1998. 111: p. 83-94.
- Hayes, T.B.**, *Endocrine Disruptors and Amphibians*, in *Ecotoxicology of Reptiles and Amphibians*, G. Linder, D. Sparling, and C. Bishop, Editors. 1999, SETAC Press. p. 537-594.
- Hayes, T.B.**, *Comparative Endocrinology: A tool for understanding mechanisms and predicting effects of endocrine mimicking xenobiotics*, in *Environmental Endocrine Disruptors: An Evolutionary Perspective*, L.J. Guillette, Editor. 1999, Taylor and Francis: NY.
- Hayes, T.B.** and **K. Menendez**, *The effect of sex steroids on primary and secondary sex differentiation in the sexually dichromatic reedfrog (*Hyperolius argus*: Hyperoliidae) from the Arabuko Sokoke Forest of Kenya*. Gen. Comp. Endocrinol., 1999. 115: p. 188-199.
- Buchholz, D.** and **T.B. Hayes**, *Larval period comparison for the spadefoot toads *Scaphiopus couchii* and *Spea multiplicata* (Anura: Pelobatidae)*. Herpetologica. 56(4):455-468, 2000. 56(4): p. 455-468.
- Hayes, T.B.**, *Hyperolius argus endocrine screen test.*, in *Official Gazette of the United States Patent and Trademark Office Patents*. 2000: USA.
- Hayes, T.B.**, *Endocrine disruption in amphibians*, in *Ecotoxicology of amphibians and reptiles*, D. Sparling, G. Linder, and C. Bishop, Editors. 2000, SETAC: Pensacola, FL. p. 595-616.
- Noriega, N.** and **T.B. Hayes**, *DDT congener effects on secondary sex coloration in the reed frog *Hyperolius argus*: A partial evaluation of the *Hyperolius argus* Estrogen Screen*. Comp. Biochem. Physiol. Comp. B., 2000. 126B(2): p. 231-237.
- Datuin, J.**, **K. Ng**, **T.B. Hayes**, and H. Bern, *Effects of glucocorticoids on cartilage growth and response to IGF-I in tilapia (*Oreochromis mossambicus*)*. Gen. Comp. Endocrinol., 2001. 121(3): p. 289-294.
- Buchholz, D.** and **T.B. Hayes**, *Evolutionary patterns of diversity in spadefoot toad metamorphosis (anura: Pelobatidae)*. Copeia, 2002. 2002(1): p. 180-189.
- Hayes, T.B.**, **A. Collins**, **M. Lee**, **M. Mendoza**, **N. Noriega**, **A.A. Stuart**, and A. Vonk, *Hermaphroditic, demasculinized frogs after exposure to the herbicide atrazine at low ecologically relevant doses*. Proc. Natl. Acad. Sci. USA, 2002. 99: p. 5476-5480.
- Hayes, T.B.**, **K. Haston**, **M. Tsui**, **A. Hoang**, **C. Haefele**, and A. Vonk, *Atrazine-induced hermaphroditism at 0.1 ppb in American leopard frogs (*Rana pipiens*): Laboratory and field evidence*. Environ. Health Perspect., 2002. 111: p. 568-575.
- Hayes, T.B.**, **K. Haston**, **M. Tsui**, **A. Hoang**, **C. Haefele**, and A. Vonk, *Feminization of male frogs in the wild*. Nature, 2002. 419: p. 895-896.
- Hayes, T.B.**, *There is no denying this: Defusing the confusion about atrazine*. Bioscience, 2004. 54(12): p. 1138-1149.
- Buchholz, D.** and **T.B. Hayes**, *Variation in thyroid hormone action and content underlies species differences in the timing of metamorphosis in desert frogs*. Evolution and Development, 2005. 7(5): p. 458-467.
- Hayes, T.B.**, *Comment on "Gonadal development of larval male *Xenopus laevis* exposed to atrazine in outdoor microcosms"*. Environ. Sci. Tech., 2005. 39(19): p. 7757-7758.

- Hayes, T.B.**, *Welcome to the revolution: Integrative biology and assessing the impact of endocrine disruptors on environmental and public health*. J. Integrative Comp. Biol., 2005. 45(2): p. 321-329.
- Hayes, T.B.**, P. Case, S. Chui, D. Chung, C. Haefele, K. Haston, M. Lee, V.-P. Mai, Y. Marjua, J. Parker, and M. Tsui, *Pesticide mixtures, endocrine disruption, and amphibian declines: Are we underestimating the impact?* Environ. Health Perspect, 2006. 114 (Suppl. 1): p. 40-50.
- Hayes, T.B.**, A. Stuart, G. Mendoza, A. Collins, N. Noriega, A. Vonk, G. Johnston, R. Liu, and D. Kpodzo, *Characterization of atrazine-induced gonadal malformations and effects of an androgen antagonist (cyproterone acetate) and exogenous estrogen (estradiol 17 $\beta$ ): Support for the demasculinization/feminization hypothesis*. Environ. Health Perspect, 2006. 114 (Suppl. 1): p. 134-141.
- Fan, W., T. Yanase, H. Morinaga, S. Gondo, T. Okabe, M. Nomura, **T.B. Hayes**, R. Takayanagi, and H. Nawata, *Herbicide atrazine activates SF-1 by direct affinity and concomitant co-activators recruitments to induce aromatase expression via promoter II*. Biochemical and Biophysical Research Communications, 2007. 355(4): p. 1012-1018.
- Fan, W., T. Yanase, H. Morinaga, S. Gondo, T. Okabe, M. Nomura, T. Komatsu, K.-I. Morohashi, **T.B. Hayes**, R. Takayanagi, and H. Nawata, *Atrazine-induced aromatase expression is SF-1- dependent: Implications for endocrine disruption in wildlife and reproductive cancers in humans*. Environ. Health Perspect, 2007. 115(5): p. 720-727.
- Hayes, T.B.**, *It ain't that simple*. Environ. Health Perspect, 2007. In Press.
- Hayes, T.B.**, *The one stop shop: Chemical causes and cures for cancer, President's Cancer Panel - October 21, 2008*. Reviews on Environ. Health, 2009. 24(4): p. 297-307.
- Hayes, T.B.**, *Bite, Shake and Hold: Response to Stuart Cohen*. Setac Globe, 2009.
- Hayes, T.B.**, *More feedback on whether atrazine is a potent endocrine disruptor chemical*. Environmental Science & Technology, 2009. 43(16): p. 6115-6115.
- Hayes, T.B.**, P. Falso, S. Gallipeau, and M.J. Stice, *The cause of global amphibian declines: A developmental endocrinologist's perspective*. J. Exp. Biol., 2010. 213 (6): p. 921-933.
- Hayes, T.B.**, V. Khoury, A. Narayan, M. Nazir, A. Park, T. Brown, L. Adame, E. Chan, D. Buchholz, T. Stueve, and S. Gallipeau, *Atrazine induces complete feminization and chemical castration in male African clawed frogs (*Xenopus laevis*)*. Proc. Natl. Acad. Sci. USA, 2010. 107 (10): p. 4612-4617.
- Hayes, T.B.**, L.L. Anderson, V.R. Beasley, S.R. de Solla, T. Iguchi, H. Ingraham, P. Kestemont, J. Kniewald, Z. Kniewald, V.S. Langlois, E.H. Luque, K.A. McCoy, M. Munoz-de-Toro, T. Oka, C.A. Oliveira, F. Orton, S. Ruby, M. Suzawa, L.E. Tavera-Mendoza, V.L. Trudeau, A.B. Victor-Costa, and E. Willingham, *Demasculinization and feminization of male gonads by atrazine: Consistent effects across vertebrate classes*. Journal of Steroid Biochemistry and Molecular Biology, 2011. 127(1-2): p. 64-73.
- Hayes, T.B.**, *Atrazine Has Been Used Safely for 50 Years?*, in *Wildlife Ecotoxicology: Forensic Approaches*, J.E. Elliott, C.A. Bishop, and C.A. Morrissey, Editors. 2011, Springer, 233 Spring Street, New York, Ny 10013, United States. p. 301-324.
- Vandenberg, L.N., T. Colborn, **T.B. Hayes**, J.J. Heindel, D.R. Jacobs, Jr., D.-H. Lee, T. Shioda, A.M. Soto, F.S. vom Saal, W.V. Welshons, R.T. Zoeller, and J.P. Myers, *Hormones and Endocrine-Disrupting Chemicals: Low-Dose Effects and Nonmonotonic Dose Responses*. Endocrine Reviews, 2012. 33(3): p. 378-455.
- Rochester, J.R., W.C.J. Chung, **T.B. Hayes**, P.S. Tsai. *Opposite-sex housing reactivates*

- the declining gnRH system in aged transgenic male mice with fgf signaling deficiency.* American Journal of Physiology-Endocrinology and Metabolism, 2012. 303:E1428-E1439.
- Schug T.T., R. Abagyan, B. Blumberg, T.J. Collins, D. Crews, P.L. DeFur, **T.B. Hayes**, et al. *Designing endocrine disruption out of the next generation of chemicals.* 2013, Green Chemistry 15:181-198.
- Vandenberg L.N., T. Colborn, **T.B. Hayes**, J.J. Heindel, D.R. Jacobs, D.H. Lee, et al., *Regulatory decisions on endocrine disrupting chemicals should be based on the principles of endocrinology.* 2014, Reproductive Toxicology 38:1-15.
- Hansen M., R. Poulsen, X. Luong, D.L. Sedlak, **T.B. Hayes**, *Liquid chromatography tandem mass spectrometry method using solid-phase extraction and bead-beating-assisted matrix solid-phase dispersion to quantify the fungicide tebuconazole in controlled frog exposure study: Analysis of water and animal tissue.* 2014, Analytical and Bioanalytical Chemistry 406:7677-7685.
- Sadinski W., M. Roth M, **T.B. Hayes**, P. Jones, A. Gallant, *Indicators of the statuses of amphibian populations and their potential for exposure to atrazine in four midwestern us conservation areas.* 2014, Plos One 9.
- Falso, P.G., C.A. Noble, J.M. Diaz, **T.B. Hayes**, *The effect of long-term corticosterone treatment on blood cell differentials and function in laboratory and wild-caught amphibian models.* 2015, General and Comparative Endocrinology 212:73-83.
- Poulsen, R., X. Luong, M. Hansen, B. Styris have, **T.B. Hayes**, *Tebuconazole disrupts steroidogenesis in Xenopus laevis*, 2015 Aquatic Toxicology 168:28-37.
- Hansen, M., X. Luong, D.L. Sedlak, C.C. Helbing, **T.B. Hayes**, *Quantification of 11 thyroid hormones and associated metabolites in blood using isotope-dilution liquid chromatography tandem mass spectrometry.* 2016 Analytical and Bioanalytical Chemistry 408:5429-5442.
- Hayes, T.B.** and M. Hansen, *From silent spring to silent night: Pesticides in the Anthropocene.* 2017 Elementa-Science of the Anthropocene 5:57
- Poulsen, R., N. Cedergreen, T.B. Hayes, and M. Hansen, *Nitrate: An environmental endocrine disruptor?* 2018 Environm. Sci. Tech. 52(7):3868-3887

More than 300 abstracts and more than 50 invited talks per year.

### **Selected Books featuring my work:**

Michael Pollan, Omnivore's dilemma

John Kerry and Teresa Heinz-Kerry, This Moment on Earth

Jennifer Washburn, University Inc.: The Corporate Corruption of Higher Education\*

Nena Baker, The Body Toxic, How the Hazardous Chemistry of Everyday Things Threatens Our Health

Wendy Wagner and Rena Steinzor, Rescuing Science from Politics: Regulation and the Distortion of Scientific Research\*

Chris Mooney, The Republican War on Science\*

Dava Sobel, The Best American Science Writing

Robert F. Kennedy Jr., The Junk Science of George W. Bush\*

In addition to at least six text books and one children's book: The Frog Scientist, Pam Turner ([http://www.pamelasturner.com/the\\_frog\\_scientist\\_79242.htm](http://www.pamelasturner.com/the_frog_scientist_79242.htm))

\*My work is presented as important science that was distorted by the former administration, not examples of “junk” or “distortion”)

### **Selected documentary films featuring my work:**

“The Great African Frog Hunt” (National Geographic Television;  
<http://www.nationalgeographic.com/outthere/episodes.html> ),

“Frogs, Farms and Pharmaceuticals” (Link Television;  
[http://ecolutiontrail.org/get\\_schooled/programming/?cmd=details&pid=9](http://ecolutiontrail.org/get_schooled/programming/?cmd=details&pid=9) ),

“Strange Days on Planet Earth” (National Geographic, PBS;  
<http://www.pbs.org/strangedays/episodes/troubledwaters/experts/> ),

“The Thin Green Line” (Nature, PBS; <http://www.pbs.org/wnet/nature/episodes/frogs-the-thin-green-line/video-agricultures-effect-on-frogs/4848/>),

“The Vanishing Frog” (Animal Planet; <http://animal.discovery.com/tv/vanishing-frogs/vanishing-frogs.html>),

“Expedition Borneo” (BBC and Discovery Channel;  
<http://dsc.discovery.com/convergence/quest/borneo/scientists/scientists.html>)

“Men in Danger” (<http://www.filmakers.com/index.php?a=filmDetail&filmID=1558>)

“Ripe for Change” (<http://www.californiadreamseries.org/rfc-chars.htm>)

“Toxic Baby” (<http://www.toxicbaby.com/> )

“Unacceptable Levels”  
([http://www.naturalnews.com/042295\\_Unacceptable\\_Levels\\_documentary\\_film\\_toxic\\_environmental\\_chemicals.html](http://www.naturalnews.com/042295_Unacceptable_Levels_documentary_film_toxic_environmental_chemicals.html))



**Full length films that appeared in theatres featuring my work:**

“FLOW: For Love of Water” (<http://www.flowthefilm.com/>),

“Last Call at the Oasis” <http://www.lastcallattheoasis.com/>

**Commercials that featured my work:**

National Geographic/ Toyota commercial [http://www.youtube.com/watch?v=4A45ym\\_IaGg](http://www.youtube.com/watch?v=4A45ym_IaGg).