Approved by the Regents
May 14, 2009

PROMOTION RECOMMENDATION
UNIVERSITY OF MICHIGAN
MEDICAL SCHOOL
DEPARTMENT OF OPHTHALMOLOGY AND VISUAL SCIENCES
DEPARTMENT OF CELL AND DEVELOPMENTAL BIOLOGY

Philip J. Gage, Ph.D., assistant professor of ophthalmology and visual sciences, and assistant professor of cell and developmental biology, Medical School, is recommended for promotion to associate professor of ophthalmology and visual sciences, with tenure, Department of Ophthalmology and Visual Sciences, and associate professor of cell and developmental biology, without tenure, Department of Cell and Developmental Biology, Medical School.

Academic Degrees:

Ph.D.	1992	University of Michigan
B.S.	1981	University of Michigan

Professional Record:

2008-present	Assistant Professor of Cell and Developmental Biology, University of Michigan
2003-present	Assistant Professor of Ophthalmology and Visual Sciences, University of Michigan
2002-2003	Assistant Research Scientist, Department of Ophthalmology and Visual Sciences, University of Michigan
1997-2002	Assistant Research Scientist, Department of Human Genetics, University of Michigan

Summary of Evaluation:

Teaching: Dr. Gage teaches undergraduate, graduate, and medical students, as well as residents and postdoctoral fellows through lectures, didactic courses, seminars, and especially laboratory work in the Department of Ophthalmology and Visual Sciences as well as in the Department of Cell and Developmental Biology. In his first year on the faculty, Dr. Gage developed an eight-session vision science module for *CDB 680: Organogenesis of Complex Tissues.* This module, "Organogenesis of the Eye," was taught in 2003 and again in 2007 and is expected to be part of the regular rotation for this course, offered every three to four years. One of the reviewers of his promotion called this a "signature" course. Since joining the faculty, Dr. Gage has welcomed 14 undergraduate students and three Ph.D. students into his laboratory, providing exceptional one-on-one training. His goal is to teach these students to design and carry out valid experiments, to understand the ethical issues involved in research, to evaluate data critically, and to give them practice presenting their findings. Many have earned authorship on papers that appear in the peer-reviewed literature. Dr. Gage has sat on several preliminary examination committees, and

four dissertation committees, chairing one. He is invited to speak at conferences around the country.

Research: Dr. Gage is a developmental biologist who is fast becoming the acknowledged world expert on the roles of transcriptional networks and cell signaling pathways in mammalian eye development. He already is the authority on *Pitx2*, a transcription factor that is associated with congenital eye defects and glaucoma. He cloned *Pitx2* as a novel gene and created a mouse model that would clarify its importance in the development of multiple organs, not just the eye. He has also determined that this gene regulates extraocular muscle development. This will lead to an understanding of strabismus as well as an understanding of why these muscles are spared in muscular dystrophy.

Dr. Gage was recruited to our faculty specifically to use vertebrate models in order to elucidate eye development and disease. He has been exceptionally successful in making progress towards this goal. His research will have direct and dramatic impact on our ability to diagnose eye diseases properly and treat them effectively. Dr. Gage uses the most sophisticated methods to unravel ocular development. He willingly shares his knowledge of these techniques with other faculty members, often through formal training sessions.

Recent and Significant Publications:

Gage PJ, Qian M, Wu D, Rosenberg KI: The canonical Wnt signaling antagonist DKK2 is an essential effector of PITX2 function during eye development. *Developmental Biology* 317:310-24, 2008.

Diehl AG, Zareparsi S, Qian M, Khanna R, Gage PJ: Extraocular muscle morphogenesis and gene expression are regulated by *Pitx2* gene dose. *Investigative Ophthalmology & Visual Science* 47:1785-93, 2006.

Berry FB, Lines MA, Oas JM, Foota T, Underhill DA, Gage PJ, Walter MA: Functional interaction between FOXC1 and PITX2A underlies sensitivity of FOXC1 dosage in Axenfeld-Rieger Syndrome and anterior segment dysgenesis. *Human Molecular Genetics* 15:905-19, 2006.

Gage PJ, Rhoades W, Prucka SK, Hjalt T: Fate maps of neural crest and mesoderm in the mammalian eye. *Investigative Ophthalmology & Visual Science* 46:4200-08, 2005.

Evans AL, Gage PJ: Expression of the homeobox gene *Pitx2* in neural crest is required for optic stalk and ocular anterior segment development. *Human Molecular Genetics* 14:3347-59, 2005.

Service: Dr. Gage is the director of the Vivarium Module for the Department of Ophthalmology and Visual Science's NIH Core Grant for Vision Research and has coordinated the active Vision Research Seminar series since he joined the faculty (inviting and hosting eight to ten external basic scientists and six to eight internal basic scientists each year). He actively participates in the

Department of Cell and Development Biology where he was a member of the graduate admission committee for both the Program in Cellular and Molecular Biology and the Program in Biomedical Sciences. He serves on the faculty admissions committee for the Center for Organogenesis and reviews the Center's many pre- and post-doctoral fellowship applications. He is a thoughtful and enthusiastic participant in the weekly Organogenesis Journal Club.

Dr. Gage was co-organizer of the 2006 Great Lakes Vision Research Conference, which is hosted by the Department of Ophthalmology and Visual Sciences and draws 150 vision scientists from across the Midwest. Nationally, Dr. Gage routinely reviews for a number of top tier journals; he also reviews grant applications for private and government funding agencies.

External Review:

Reviewer A: "When this paper was published, I sent it to every member of my lab, as I recognized it as an instant classic that would forever be important for anyone working on eye development....I am looking forward to his presentation...to hear the latest work from his laboratory. I expect that it will confirm his place as one of the leading scientists in this important area of eye development."

Reviewer B: "It is very clear that Phil is a rigorous research scientist and a dedicated teacher and mentor....he is one of the very best developmental biologists working on ocular development related to the anterior segment and glaucoma in the world. He is a very important member of his department and I would most certainly recommend his promotion at my institution."

Reviewer C: "His work will form an important backdrop for future work on the ocular mesenchyme and its interactions with the ocular epithelia in patterning the organ. It is also very clear that his work is valuable in the broader context of developmental biology where the pathways he has uncovered will no doubt be relevant to other settings where the *Pitx* gene family functions."

Reviewer D: "His publication record over the last five years has been excellent and has made significant and important contributions that are clearly the result of Dr. Gage's work and leadership. Dr. Gage continues to collaborate with other investigators and this is a hallmark of a successful scientist who has the ability to work well with others in both related and complementary areas."

Reviewer E: "...Dr. Gage meets or exceeds all expectations in each of the three categories. Because of his overall excellent performance and his national and international stature I have no hesitation in recommending his promotion to Associate Professor....Dr. Gage's scholarly productivity is excellent....He also published a beautiful fate mapping study on the developing mouse eye that is considered a reference work in the field."

Summary of Recommendation:

Dr. Gage is an outstanding representative of the University of Michigan teaching and research faculty, as well as a highly respected member of the international vision research community. His commitment to teaching is admirable, his talent is exceptional. He has a curious, keen, organized, and focused intellect that has dramatically expanded our understanding of the development of ocular tissue and vision. I enthusiastically recommend the promotion of Dr. Philip Gage to associate professor, with tenure, in the Department of Ophthalmology and Visual Sciences and associate professor, without tenure, in the Department of Cell and Developmental Biology.

James O. Woolliscroft, M.D.
Dean
Lyle C. Roll Professor of Medicine

May 2009