

Bo-mi Song, PhD

Summary:

- My research interest is in mechanistic understanding of sensory perception. For this aim, I have studied various aspects of sensory perception, from determination of function of a molecular sensor, quantitative behavioral analysis, identification and characterization of the neural pathways that control behavior. I am currently studying neural pathway underlying gustatory coding in *Drosophila melanogaster* and developing a tool to study sensory coding in non-Drosophilid insect *Manduca sexta*.

Professional Experience:

National Institute of Health

Maryland

**Postdoctoral Researcher, Molecular biology, *Drosophila* Genetics, transgenesis of non-Drosophilid insect, Histology, Imaging, electrophysiology & behavior analysis
Jan 2016 – present**

- *Goal:* Determine neural pathway underlying gustatory coding in *D. melanogaster*/ Develop transgenesis in *Manduca sexta* for study of sensory coding
- *Skills:* *Drosophila* genetics, Dissection, RNA extraction, reverse-transcription, Calcium imaging, sensilla recording (*in vivo* extracellular recording), Data analysis using MATLAB, 5'RACE, promoter analysis, subcloning, PCR, electrophoresis, behavioral analysis, immunohistochemistry, microscopy (light microscope, confocal microscope and two photon microscope), western blot

Brandeis University

Massachusetts

**Postdoctoral Researcher, Molecular biology, *Drosophila* Genetics, CRISPR/Cas9-mediated genome engineering, Electrophysiology & Behavioral analysis
Jan 2013 – Dec 2015**

- *Goal:* Determine function of alternative isoforms of *Drosophila* TrpA1 gene that encodes polymodal sensor.
- *Approach:* polyA-bearing RNAs were extracted from different fruit fly tissues, and were reverse-transcribed to generate cDNAs. DNA fragments that cover

every junction of neighboring exons of TrpA1 transcripts in the cDNA pools were amplified by PCR using forward and reverse primers that bind to two neighboring exons. Pattern of alternative splicing in TrpA1 gene was determined by sequencing of the PCR products. After constructing plasmids that express guide RNAs targeting each “isoform-specific exon”, isoform-specific mutants were generated by CRISPR-CAS9 mediated genome engineering. To determine function of different TrpA1 isoforms, behavioral analysis and sensilla recording from fruit fly labellum were performed.

- *Skills:* *Drosophila* genetics, Dissection, RNA extraction, reverse-transcription, PCR, electrophoresis, behavioral analysis and sensilla recording (*in vivo* extracellular recording), immunohistochemistry, microscopy (light microscope and confocal microscope)

Kangnam St. Mary’s hospital

Korea

Research Assistant

Cell biology

Summer 2000- Spring 2002

- *Goal:* Determine functions of different Wnt molecules
- *Approach:* Stable cell lines were generated by transfection of plasmids, each of which expresses individual Wnt molecule, and by subsequent drug-based selection. Secretion of functional Wnt proteins was validated by western blot and by luciferase assay.
- *Skills:* mammalian cell culture, preparation and maintenance of frozen cell stocks, transfection and luciferase assay

Education:

U.T. Southwestern Medical Center at Dallas, Dept of Molecular biology

Texas

Ph.D. in Neuroscience

2005-2011

Molecular biology, Genetics, Behavioral analysis, Pharmacology & Microbiology

Dissertation Title: Familiar food-induced feeding activation in the nematode *C. elegans*

- *Goal:* Determine function of serotonin and mechanism of its action as a feeding regulator of the nematode *C. elegans*
- *Approach:* Using video analysis, feeding motions of *C. elegans* were quantitatively analyzed. The serotonin receptor and the components

downstream G protein signaling cascade were identified by screening mutants and transgenic animals. For constructing expression vectors that drive expression of wild-type and constitutively active signaling molecules were generated by RNA extraction, reverse-transcription, PCR and mutagenesis. In addition to gene expression, pharmacological drug treatment was also used to manipulate activity of signaling molecules. In order to visualize and to quantitatively analyze the feeding motions from freely moving animals, transgenic bacteria of diverse species that express fluorescent proteins were also generated by PCR and subcloning.

- *Skills: C. elegans* genetics, PCR, subcloning, electrophoresis, western blot, behavioral analysis, laser ablation, pharmacology, microbiology, microscopy (light microscope and confocal microscope)

Handong University
B.S. majors in Bioscience and Food Engineering

Korea
1996-2000

Publications:

1. **Song BM**, Avery L. (2012), "Serotonin activates overall feeding by activating two separate neural pathways in *Caenorhabditis elegans*.", *J Neurosci.* 32(6):1920-31.
2. **Song BM**, Faumont S, Lockery S, Avery L. (2013), "Recognition of familiar food activates feeding via an endocrine serotonin signal in *Caenorhabditis elegans*.", *Elife* 2:e00329.
3. **Song BM**, Avery L. (2013), "The pharynx of the nematode *C. elegans*: A model system for the study of motor control.", *Worm* 2(1):e21833.
4. Straud S, Lee I, **Song B**, Avery L, You YJ. (2013), "The jaw of the worm: GTPase-activating protein EAT-17 regulates grinder formation in *Caenorhabditis elegans*.", *Genetics* 195(1):115-25.
5. Raizen D, **Song BM**, Trojanowski N, You YJ. (2012), "Methods for measuring pharyngeal behaviors.", *WormBook* 1-13. doi: 10.1895/wormbook.1.154.1.
6. **Song BM**, Ni L, Ahn TJ, Du EJ, Kim HW, Kang K, Garrity PA, "A highly chemosensitive splice isoform of TRPA1 mediates Painless-independent detection of wasabi and other electrophiles in *Drosophila*", (*in preparation*).
7. **Song BM**, Lee CH. (2018), "Toward mechanistic understanding of color vision in insects", *Front Neural Circuits.* 12:16

Honors:

- Participation award for postdoctoral fellow, NICHD, 2016
- Sigma XI award for Excellence in Research, UTsouthwestern Medical Center, 2009
- *Summa Cum Laude*, Handong University, 2000
- Undergraduate Fellowship for Excellence, Handong University, 1996-2000

Presentation experience:

- Gordon Research Conference (poster in 2011)
- Society for Neuroscience (poster in 2011)
- *Caenorhabditis elegans* Neuroscience meeting (poster in 2006, talk in 2008)
- International *Caenorhabditis elegans* meeting (talk in 2007 and 2009)

Teaching experience:

- *Drosophila Neurobiology* course, Cold spring harbor laboratory (July 2017):
Brain dissection and imaging using confocal and two-photon microscopy
- *Research mentoring for undergraduate and graduate students and summer interns:* Chuck Phillips (Fall 2013), Kirsten Knecht (Summer 2014), Sarah Shin (2015)