Kazushi SUZUKI, Ph.D.

Associate Professor
Program: Life and Food Sciences
Area: Applied Life and Food Sciences
Undergraduate: Dept. of Applied Biological Chemistry
http://www.agr.niigata-u.ac.jp/~ksuzuki/ApplMicro/Welcome.html

Professional Expertise

I conduct the research based on the following professional expertise. Applied Microbiology, Molecular Genetics of Bacteria, Genetic Engineering, Microbial Gene Regulation

Research Fields of Interest

Mechanism of gene expression regulation in bacteria:

•We study the important global regulatory system, Csr system, in bacteria. In *Escherichia coli*, it includes a small RNA-binding protein (CsrA), non-coding small RNAs (CsrB and CsrC) and a predicted membrane bound signaling protein (CsrD). CsrA binds to specific mRNAs, resulting in altered translation and/or message stability. CsrB/C RNAs form complexes with multiple CsrA, thereby antagonizing the effects of CsrA on gene expression. CsrD acts as a specificity factor for degradosome-mediated decay of CsrB/C RNAs. We are studying the molecular mechanism of this system in *E. coli* and *S. marcescens*.

Mechanism of chitin degradation and utilization by bacteria:

•We have elucidated the chitinase system in *Serratia marcescens*. Chitinases hydrolyze the β-1,4-linkages in chitin, the second most abundant biopolymer in nature next to cellulose. *S. marcescens* is an efficient biological degrader of chitin and one of the most extensively studied chitinolytic bacteria. *S. marcescens* 2170 releases a relatively limited number of proteins into the culture medium when grown in the presence of chitin. The proteins detected in the culture supernatant include three chitinases and a chitin-binding protein (CBP21) lacking chitinase activity. We are studying the molecular mechanism of chitinases and CBP21, and the regulation of gene expression of chitinase system.

Education

1999: Ph.D. in Agriculture, Graduate School of Science and Technology, Niigata University, Japan
1990: M.S. in Agriculture, Graduate School of Agriculture, Niigata University, Japan

Postdoctoral Fellow and Academic Appointments

2006: Research Associate, Emory University School of Medicine (USA)
2002-2006: Emory University School of Medicine (USA)
2000-2002: University of North Texas Health Science Center at Fort Worth (USA),
1999-2000: JSPS Research Fellow (Niigata University),

Employment History

1990-1996: Meiji Seika Kaisha, Ltd., Tokyo, Japan

Professional Societies and Activities

1. American Society for Microbiology
2. Japan Society for Bioscience, Biotechnology, and Agrochemistry
3. Japanese Society for Chitin and Chitosan
4. The Molecular Biology Society of Japan
5. The RNA Society of Japan
6. The Japanese Society for Bacteriology

Major Publications

Papers

[1] Regulation of Chitinase Production by the 5′-Untranslated Region of the *ybfM* in *Serratia marcescens* 2170. *Biosci. Biotechnol. Biochem.* 76(10):1920-1924, 2012.

[2] *Serratia marcescens* induces apoptotic cell death in host immune cells via a lipopolysaccharide- and flagella-dependent mechanism. *J. Biol. Chem.* 287(43):36582-36592, 2012.

[3] Loss of *Aspergillus oryzae amyR* function indirectly affects hemicellulolytic and cellulolytic enzyme production. *J. Biosci. Bioeng.* 111(4):408-413, 2011.

[4] Improved transformation of the halo-tolerant yeast *Zygosaccharomyces rouxii* by electroporation. *Biosci. Biotechnol. Biochem.* 74(5):1092-1094, 2010.

[5] Structure of full-length class I chitinase from rice revealed by X-ray crystallography and small-angle X-ray scattering. Proteins 78(10):2295-305, 2010.

[6] The importance of chitobiase and *N*-acetylglucosamine (GlcNAc) uptake in *N,N'*-diacetylchitobiose [$(GlcNAc)_2$] utilization by *Serratia marcescens* 2170. *Microbiology* 154(5):1326-1332, 2008.

[7] Purification and characterization of recombinant chitinase from *E. coli* carrying the cDNA of family 19 chitinase from rice (*Oryza sativa* L.). *Biosci. Biotechnol. Biochem.* 72(3):893-895, 2008.

[8] Role of the Loop Structure of the Catalytic Domain in Rice Class I Chitinase. *J. Biochem*. 143(4):487-495, 2008.

[9]. Identification of a novel regulatory protein (CsrD) that targets the global regulatory RNAs CsrB and CsrC for degradation by RNase E. *Genes & Development* 20(18):2605-2617, 2006.

[10] Comprehensive alanine-scanning mutagenesis of *Escherichia coli* CsrA defines two subdomains of critical functional importance. *J. Biol. Chem.* 281(42):31832-31842, 2006.

[11] CsrA post-transcriptionally represses *pgaABCD*, responsible for synthesis of a biofilm polysaccharide adhesin of *Escherichia coli*. *Mol. Microbiol.* 56(6):1648-1663, 2005.

[12] A novel sRNA member of the carbon storage regulatory system of *Escherichia coli. Mol. Microbiol.* 48(3):657-670, 2003.

[13] Regulatory circuitry of the CsrA/CsrB and BarA/UvrY systems of *Escherichia coli. J. Bacteriol.* 184(18):5130-5140, 2002.

[14] CsrA regulates glycogen biosynthesis by preventing translation of *glgC* in *Escherichia coli. Mol. Microbiol.* 44(6):1599-1610, 2002.

[15]. Chitinases A, B, and C1 from *Serratia marcescens* 2170 produced by recombinant *Escherichia coli*: enzymatic properties and synergism on chitin degradation. *Biosci. Biotechnol. Biochem.* 66(5):1075-1083, 2002.

[16] Biofilm formation and dispersal under the influence of the global regulator CsrA of *Escherichia coli. J. Bacteriol.* 184(1):290-301, 2002.

[17] Regulatory interactions of Csr components: the RNA binding protein CsrA activates *csrB* transcription in *Escherichia coli*. *J. Bacteriol.* 183(20):6017-6027, 2001.

[18] LysR-type transcriptional regulator ChiR is essential for production of all chitinases and a chitin-binding protein, CBP21, in *Serratia marcescens* 2170. *Biosci. Biotechnol. Biochem.* 65 (2):338-347, 2001.

[19] The third chitinase gene (*chiC*) of *Serratia marcescens* 2170 and the relationship of its product to other bacterial chitinases. *Biochem. J.* 343(3):587-596, 1999.

[20] Chitin binding protein (CBP21) in the culture supernatant of *Serratia marcescens* 2170. *Biosci Biotechnol Biochem.* 62(1):128-35, 1998.

[21] Genetic analysis of the chitinase system of *Serratia marcescens* 2170. *J Bacteriol.* 179(22):7111-7117, 1997.

[22] Structure of the gene encoding chitinase D of *Bacillus circulans* WL-12 and possible homology of the enzyme to other prokaryotic chitinases and class III plant chitinases. *J Bacteriol.* 174(2):408-414, 1992.

[23] Gene cloning of chitinase A1 from *Bacillus circulans* WL-12 revealed its evolutionary relationship to *Serratia* chitinase and to the type III homology units of fibronectin. *J Biol Chem.* 265(26):15659-15665, 1990

[24] Chitinase system of *Bacillus circulans* WL-12 and importance of chitinase A1 in chitin degradation. *J Bacteriol.* 172(7):4017-4022, 1990

Books

[1] Suzuki, K., T. Uchiyama, M. Suzuki, M. Taiyoji, N. Nikaidou, and T. Watanabe. 1999. "Chitinase system and chitinase deficient mutants of *Serratia marcescens* 2170" *Genetics, Biochemistry and Ecology of Cellulose Degradation*, Uni Publishers Co., Ltd. pp.673-682.