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Born in 1961, Athens, Greece.

Education

B.Sc in Biology, National and Kapodistrian University of Athens, Greece, 1984
Ph.D in Biological Chemistry, University of Ioannina Medical School, Greece, 1991

Career milestones

1993-1996

Research Associate, Human Frontier (HFSP) fellowship, Howard Hughes Medical Institute (HHMI), Department of Physiology & Molecular Biology Institute, University of California Los Angeles (UCLA), Los Angeles, California.

1998-1999

Fulbright Senior Research Scholar, Department of Physiology & Molecular Biology Institute, University of California Los Angeles (UCLA), Los Angeles, California.

1999-2000

Lecture assistant, Elective Undergraduate Study Program in Biochemistry, University of Ioannina, Greece.

2000-2006

Assistant Professor, Biological Chemistry, University of Ioannina Medical School, Greece.

2007-today

Associate Professor, Biological Chemistry, University of Ioannina Medical School, Greece.

2008-today

Director, Postgraduate Program in Biotechnology, University of Ioannina Medical School, Greece.

Teaching*Postgraduate Courses*

Molecular Pathology, M.Sc Program in Biotechnology, University of Ioannina, Greece, 2002-today

Model microbial systems, M.Sc Program in Microbial Biotechnology, National and Kapodistrian University of Athens, Greece, 2003-today

Undergraduate Courses

Biochemistry, University of Ioannina Medical School, Greece. 2002-today

From Genome to Proteome, University of Ioannina Medical School, Greece, 2002-today

Biology, Department of Chemistry, University of Ioannina, 2004-today

Evolutionary Biology, Department of Biological Applications and Technologies, University of Ioannina, Greece, 2004-today

From Genome to Proteome, Department of Biological Applications and Technologies, University of Ioannina, Greece, 2004-today

Books

Biology II (Biology of Organisms), 1999

Biochemistry, Molecular Biology (Laboratory Manuals), 2001

From Genome to Proteome, 2003

Textbook translations (participation)

Brock Biology of Microorganisms, Pearson, 2003 (University Editions of Creta, 2007)

Watson Molecular Biology of the Gene, Pearson, 2008 (Utopia Publishing, Athens, 2011)

Barton Evolution, Cold Spring Harbor Laboratory Press, 2007 (Utopia Publishing, Athens, 2011)

Cooper The Cell – a molecular approach, Sinauer, 2009 (Academic Editions, 2011)

Research

Our research team focuses on the elucidation of structure-function relationships in membrane transport proteins. We use model prokaryotic systems to characterize and study transporters as prototypes for evolutionarily broad families with biomedical or environmental significance. We analyze newly characterized members using Cys-scanning and site-directed alkylation techniques in cells, membrane vesicles, or appropriate detergent solutions after overexpression and purification in *E. coli* K-12. We are interested in combining analysis of cross-homolog chimeras with bioinformatic and genome mining approaches to address questions on the evolution and evolvability of substrate specificity in such proteins. Our current work focuses mainly on secondary active nucleobase transporters. In this context, we collaborate with the research groups of G. Diallinas (National and Kapodistrian University of Athens, Department of Biology), V. Sophianopoulou (NCSR Demokritos, Institute of Biology), H. R. Kaback (UCLA, Department of Physiology), G. Rudnick (Yale University, Department of Pharmacology), J. C. Voss (UCDavis, Department of Biological Chemistry Medical School).

Research Group

Post-doctoral: Konstantinos Papakostas

PhD students: Ekaterini Karena, Ekaterini Georgopoulou

Undergraduate students: Maria Botou

Previous members include: George Mermelekas (PhD, 2009), Sotiria Tavoulari (PhD, 2005), Panayiota Karatza (PhD, 2006), Panayiotis Panos (MSc, 2005), Alexander Kallis (MSc, 2009), Eleni Vourvou (BSc, 2008), Bill Vlantos (BSc, 2010).

Funding

Greek Ministry of Education Heraklitos-I (2003-2007), Greek Ministry of Development GSRT "Reinforcement Programme of Human Research Manpower" (PENED) (2005-2009), GSRT "Collaborations with Research and Technology Organizations outside Europe" (NONEU) (2006-2009), co-financed from the European Union Social Fund, Greek Ministry of Education Heraklitos-II (2009-2013).

Selected publications

E. Georgopoulou, G. Mermelekas, E. Karena, and S. Frillingos, «Purine substrate recognition by the nucleobase-ascorbate transporter motif in the YgfO xanthine permease: Asn-325 binds and Ala-323 senses substrate», *J. Biol. Chem.* 285, 19422-19433 (2010).

<http://www.ncbi.nlm.nih.gov/pubmed/20406814>

E. Karena, and S. Frillingos, «Role of intramembrane polar residues in the YgfO xanthine permease: His-31 and Asn-93 are crucial for affinity and specificity, and Asp-304 and Glu-272 are irreplaceable», *J. Biol. Chem.* 284, 24257-24268 (2009).

<http://www.ncbi.nlm.nih.gov/pubmed/19581302>

H. R. Kaback, R. Dunten, S. Frillingos, P. Venkatesan, I. Kwaw, W. Zhang, and N. Ermolova, «Site-directed alkylation and the alternating access model for LacY», *Proc. Natl. Acad. Sci. USA* 104, 491-494 (2007).

<http://www.ncbi.nlm.nih.gov/pubmed/17172438>

P. Karatza, and S. Frillingos, «Cloning and functional characterization of two bacterial members of the NAT/NCS2 family in *Escherichia coli*», *Mol. Membr. Biol.* 22, 251-261 (2005).

<http://www.ncbi.nlm.nih.gov/pubmed/16096268>

S. Frillingos, M. Sahin-Tóth, J. Wu, and H. R. Kaback, «Cys-scanning mutagenesis: a novel approach to structure-function relationships in membrane proteins», *FASEB J.* 12, 1281-1299 (1998).

<http://www.ncbi.nlm.nih.gov/pubmed/9761772>

List of core publications

G. Mermelekas, E. Georgopoulou, A. Kallis, M. Botou, V. Vlantos, and S. Frillingos, «Cysteine-scanning analysis of helices TM8, TM9a, TM9b and intervening loops in the YgfO xanthine permease: a carboxyl group is essential at position Asp-276», *J. Biol. Chem.* 285, 35011-35020 (2010).

<http://www.ncbi.nlm.nih.gov/pubmed/20802252>

E. Georgopoulou, G. Mermelekas, E. Karena, and S. Frillingos, «Purine substrate recognition by the nucleobase-ascorbate transporter motif in the YgfO xanthine permease: Asn-325 binds and Ala-323 senses substrate», *J. Biol. Chem.* 285, 19422-19433 (2010).

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E. Karena, and S. Frillingos, «Role of intramembrane polar residues in the YgfO xanthine permease: His-31 and Asn-93 are crucial for affinity and specificity, and Asp-304 and Glu-272 are irreplaceable», *J. Biol. Chem.* 284, 24257-24268 (2009).

<http://www.ncbi.nlm.nih.gov/pubmed/19581302>

N. Lemuh, G. Diallinas, S. Frillingos, G. Mermelekas, A. D. Karagouni, and D. G. Hatzinikolaou, «Purification and partial characterization of the xanthine – uric acid transporter (UapA) of *Aspergillus nidulans*», *Prot. Expr. Purif.* 63, 33-39 (2009).

<http://www.ncbi.nlm.nih.gov/pubmed/18824106>

K. Papakostas, E. Georgopoulou, and S. Frillingos, «Cysteine-scanning analysis of putative helix XII in the YgfO xanthine permease: Ile-432 and Asn-430 are important», *J. Biol. Chem.* 283, 13666-13678 (2008).

<http://www.ncbi.nlm.nih.gov/pubmed/18359771>

S. Tavoulari, and S. Frillingos, «Substrate selectivity of the melibiose permease (MelY) from *Enterobacter cloacae*», *J. Mol. Biol.* 376, 681-693 (2008).

<http://www.ncbi.nlm.nih.gov/pubmed/18177889>

A. Kallimanis, S. Frillingos, C. Drinas, and A. Koukkou, «Taxonomic identification, phenanthrene uptake activity and membrane lipid alterations of the PAH degrading *Arthrobacter sp.* strain Sphe3», *Appl. Microbiol. Biotechnol.* 76, 709- 717 (2007).

<http://www.ncbi.nlm.nih.gov/pubmed/17583808>

P. Kafasla, D. Bouzarelou, S. Frillingos, and V. Sophianopoulou, «The proline permease of *Aspergillus nidulans*: functional replacement of the cysteine residues and properties of a cysteine-less transporter», *Fung. Genet. Biol.* 44, 615-626 (2007).

<http://www.ncbi.nlm.nih.gov/pubmed/17350864>

H. R. Kaback, R. Dunten, S. Frillingos, P. Venkatesan, I. Kwaw, W. Zhang, and N. Ermolova, «Site-directed alkylation and the alternating access model for LacY», *Proc. Natl. Acad. Sci. USA* 104, 491-494 (2007).

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P. Karatza, P. Panos, E. Georgopoulou, and S. Frillingos, «Cysteine-scanning analysis of the nucleobase-ascorbate transporter signature motif in YgfO permease of *Escherichia coli*: Gln-324 and Asn-325 are essential and Ile-329–Val-339 form an alpha-helix». *J. Biol. Chem.* 281, 39881-39890 (2006).

<http://www.ncbi.nlm.nih.gov/pubmed/17077086>

S. Goudela, P. Karatza, M. Koukaki, S. Frillingos, and G. Diallinas, «Comparative substrate recognition by bacterial and fungal purine transporters of the NAT/NCS2 family», *Mol. Membr. Biol.* 22, 263-275 (2005).

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- P. Karatza, and S. Frillingos, «Cloning and functional characterization of two bacterial members of the NAT/NCS2 family in *Escherichia coli*», *Mol. Membr. Biol.* 22, 251-261 (2005).
<http://www.ncbi.nlm.nih.gov/pubmed/16096268>
- S. Tavoulari, S. Frillingos, P. Karatza, I. Messinis, and K. Seferiadis, «The recombinant subdomain IIIB of human serum albumin displays activity of gonadotrophin surge attenuating factor», *Human Reproduction* 19, 849-858 (2004).
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- M. Sahin-Tóth, S. Frillingos, M. C. Lawrence, and H. R. Kaback, «The sucrose permease of *Escherichia coli*: Functional significance of the Cys residues and properties of a Cys-less transporter», *Biochemistry* 39, 6164-6169 (2000).
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- S. Frillingos, A. Linden, F. Niehaus, C. Vargas, J. J. Nieto, A. Ventosa, G. Antranikian, and C. Drainas, «Cloning and expression of α -amylase from the hyperthermophilic archaeon *Pyrococcus woesei* in the moderately halophilic bacterium *Halomonas elongata*», *J. Appl. Microbiol.* 88, 495-503 (2000).
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- E. Douka, A. I. Koukkou, G. Vartholomatos, S. Frillingos, E. M. Papamichael, and C. Drainas, «A *Zymomonas mobilis* mutant with delayed growth on high glucose concentrations», *J. Bacteriology* 181, 4598-4604 (1999).
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- S. Frillingos, M. Sahin-Tóth, J. Wu, and H. R. Kaback, «Cys-scanning mutagenesis: a novel approach to structure-function relationships in membrane proteins», *FASEB J.* 12, 1281-1299 (1998).
<http://www.ncbi.nlm.nih.gov/pubmed/9761772>
- S. Frillingos, A. Gonzalez, and H. R. Kaback, «Cysteine-scanning mutagenesis of helix IV and the adjoining loops in the lactose permease of *Escherichia coli*», *Biochemistry* 36, 14284-14290 (1997).
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- S. Frillingos, J. Wu, P. Venkatesan, and H. R. Kaback, «Binding of ligand or monoclonal antibody 4B1 induces discrete structural changes in the lactose permease of *Escherichia coli*», *Biochemistry* 36, 6408-6414 (1997).
<http://www.ncbi.nlm.nih.gov/pubmed/9174357>
- J. Sun, S. Frillingos, and H. R. Kaback, «Binding of monoclonal antibody 4B1 to homologs of the lactose permease of *Escherichia coli*», *Protein Science* 6, 1503-1510 (1997).
<http://www.ncbi.nlm.nih.gov/pubmed/9232651>
- S. Frillingos, and H. R. Kaback, «The role of helix VIII in the lactose permease of *Escherichia coli*: II. Site-directed sulfhydryl modification», *Protein Science* 6, 438-443 (1997).
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- S. Frillingos, M. L. Ujwal, J. Sun, and H. R. Kaback, «The role of helix VIII in the lactose permease of *Escherichia coli*: I. Cysteine-scanning mutagenesis», *Protein Science* 6, 431-437 (1997).
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- S. Frillingos, J. Sun, A. Gonzalez, and H. R. Kaback, «Cysteine-scanning mutagenesis of helix II and flanking hydrophilic domains in the lactose permease of *Escherichia coli*», *Biochemistry* 36, 269-273 (1997).

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S. Frillingos, and H. R. Kaback, «Chemical rescue of mutants Asp237>Ala and Lys358>Ala in the lactose permease of *Escherichia coli*», *Biochemistry* 35, 13363-13367 (1996).

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S. Frillingos, and H. R. Kaback, «Monoclonal antibody 4B1 alters the pK_a of a carboxylic acid at position 325 (helix X) of the lactose permease of *Escherichia coli*», *Biochemistry* 35, 10166-10171 (1996).

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S. Frillingos, and H. R. Kaback, «Cysteine-scanning mutagenesis of helix VI and the flanking hydrophilic domains in the lactose permease of *Escherichia coli*», *Biochemistry* 35, 5333-5338 (1996).

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S. Frillingos, and H. R. Kaback, «Probing the conformation of the lactose permease of *Escherichia coli* by *in situ* site-directed sulfhydryl modification», *Biochemistry* 35, 3950-3956 (1996).

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S. Frillingos, M. Sahin-Tóth, J. W. Lengeler, and H. R. Kaback, «Helix packing in the sucrose permease of *Escherichia coli*: properties of engineered charge pairs between Asn324 (helix VII) and Ser356 (helix XI)», *Biochemistry* 34, 9368-9373 (1995).

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M. Sahin-Tóth, S. Frillingos, J. W. Lengeler, and H. R. Kaback, «Active transport by the CscB permease in *Escherichia coli* K12», *Biochem. Biophys. Research Commun.* 208, 1116-1123 (1995).

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J. Wu, S. Frillingos, J. Voss, and H. R. Kaback, «Ligand-induced conformational changes in the lactose permease of *Escherichia coli*», *Protein Science* 3, 2294-2301 (1994).

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M. Sahin-Tóth, S. Frillingos, E. Bibi, A. Gonzalez, and H. R. Kaback, «The role of putative transmembrane domain III in the lactose permease of *Escherichia coli*», *Protein Science* 3, 2302-2310 (1994).

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H. R. Kaback, S. Frillingos, H. Jung, K. Jung, G. G. Prive, M. L. Ujwal, C. Weitzman, J. Wu, and K. Zen, «The lactose permease meets Frankenstein», *J. Exp. Biol.* 196, 183-195 (1994).

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S. Frillingos, M. Sahin-Tóth, B. Persson, and H. R. Kaback, «Cysteine-scanning mutagenesis of putative helix VII in lactose permease of *Escherichia coli*», *Biochemistry* 33, 8074-8081 (1994).

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