Prof. Benjamin Aroeti - Short CV

Department of Cell and Developmental Biology; The Silberman Institute of Life Sciences; Faculty of Sciences; The Hebrew University of Jerusalem, Givat Ram, P.O.B. 91904, Israel.

Born: Oct 30th 1958, Tel-Aviv-Jaffa; Married, two children

Associate Professor of Cell Biology

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Education:

1980-1983 **B.Sc. Biology**, Tel-Aviv University, Faculty of Life Sciences.

1983-1985 **M.Sc. (Cum Laude**), Biochemistry, Tel-Aviv University.

1985-1991 **Ph.D.** in Biochemistry, Tel-Aviv University.

Positions and Employments:

1990-1994 **Postdoctoral training**, Departments of Anatomy and Biochemistry, University of California, San Francisco.

1994-2001 **Lecturer**, Department of Cell and Animal Biology, Institute of Life Sciences, The Hebrew University of Jerusalem.

2001-2012 **Senior lecturer** in cell biology; Department of Cell and Developmental Biology, Institute of Life Sciences, The Hebrew University of Jerusalem.

2002-2003 **Visiting Scientist** at Stanford University, Medical School.

2004-2009 **Chairman** of the Cell and Developmental Biology Teaching Program.

2009-2012 **Head of the Honor's Program for excellent students in Life Sciences**, Etgar.

2009 **Visiting Scientist** at Stanford University Medical School.

2012 **Associate Professor of Cell Biology**; Department of Cell and Developmental Biology, Institute of Life Sciences, The Hebrew University of Jerusalem.

2013-2018 **Chairman**, Department of Cell and Developmental Biology, Institute of Life Sciences; The Hebrew University of Jerusalem

2010-present **Academic supervisor of the Interdepartmental Equipment Unit**

2010-present **Academic supervisor of the Imaging Unit**

Academic Awards:

Recipient of an EMBO short-term fellowship for collaboration with Professor Thomas M. Jovin, Department of Molecular Biology, Max-Planck Institute for Biophysical Chemistry, D-3400 Goettingen, Germany.

1990 - 1992 Human Frontier Science Program fellowship for post-doctoral training.

1992 - 1994 American Heart Association, California Affiliate post-doctoral fellowship.

1995 - 1998 Recipient of the Dorot Foundation Research award administered by the Israel National Science Foundation.

Research Interests - in brief

My research group is focused on studying the molecular mechanisms underlying host-pathogen interactions, with special emphasis on how enteric bacterial pathogens elicit epithelial host cell infection. Our research focuses on the enteric human bacterial pathogen, enteropathogenic *E. coli* (EPEC), which infects the enterocytes of the human small intestine and causes acute diarrhea in infants and children in developing countries. Upon attachment to the apical surface of the epithelial cells, EPEC injects a series of proteins effectors from its own cytoplasm into the host cells. These proteins hijack diverse host cell organelles and signaling processes. Our global aim is to decipher the detailed mechanisms by which these protein effectors, and other pathogenic *E. coli* factors work at the molecular level. To this end we employ advanced imaging, molecular biological, biochemical, biophysical and cell biological methodologies to study the host-pathogen interactions. In terms of global public health, *E. coli* pathogenic strains are the leading cause of severe diarrhea, gastroenteritis, and even kidney failure in humans worldwide. Hence, identification of specific *E. coli* infectious agents that abrogate the normal activities of their host cells in the human body is expected to pave the way for novel therapeutic and diagnostic strategies to combat devastating human illnesses contributed by *E. coli* infections. Such developments are highly important in a world that rapidly moves to a post-antibiotic era, whereby bacteria that cause common human infections (e.g. urinary tract infections, pneumonia, intestinal and bloodstream infections) become resistant to antibiotic treatments. Moreover, bacterial infections have been associated with inflammatory bowel diseases (IBDs), such as the Crohn's disease. Hence, our studies on *E. coli* infections may lead to better understanding of IBDs, as well as define a potentially broadly applicable context for designing novel interventions to block these devastating human diseases.

List of Publications

February 3, 2019

Papers:

1. Ramachandran, PI., Vences-Catalán, F., Weiseman, D., Zlotkin-Rivkin, E., Shteyer, E., Melamed-Book, N., Rosenshine, I., Levy, S., & **Aroeti, B**. (2018) EspH suppresses Erk by spatial segtrgation from CD81 tetraspanin microdomains. **Infection and Immunity**, 86(10) e00303-18.

2. Brahami, A., Levy, H., Zlotkin-Rivkin, E., Melamed-Book, N., Tal, N., Lev, D., Yeshua, T., Fedosyeyev, O., **Aroeti, B**., & Lewis, A. (2017) Live cell near-field optical imaging and voltage sensing with ultrasensitive force control. **Opt Express** 25(11), *12131-12143*

3. Cohen, M., Kitsberg, D., Tsytkin, S., Shulman, M., **Aroeti, B**. & Nahmias, Y. (2014) Live imaging of GLUT2 glucose dependent trafficking and its inhibition in polarized epithelial cells. **Open Biol.** 4(7) e140091 ***Received Cover***.

4. Yashunsky, V., Kharliker, L., Zlotkin-Rivkin, E., Rund, D., Melamed-Book, N., Zahavi, EE., Perlson, E., Mercone, S., Golosovsky, M., Davidov, D. & **Aroeti, B.** (2013) Real-time sensing of enteropathogenic E. coli-induced effects on epithelial host cell height, cell-substrate interactions, and endocytic processes by infrared surface plasmon spectroscopy. **PLoS ONE**, *8(10) e78431.*

5. Yashunsky, V., Lirtsman, V., Zilbershtein, A., Bein, A., Schwartz, B., **Aroeti, B.**, Golosovsky, M. & Davidov, D. (2012) Surface plasmon-based infrared spectroscopy for cell biosensing. **J. Biomed. Opt.** *17(8): 081409-1*

6. Yashunsky, V., Marciano, T., Lirtsman, V., Golsovsky, M., Davidov, D., & **Aroeti, B.** (2012) Real-time sensing of cell morphology by infrared waveguide spectroscopy. **PLoS ONE**, *7(10)* e48454

7. **Aroeti, B**., Friedman, G., Zlotkin-Rivkin, E., & Donnenberg M. (2012) Retraction of enteropathogenic E. coli type IV pili promotes efficient host cell colonization, effector translocation and tight junction disruption. **Gut Microbes**. 3, 1-5.

8. Yashunsky, V., Lirtsman, V., Zilbershtein, A., Bein, A., Schwartz, B., **Aroeti, B**., Golosovsky, M., & Davidov, D. (2012) Surface plasmon based infrared spectroscopy for cell biosensing. **The Journal of Biomedical Optics** *17(8) 081409* (1-8).

9. Yashunsky, V., Zilbershtein, A., Lirtsman, V., Marciano, T., **Aroeti, B.,** Golosovsky, M., & Davidov, D. (2012) Infrared surface plasmon spectroscopy and biosensing. *8234, 823419-823419-7*

10. Zilbershtein, A., Golosovsky, M., Lirtsman, V., **Aroeti, B**., & Davidov, D. (2012) Quantitative surface plasmon spectroscopy: Determination of the infrared optical constants of living cells. **Vibrational Spectroscopy** *61, 43-49*.

11. Zahavi, EE., Lieberman, JA., Donnenberg, MS., Nitzan, M., Baruch, K., Rosenshine, I., Turner, JR., Melamed-Book, N., Feinstein, N., Zlotkin-Rivkin, E & **Aroeti, B.** (2011) Bundle-forming pilus retraction enhances enteropathogenic Escherichia coli infectivity. **Mol Biol Cell** *22*, 2436-2437. ***Highlighted by MBoC***.

12. Matto, M., Sklan, EH., David, N., Melamed-Book, N., Casanova, JE., Glenn, JS & **Aroeti, B**. (2011) Role for ADP ribosylation factor 1 in the regulation of hepatitis C virus replication. **J Virol.** *85*, 946-956.

13. Yashunsky, V., Lirtsman, V., Golosovsky, M., Davidov, D & **Aroeti,** B. (2010) Real-time monitoring of epithelial cell-cell and cell-substrate interactions by infrared surface plasmon spectroscopy. **Biophys J.** *99,* 4028-4036.

14. Simovitch, M., Sason, H., Cohen, S., Zahavi, EE., Melamed-Book, N., Weiss, A., **Aroeti, B**, & Rosenshine I. (2010) EspM inhibits pedestal formation by enterohaemorrhagic Escherichia coli and enteropathogenic E. coli and disrupts the architecture of a polarized epithelial monolayer. **Cell Microbiol.** *12,* 489-505.

15. Yashunsky, V., Shimron, S., Lirtsman, V., Weiss, AM., Melamed-Book, N., Golosovsky, M., Davidov, D & **Aroeti,** B. **(**2009) Real-time monitoring of transferrin-induced endocytic vesicle formation by mid-infrared surface plasmon resonance. **Biophys J**. *19,* 1003-12.

16. Sason, H., Milgrom, M., Weiss, AM., Melamed-Book, N., Balla, T., Grinstein, S., Backert, S., Rosenshine, I & **Aroeti** B. (2009) Enteropathogenic Escherichia coli subverts phosphatidylinositol 4,5-bisphosphate and phosphatidylinositol 3,4,5-trisphosphate upon epithelial cell infection. **Mol Biol Cell** *20*, 544-55.

17. Sklan, EH., Staschke, K., Oakes, M., Elazar, M., Winters, M., **Aroeti, B.,** Danieli, T & Glenn, J.S. (2007) A Rab-GAP TBC domain protein binds hepatitis C virus. **J. Virol.** *81*, 11096-11105.

18. Leyt, J., Melamed-Book, N.,Vaerman, J-P., Cohen, S., Weiss, A.M & **Aroeti, B**. (2007) Cholesterol-sensitive modulation of transcytosis. **Mol. Biol. Cell** *18*, 2057-2071.

19. Ziblat, R., Lirtsman, V., Davidov, D & **Aroeti, B.** (2006) Infrared surface plasmon resonance-a novel tool for real-time sensing of variations in living cells. **Biophys J.** 90, 2592-2599. *The paper has been selected for review in the 'News" section of Analytical Chemistry June 1st 2006, page 3485

20. Matto, M., Rice, C.M., **Aroeti, B*** & Glenn, J.S*. (2004) Hepatitis C virus core protein associates with detergent resistant membranes distinct from classical plasma membrane rafts. **J. Virol.***78*, 12047-12053. * Equal Contribution.

21. Shelly, M., Mosesson, Y., Citri, A., Lavi, S., Zwang, Y., Melamed-Book, N., **Aroeti, B &** Yarden, Y. (2003) Polar Expression of ErbB-2/HER2 in Epithelia: Bimodal Regulation by Lin-7. **Developmental Cell** *5*, 475-486.

22. Orzech, E., Livshits, L., Leyt, J., Okhrimenko, H., Reich, V., Cohen, S., Weiss, A., Melamed-Book, N., Lebendiker, M., Altschuler, Y & **Aroeti, B**. (2001) Interactions between AP-1 adaptor of the clathrin

coat and microtubules, potentially mediated via type 1a microtubule-associated proteins. **J. Biol. Chem**. *276*, 31340-31348.

23. Wang, E., Brown, P.S., **Aroeti, B**., Chapin, S.J., Mostov, K.E & Dunn, K.W. (2000) Apical and basolateral endocytic pathways of MDCK cells meet in acidic common endosomes distinct from a nearly-neutral apical recycling endosomes. **Traffic** *1*, 480-493.

24. Orzech, E., Cohen, S., Weiss, A & **Aroeti, B**. (2000) Interactions between the endocytic and exocytic pathways in polarized Madin Darby canine kidney cells. **J. Biol. Chem**. *275*, 15207-15219.

25. Brown, S.P., Wang, E., **Aroeti, B**., Chapin, S.J., Mostov, K & K. Dunn. (2000) Definition of distinct compartments in polarized Madin-Darby canine kidney (MDCK) cells for membrane-volume sorting, polarized sorting and apical recycling. **Traffic***1*, 124-140.

26. Orzech, E., Schlessinger, K., Weiss, A., Okamoto, T.C & **Aroeti, B**. (1999) Interactions of the AP-1 Golgi adaptor with the polymeric immunoglobulin receptor and their possible role in mediating BFA-sensitive basolateral targeting from the *trans*-Golgi network. **J. Biol. Chem**. *274*, 2201-2215.

27. Yelin, R., Steiner-Mordoch, S., **Aroeti, B** & Schuldiner, S. (1998) Glycosylation of a vesicular monoamine transporter: a mutation in a conserved proline residue affects the activity, glycosylation and localization of the transporter. **J. Neurochem**. *71*, 2518-2527.

28. Chapin, S,J., Enrich, C., **Aroeti, B**., Havel, R.J & Mostov, K.E. (1996) Calmodulin binds to the basolateral targeting signal of the polymeric immunoglobulin receptor. **J. Biol. Chem**. *271*, 1336-1342.

29. Reich,V., Mostov, K.E & **Aroeti, B.** (1996) The basolateral sorting signal of the polymeric immunoglobulin receptor contains two functional domains **J. Cell Science** *109*, 2133-2139.

30. **Aroeti, B** & Mostov, K.E. (1994) Polarized sorting of the polymeric immunoglobulin receptor in the exocytotic and endocytotic pathways is controlled by the same amino acids. **EMBO J.** *13*, 2297-2304.

31. Apodaca, G., **Aroeti, B**., Tang, K & Mostov, K.E. (1993) Brefeldin A inhibits the delivery of the polymeric immunoglobulin receptor to the basolateral surface of MDCK cells. **J. Biol. Chem**. *268*, 20380-20385.

32. **Aroeti, B**., Kosen, P.A., Kuntz, I.D., Cohen, F.E. & Mostov, K.E. (1993) Mutational and secondary structural analysis of the basolateral sorting signal of the polymeric immunoglobulin receptor. **J. Cell Biol.** *123*, 1149-1160.

33. Mostov, K., Apodaca, G., **Aroeti, B** & Okamoto, C. (1992) Plasma membrane protein sorting in polarized epithelial cells. **J. Cell Biol.** *116*, 577-583.

34. **Aroeti, B**., Gutman, O & Henis, Y.I. (1992) Transient alterations in the lateral mobility of erythrocyte membrane components during Sendai virus-mediated fusion. **J. Biol. Chem**. *267*, 13272-13277.

35. **Aroeti, B** & Henis, Y.I. (1991) Accumulation of Sendai virus glycoproteins in cell-cell contact regions and its role in cell fusion. **J. Biol. Chem**. *266*, 15845-15849.

36. **Aroeti, B**., Jovin, T.M & Henis, Y.I. (1990) Rotational mobility of Sendai virus glycoproteins in membranes of fused human erythrocytes and in the envelopes of cell-bound virions. **Biochemistry** *29*, 9119-9125.

37. Henis, Y. I., Herman-Barhom, Y., **Aroeti, B** & Gutman, O. (1989) Lateral mobility of both envelope proteins (F and HN) of Sendai virus in the cell membrane is essential for cell-cell fusion. **J. Biol. Chem**. *264*, 17119-17125.

38. **Aroeti, B** & Henis Y. I. (1988) Effects of fusion temperature on the lateral mobility of Sendai virus glycoproteins in erythrocyte membranes and on cell fusion indicate that glycoprotein mobilization is required for cell fusion. **Biochemistry** *27*, 5654-5661.

39. **Aroeti, B** & Henis, Y. I. (1988) Fusion of native Sendai virions with human erythrocytes: quantitation by fluorescence photobleaching recovery. **Exp. Cell Res**. *170*, 322-337.

40. **Aroeti, B** & Henis Y. I. (1986) Fluorescence photobleaching recovery as a method to quantitate viral envelope-cell fusion: application to study fusion of Sendai virus envelope with cells. **Biochemistry** *25*, 4588-4596.

41. **Aroeti, B** & Henis, Y. I. (1986) The lateral mobility of cell membrane components is not altered following cell fusion induced by Sendai virus. **Exp. Cell Res**. *162*, 243-254.

<u>Book Chapters and Invited Reviews/Editorials:</u>

1. **Aroeti, B.** and Kassa E. (2018). Stinging tight junctions with WASPS. **CMGH (editorial)** 5(3) 420-421.

2. Yashunsky V. & **Aroeti, B**. (2015) Infrared surface plasmon spectroscopy decodes cellular processes in epithelial host cells upon enteropathogenic *E. coli* infection; chapter 20. Ye Fang (ed.),

Label-Free Biosensor Methods in Drug Discovery, **Methods in Pharmacology and Toxicology**, © Springer Science+Business Media New York.

3. **Aroeti, B.,** Friedman, G., Zlotkin-Rivkin, E & Donnemberg, MS. (2012) Retraction of enteropathogenic E. coli type IV pili promotes efficient host cell colonization, effector translocation and tight junction disruption. **Gut Microbes** 3:3, 1-5.

4. Yashunsky, V., Zilbershtein, A., Lirtsman, V., Marciano, T., **Aroeti, B**., Golosovsky, M & Davidov, D. (2012) "Infrared surface plasmon spectroscopy and biosensing" in **Plasmonics in Biology and Medicine** *IX*, edited by Tuan Vo-Dinh, Joseph R. Lakowicz, Proceedings of SPIE Vol. 8234 (SPIE, Bellingham, WA) 823419.

5. Yashunsky, V ., Zilberstein, A., Marciano, T., Lirtsman, V., Golosovsky, M., **Aroeti, B** & Davidov, D. (2011) Studying Living Cells by Infrared Surface Plasmon Spectroscopy. **Chapter 6 In: Plasmoms: Structure, Properties**. Editor: Anton E. Turumen. Nova Science Publishers.

6. Golosovsky, M., Yashunsky, V., Zilberstein A., Marciano, T., Lirtsman, V., Davidov, D & **Aroeti, B**. (2010) Infrared surface plasmon spectroscopy of living cells. **Chapter 14 In Plasmons: Theory and Applications**. Editor: Kristina N. Helsey. Nova Science Publishers.

7. Golosovsky, M., Lirtsman, V., Yashunsky, V., Davidov, D & **Aroeti, B.** (2009) Mid-Infrared Surface-Plasmon-Resonance - a novel biophysical tool for studying living cells. **J. Appl. Phys.** *105*, 102036

8. Golosovsky, M., Davidov, D & **Aroeti, B.** (2008) SPR reaches new depths. **BioOptics World**. (***Invited Review***).

9. **Aroeti, B.,** Okhrimenko, H., Reich, V & Orzech, E. (1998) Polarized trafficking of plasma membrane proteins: emerging roles for coats, SNAREs, GTPases and their link to the cytoskeleton. **Biochim. Biophys. Acta-Biomembranes** *1376*, 57-90. (***Invited review***).

10. **Aroeti, B.,** Casanova, J., Okamoto, C., Cardone, M., Pollack, A., Tang, K & Mostov, K. (1991) The polymeric immunoglobulin receptor. In: Molecular Biology of Receptors and Transporters (Friedlander, M. and Mueckler, M. eds.) **International Review of Cytology** vol. *137B* Academic Press, Inc. pp. 157-168.