

AMIT ZEISEL, CURRICULUM VITAE

Address and personal:

Personal: Kfar Hamishtalmim 134/10, Technion, 3200003, Israel.

Work: Faculty of Biotechnology and Food Engineering, Technion, Israel.

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Date and Place of Birth: August 27, 1978, Kibbutz Eyal, Israel.

Marital Status: married +1.

Citizenship: Israeli.

Hobbies: Long distance running (marathon best time 2:49:13), Hiking.

Academic track:

2018-current: Principle investigator (Assistant professor), Faculty of Biotechnology and Food Engineering, Lorry I. Lokey, Interdisciplinary Center for Life Science and Engineering.

2013-2017: Postdoc in the group of Prof. Sten Linnarsson, division for molecular neurobiology. Main research topic, classification of cell-types in the mammalian brain using single-cell RNA-seq.

2012-2013: Postdoc in Prof. Eytan Domany's group. Department of physics of complex systems, Weizmann Institute of Science.

2012: PhD, in Computer Science and Applied Math, in Bioinformatics and Systems Biology, Weizmann Institute of Science.

2007: M.Sc in Civil and Environmental Engineering, (Summa Cum Laude), Technion, Israel Institute of Technology.

2005: B.Sc in Aerospace Engineering, (Summa Cum Laude), Technion, Israel Institute of Technology.

Theses:

2007 - 2011: PhD Thesis Development of mathematical and statistical methods and their application to the analysis of high throughput biological data under the supervision of Prof. Eytan Domany. Methods for analysis of high-throughput data of various types were developed and applied to a variety of experimental systems. The experiments were done in close collaboration with groups at Weizmann and elsewhere, covering topics such as cardiac development, transcriptional dynamics during signaling, DNA repair and more.

2005 - 2007: M.Sc. Thesis on the subject of wind wave generation. The research deals mainly with the solution of the stability problem of two viscous fluids with a wavy interface. More particularly, the perturbation model leads to a pair of Orr-Sommerfeld equations that are solved numerically under a specific base flow. Advisors: Prof. Michael Stiassnie and Prof. Yehuda Agnon.

2003 - 2004: Experimental research Project on a Mesoscale Combustor. The research deals with an experimental characterization of mesoscale combustors (millimeter scale), using parameters such as: burning intensity, stability temperature and efficacy. Advisors Prof. Yeshayahou Levy, Dr. Yaakov Goldman.

Lectures, presentations at meetings, seminars:

- Invited seminar, VIB Center for the Biology of Disease, KU Leuven, Belgium. May 2016. Cell types in the mouse brain as revealed by single-cell RNA-seq.
- RNA club, Gurdon Institute, Cambridge, UK. April 2016. Cell types in the mouse brain as revealed by single-cell RNA-seq.
- Neuroscience department seminar, Weizmann Institute of Science, Israel. April 2015. Cell types in mouse cerebral cortex revealed by single-cell RNA-seq.
- Ecole Polytechnique Federale de Lausanne, October 2011, Complex dynamics of transcription in cellular response.
- Centre for Genomic Regulation, Barcelona, September 2011, Complex dynamics of transcription in cellular response.
- Technion, Biophysics Seminar, June 2011, Dynamics of transcription during cellular response to stimulus.
- Cancer Research UK, Cambridge, September 2010. Unexpected complex dynamics of transcription cellular response.
- Annual meeting of the Society for Developmental Biology, San-Francisco July 2009. Implantation disorder related to impaired translation in the oocyte and in the resulting embryo.

Prizes and awards:

2014: Human frontiers science program fellowship.

2012: Student project grant award of the Azrieli Center for systems biology.

2012: The John F. Kennedy Prize, (Feinberg Graduate School award of excellence in recognition of accomplishments).

2008: Rina and Prof. Shragga Irmay Prize for research in fluid mechanics.

2006: Gutwirth Memorial Scholarship, (Awarded based on academic achievements and research activity).

2005: Rubin Prize winner in the field of propulsion for work on a joint RAFAEL-Technion two stage rocket project.

2005: Israeli annual Aerospace Conference student project contest winner for work on the Albatross project as part of the AIAA Design Build Fly international contest. The Albatross is a flying wing mini-UAV designed by the Technion student team.

Teaching Experience:

2005 - 06: Faculty of Civil and Environmental Engineering - Introduction to numerical methods (4 semesters).

2006: Faculty of Mathematics - Partial Differential Equations (1 semester).

References:

• Prof. Eytan Domany. Department of physics of complex systems, Weizmann institute of science, Israel. email: eytan.domany@weizmann.ac.il.

• Prof. Yosef Yarden. Department of biological regulation, Weizmann institute of science, Israel. email: yosef.yarden@weizmann.ac.il.

• Prof. Eldad Tzahor. Department of molecular cell biology, Weizmann institute of science, Israel. email: eldad.tzahor@weizmann.ac.il.

• Prof. Zvi Livneh. Department of biological chemistry, Weizmann institute of science, Israel. email: zvi.livneh@weizmann.ac.il.

• Prof. Sten Linnarsson. Department of Medical Biochemistry and Biophysics, Karolinska Institutet, Sweden. email: sten.linnarsson@ki.se.

• Prof. Goncalo Castelo-Branco. Department of Medical Biochemistry and Biophysics, Karolinska Institutet, Sweden. email: Goncalo.Castelo-Branco@ki.se.

• Prof. Gilad Silberberg. Department of Neuroscience, Karolinska Institutet, Sweden. email: gilad.silberberg@ki.se.

List of publications (chronological order):

*=equal first author

Postdoc period:

Zeisel A, Hochgerner H, Lönnerberg P, Johnsson A, Memic F, van der Zwan J, Häring M, Braun E, Borm LE, La Manno G, Codeluppi S, Furlan A, Lee K, Skene N, Harris KD, Hjerling-Leffler J, Arenas E, Ernfors P, Marklund U, Linnarsson S. Molecular architecture of the mouse nervous system. *Cell*. 2018 Aug 9;174(4).

Codeluppi, S. *, Borm, L.E. *, **Zeisel, A.**, La Manno, G., van Lunteren, J.A., Svensson, C.I., and Linnarsson, S. (2018). Spatial organization of the somatosensory cortex revealed by cyclic smFISH. *Nature Methods*, in press.

La Manno G, Soldatov R, **Zeisel A**, Braun E, Hochgerner H, Petukhov V, Lidschreiber K, Kastriiti ME, Lönnerberg P, Furlan A, Fan J, Borm LE, Liu Z, van Bruggen D, Guo J, He X, Barker R, Sundström E, Castelo-Branco G, Cramer P, Adameyko I, Linnarsson S, Kharchenko PV. RNA velocity in single cells. *Nature*, 2018 Aug 8.

Häring, M. *, **Zeisel, A. ***, Hochgerner, H. *, Rinwa, P., Jakobsson, J.E.T., Lönnerberg, P., la Manno, G., Sharma, N., Borgius, L., Kiehn, O., et al. (2018). Neuronal atlas of the dorsal horn defines its architecture and links sensory input to transcriptional cell types. *Nat. Neurosci*.

Hochgerner, H., Lönnerberg, P., Hodge, R., Mikes, J., Heskol, A., Hubschle, H., Lin, P., Picelli, S., La Manno, G., Ratz, M., Dunne, J., Husain, S., Lein, E., Srinivasan, M., **Zeisel, A. ***, Linnarsson, S. * (2017). STRT-seq-2i: Dual-index 5' single cell and nucleus RNA-seq on an addressable microwell array. *Sci. Rep.* 7.

Hochgerner, H. *, **Zeisel, A. ***, Lönnerberg, P., and Linnarsson, S. (2018). Conserved properties of dentate gyrus neurogenesis across postnatal development revealed by single-cell RNA sequencing. *Nat. Neurosci.* 21.

Romanov, R.A.*, **Zeisel, A.***, Bakker, J., Girach, F., Hellysaz, A., Tomer, R., Alpár, A., Mulder, J., Clotman, F., Keimpema, E., et al. (2016). Molecular interrogation of hypothalamic organization reveals distinct dopamine neuronal subtypes. *Nat. Neurosci.* 20, 176–188.

La Manno, G.*, Gyllborg, D.*, Codeluppi, S., Nishimura, K., Salto, C., **Zeisel, A.**, Borm, L.E., Stott, S.R.W., Toledo, E.M., Villaescusa, J.C., et al. (2016). Molecular Diversity of Midbrain Development in Mouse, Human, and Stem Cells. *Cell* 167, 566–580.e19.

Joost, S., **Zeisel, A.**, Jacob, T., Sun, X., La Manno, G., Lönnerberg, P., Linnarsson, S., and Kasper, M. (2016). Single-Cell Transcriptomics Reveals that Differentiation and Spatial Signatures Shape Epidermal and Hair Follicle Heterogeneity. *Cell Syst.* 3, 221–237.e9.

Marques, S.*, **Zeisel, A.***, Codeluppi, S., van Bruggen, D., Falcão, A.M., Xiao, L., Huiliang, L., Häring, M., Hochgerner, H., Romanov, R.A., Gyllborg, D., Manchado, A.B.M., La Manno, G., Lönnerberg, P., Floriddaia, E., Rezayee, F., Ernfors, P., Arenas, E., Hjerling-Leffler, J., Harkany, T., Richardson, W.D.,

Linnarsson, L., Castelo-Branco, G., (2016). Oligodendrocyte heterogeneity in the mouse juvenile and adult central nervous system. *Science* 352:1326-29.

Fuzik J*, **Zeisel A.***, Máté Z, Calvigioni D, Yanagawa Y, Szabó G, Linnarsson S & Harkany T (2015) Integration of electrophysiological recordings with single-cell RNA-seq data identifies neuronal subtypes. *Nat. Biotechnol.* 34: 175–183

Zeisel A.*, Machado ABM*, Codeluppi S, Lonnerberg P, La Manno G, Jureus A, Marques S, Munguba H, He L, Betsholtz C, Rolny C, Castelo-Branco G, Hjerling-Leffler J & Linnarsson S (2015) Cell types in the mouse cortex and hippocampus revealed by single-cell RNA-seq. *Science* (80-.). 347: 1138–42

Romanov RA, Alpar A, Zhang M-D, **Zeisel A**, Calas A, Landry M, Fuszard M, Shirran SL, Schnell R, Dobolyi A, Olah M, Spence L, Mulder J, Martens H, Palkovits M, Uhlen M, Sitte HH, Botting CH, Wagner L, Linnarsson S, et al (2015) A secretogin locus of the mammalian hypothalamus controls stress hormone release. *EMBO J.* 34: 36–54

Islam S, **Zeisel A.**, Joost S, La Manno G, Zajac P, Kasper M, Lönnerberg P & Linnarsson S (2014) Quantitative single-cell RNA-seq with unique molecular identifiers. *Nat. Methods* 11: 163–6

PhD period:

Fuks, G., Elgart, M., Amir, A., **Zeisel, A.**, Turnbaugh, P.J., Soen, Y., and Shental, N. (2018). Combining 16S rRNA gene variable regions enables high-resolution microbial community profiling. *Microbiome* 6.

Golan-Lavi, R., Giacomelli, C., Fuks, G., **Zeisel, A.**, Sonntag, J., Sinha, S., Köstler, W., Wiemann, S., Korf, U., Yarden, Y., et al. (2017). Coordinated Pulses of mRNA and of Protein Translation or Degradation Produce EGF-Induced Protein Bursts. *Cell Rep.* 18.

Cohen-Dvashi H, Ben-Chetrit N, Russell R, Carvalho S, Lauriola M, Nisani S, Mancini M, Nataraj N, Kedmi M, Roth L, Kostler W, **Zeisel A**, Yitzhaky A, Zylberg J, Tarcic G, Eilam R, Wigelman Y, Will R, Lavi S, Porat Z, et al (2015) Navigator-3, a modulator of cell migration, may act as a suppressor of breast cancer progression. *EMBO Mol. Med.* 7: 299–314

Ziv O, **Zeisel A**, Mirlas-Neisberg N, Swain U, Nevo R, Ben-Chetrit N, Martelli MP, Rossi R, Schiesser S, Canman CE, Carell T, Geacintov NE, Falini B, Domany E & Livneh Z (2014) Identification of novel DNA-damage tolerance genes reveals regulation of translesion DNA synthesis by nucleophosmin. *Nat. Commun.* 5: 5437

Plaks V*, Gershon E*, **Zeisel A***, Jacob-Hirsch J, Neeman M, Winterhager E, Rechavi G, Domany E & Dekel N (2014) Blastocyst implantation failure relates to impaired translational machinery gene expression. *Reproduction* 148: 87–98

Lauriola M, Euka Y, **Zeisel A**, D’Uva G, Roth L, Sharon-Sevilla M, Lindzen M, Sharma K, Nevo N, Feldman M, Carvalho S, Cohen-Dvashi H, Kedmi M, Ben-Chetrit N, Chen A, Solmi R, Wiemann S, Schmitt F, Domany E & Yarden Y (2014) Diurnal suppression of EGFR signalling by glucocorticoids and implications for tumour progression and treatment. *Nat. Commun.* 5: 5073

Fridmann-Sirkis Y, Stern S, Elgart M, Galili M, **Zeisel A**, Shental N & Soen Y (2014) Delayed development induced by toxicity to the host can be inherited by a bacterial-dependent, transgenerational effect. *Front. Genet.* 5:

Köstler WJ*, **Zeisel A***, Körner C*, Tsai JM, Jacob-Hirsch J, Ben-Chetrit N, Sharma K, Cohen-Dvashi H, Yitzhaky A, Lader E, Tschulena U, Rechavi G, Domany E, Wiemann S, Yarden Y, Pan Q, Shai O, Lee L, Frey B, Blencowe B, et al (2013) Epidermal Growth-Factor – Induced Transcript Isoform Variation Drives Mammary Cell Migration. *PLoS One* 8: e80566

Amir A*, **Zeisel A***, Zuk O*, Elgart M, Stern S, Shamir O, Turnbaugh PJ, Soen Y & Shental N (2013) High-resolution microbial community reconstruction by integrating short reads from multiple 16S rRNA regions. *Nucleic Acids Res.* 41:

Zeisel A, Yitzhaky A, Koerner C, Lauriola M, Cohen-Dvashi H, Köstler WJ, Yarden Y, Wiemann S & Domany E (2013) qCMA: a desktop application for quantitative collective cell migration analysis. *J. Biomol. Screen.* 18: 356–60

Zeisel A, Yitzhaky A, Bossel Ben-Moshe N & Domany E (2013) An accessible database for mouse and human whole transcriptome qPCR primers. *Bioinformatics* 29: 1355–1356

Bossel Ben-Moshe N, Avraham R, Kedmi M, **Zeisel A**, Yitzhaky A, Yarden Y & Domany E (2012) Context-specific microRNA analysis: Identification of functional microRNAs and their mRNA targets. *Nucleic Acids Res.* 40: 10614–10627

Pradeep C-R, **Zeisel A**, Köstler WJ, Lauriola M, Jacob-Hirsch J, Haibe-Kains B, Amariglio N, Ben-Chetrit N, Emde A, Solomonov I, Neufeld G, Piccart M, Sagi I, Sotiriou C, Rechavi G, Domany E, Desmedt C & Yarden Y (2012) Modeling invasive breast cancer: growth factors propel progression of HER2-positive premalignant lesions. *Oncogene* 31: 3569–83

Zeisel A*, Köstler WJ*, Molotski N, Tsai JM, Krauthgamer R, Jacob-Hirsch J, Rechavi G, Soen Y, Jung S, Yarden Y & Domany E (2011) Coupled pre-mRNA and mRNA dynamics unveil operational strategies underlying transcriptional responses to stimuli. *Mol. Syst. Biol.* 7: 529

Zeisel A*, Zuk O* & Domany E (2011) FDR control with adaptive procedures and FDR monotonicity. *Ann. Appl. Stat.* 5: 943–968

Zeisel A*, Amir A*, Köstler WJ & Domany E (2010) Intensity dependent estimation of noise in microarrays improves detection of differentially expressed genes. *BMC Bioinformatics* 11: 400

Tirosh-Finkel L*, **Zeisel A***, Brodt-Ivenshitz M*, Shamai A, Yao Z, Seger R, Domany E & Tzahor E (2010) BMP-mediated inhibition of FGF signaling promotes cardiomyocyte differentiation of anterior heart field progenitors. *Development* 137: 2989–3000

Avraham R, Sas-Chen A, Manor O, Steinfeld I, Shalgi R, Tarcic G, Bossel N, **Zeisel A**, Amit I, Zwang Y, Enerly E, Russnes HG, Biagioni F, Mottolese M, Strano S, Blandino G, Børresen-Dale A-L, Pilpel Y, Yakhini Z, Segal E, et al (2010) EGF decreases the abundance of microRNAs that restrain oncogenic transcription factors. *Sci. Signal.* 3: ra43

MSc period:

ZEISEL A, STIASSNIE M & AGNON Y (2008) Viscous effects on wave generation by strong winds. *J. Fluid Mech.* 597: 343–369