

The Genetics Society of Israel Annual Meeting 2016

The Hebrew University of Jerusalem
Edmond J. Safra Campus
Givat Ram

January 25, 2016

FRONTIERS IN GENETICS X

PROGRAM

MEETING ORGANIZER

Target Conferences Ltd.

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***Honorary Membership in the
Genetic Society of Israel
is awarded to***

Prof. Eliezer Lifschitz

from the

***Technion – Israel Institute of Technology,
Israel***

***We are indebted to you for your
contributions to
Genetics in Israel***

תואר חבר כבוד מוענק בשם
החברה לגנטיקה בישראל

לפרופ' אליעזר ליפשיץ

הטכניון מכון טכנולוגי לישראל

אנו מוקירים את תרומתך למחקר
בתחום הגנטיקה בישראל

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BOARD MEMBERS

Martin Kupiec, President, The Genetics Society of Israel
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ACKNOWLEDGEMENTS

The Organizing Committee would like to express its sincere thanks to:

IAFI (*International Academic Friends of Israel*)



Constantiner Institute for Molecular Genetics



The Hebrew University of Jerusalem



VENUE

Belgium House
The Hebrew University of Jerusalem
Edmond J. Safra Campus
Givat Ram

LANGUAGE

The Meeting will be conducted in English.

REGISTRATION / INFORMATION

A registration desk will operate during session hours.

NAME BADGE

Your name badge is included in the material which you received upon registration. Please wear your badge to all Meeting sessions.

ABSTRACTS

All abstracts can be found online at www.genetics2016.com

POSTERS

Posters will be on display for the duration of the Meeting. Presenters are requested to refer to pages 24-32 of the program book to find the board number assigned to them. Please use the poster board with the same number. Posters should be removed by the end of sessions. Please note that the organizers cannot be held responsible for posters that are not removed.

EXHIBITION

An exhibition will run alongside the Meeting hours. All participants are invited to view the exhibition.

MEETING ORGANIZERS

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EXHIBITORS

The Organizing Committee wishes to acknowledge the following companies, whose generous support by active participation in the Exhibition, have assisted towards the success of the Meeting.

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SCIENTIFIC PROGRAM

08:30 Registration

09:00 Opening Session **Auditorium**

Opening
Martin Kupiec, President, The Genetics Society of Israel

09:10 – 10:35 Session I **Auditorium**

Chair: Judy Berman, Tel Aviv University, Israel

09:10 THE MECHANISM OF THE SPLICED LEADER SILENCING (SLS)
LEADING TO PROGRAMMED CELL DEATH IN TRYPANOSOMA
BRUCEI
Shulamit Michaeli, Bar Ilan University, Israel

09:30 ENIGMAS IN VIRAL EVOLUTION
Adi Stern, Tel Aviv University, Israel

09:50 IDENTIFICATION AND VISUALISATION OF SPLICING AT THE SINGLE
CELL LEVEL
Tal Shay, Ben-Gurion University of the Negev, Israel

10:10 *Coffee and Exhibition Viewing*

10:40 – 12:25 Session II **Auditorium**

Chair: Yehuda Tzfati, The Hebrew University of Jerusalem, Israel

10:40 READING AND WRITING GENOMES IN 3D
Erez Lieberman-Aiden, Baylor University and Rice University, USA

11:25 CYTOPROTECTIVE STRESS RESPONSES REPROGRAM TUMOR
STROMA TO SUPPORT MALIGNANCY
Ruth Scherz-Shouval, Weizmann Institute of Science, Israel

11:45 THERAPEUTIC LEVELS OF IN VIVO GENE TARGETING WITHOUT
NUCLEASES
Adi Barzel, Tel Aviv University, Israel

SCIENTIFIC PROGRAM (continued)

11:05 – 12:25 **Session II Continued** **Auditorium**

12:05 SINGLE-CELL CHROMATIN IMMUNOPRECIPITATION REVEALS
PRINCIPLES OF CHROMATIN STATE HETEROGENEITY
Oren Ram, The Hebrew University of Jerusalem, Israel

12:25 *Lunch, Poster Session and Exhibition Viewing*

13:45 – 16:00 **Session III** **Auditorium**

Chair: Batsheva Kerem, The Hebrew University of Jerusalem

13:45 Genetics Society Assembly Meeting & Elections

14:00 YEAST RESPONSE TO MULTIPLE CARBON SOURCES: A CASE
STUDY OF COMBINATORIAL SIGNAL INTEGRATION
Yonatan Savir, Technion – Israel Institute of Technology, Israel

14:20 THE ROLE OF AUXIN IN TOMATO COMPOUND LEAF
DEVELOPMENT
Naomi Ori, The Hebrew University of Jerusalem (Rehovot), Israel

14:40 **Honorary Member Ceremony**
Eliezer Lifschitz, Technion – Israel Institute of Technology, Israel

15:00 *Coffee Break and Exhibition Viewing*

15:20 CHAPERONE-MEDIATED TRANSLATIONAL CONTROL IN
PROTEOSTASIS
Reut Shalgi, Rappaport Faculty of Medicine,
Technion – Israel Institute of Technology, Israel

15:40 SPATIAL TRANSCRIPTOMIC ANALYSIS OF THE C. ELEGANS
GERMLINE UNCOVERS ENTIRE TRANSCRIPTOME EXPRESSION
SWITCH
Yonatan Tzur, The Hebrew University of Jerusalem, Israel

16:00 Closing Remarks and Poster Prizes

INVITED SPEAKERS

Prof. Shulamit Michaeli was born in Israel in 1955. Michaeli obtained all her education in Tel-Aviv University (B.Sc summa cum laude), and was from the first students in the direct Ph.D student as the George S. Wise Faculty of Life Science. Michaeli obtained her Ph.D from the department of Microbiology under the supervision of Prof. Eliora Ron.



From 1985 to 1990 Michaeli was a post-doctoral fellow at the Intercampus program for Molecular Parasitology UC Berkeley-UCSF, California, under the guidance of Prof. Nina Agabian when she switched from working on bacteria to study the parasitic protozoans from the trypanosome family. From 1990 to 1999 Michaeli was a faculty member at the department of Biological Chemistry at the Weizmann Institute. In 1999 Michaeli moved to the Mina and Everard Goodman Faculty of Life Sciences as an Associate professor, where she is currently a Professor and the Dean. Michaeli is working on RNA metabolism in trypanosomes and mammalian cells.

She is mostly interested in trans-splicing, small RNAs, regulation by RNA modification and genes, silencing by RNAi its mechanism and utilization as anti-cancer and anti-parasitic drug.

1. Eliaz, D., Doniger, T., Tkacz I. D., Gupta, S.K., Kolev, N.G., Unger, R., Ullu, E., Tschudi, C., Michaeli S. 2015. Genome-wide analysis of small nucleolar RNAs of *Leishmania major* reveals a rich repertoire of RNAs involved in modification and processing of rRNA. *RNA Biology* **2(11)**:1222-55.
2. Hope, R., Ben-Mayor, E., Friedman, N., Voloshin, K., Biswas, D., Matas, D., Drori, Y., Günzl, A., **Michaeli, S.** 2014. Phosphorylation of the TATA-binding protein activates the spliced leader silencing pathway in *Trypanosoma brucei*. *Sci Signal.* **7**, ra85
3. Lellouche, E., Israel, L.L., Bechor, M., Attal, S., Kurlander, E., Dolitzky, Shaham, L., Izraeli, S., Lellouche, J-P*, **Michaeli, S***. 2015. MagRET nanoparticles: an iron oxide nanocomposite platform for gene silencing from microRNAs to long non-coding RNAs. *Bioconju. Chem* Jun 23. **26(8)**:1692-701.
4. **Michaeli, S.** 2015. The response of trypanosomes and other eukaryotes to ER stress and the spliced leader silencing (SLS) pathway in *Trypanosoma brucei*. *Crit Rev Biochem Mol Biol.* **19**: 1-12.

INVITED SPEAKERS (continued)

5. **Michaeli, S.** 2014. Non- coding RNA and the complex regulation of the trypanosome life cycle. *Curr Opin Microbiol.* **20C**, 146-152.
6. **Michaeli, S.**, Doniger, T., Gupta, S.K., Wurtzel, O., Romano, M., Visnovetzky, D., Sorek, R., Unger, R., Ullu, E. 2012. RNA-seq analysis of small RNPs in *Trypanosoma brucei* reveals a rich repertoire of non-coding RNAs. *Nucleic Acids Res.* **40**(3), 1282-1298
7. Goldshmidt H, Matas D, Kabi A, Carmi S, Hope R and **Michaeli S.** 2010. Persistent ER stress induces the spliced leader RNA silencing pathway (SLS) - leading to programmed cell death in *Trypanosoma brucei*. *PLoS Pathog.* **6**: e1000731.

INVITED SPEAKERS (continued)

Dr. Adi Stern studies the evolution of RNA viruses and their hosts. She began her scientific training in the lab of Prof. Tal Pupko, where she developed phylogenetic models and used them to study how HIV adapted to its host. In 2009 she began postdoctoral training in the lab of Prof. Rotem Sorek, where she studied co-evolution of bacteria and their parasite viruses, and in particular the newly discovered anti-phage system called CRISPR. In 2011 she continued on to a second post-doc working jointly in UCSF (Prof. Raul Andino) and UC Berkeley (Prof. Rasmus Nielsen), combining theoretical modeling, bioinformatics, and experimental evolution of RNA viruses. In 2014 she opened her new lab at Tel-Aviv University, where she continues to pursue her passion to uncover the set of probabilistic rules that govern RNA virus evolution.



Dr. Tal Shay started her academic career in the Hebrew University of Jerusalem studying Life Science and Computer Science. She then moved to the Weizmann Institute and did her master in Bioinformatics, segmentation and tracking cells in microscope images under the supervision of Profs. Zvi Kam and Achi Brandt. Tal started her PhD in the laboratory of Prof. Eytan Domany, studying the relationship between gene expression and DNA copy number in cancer. She joined Prof. Aviv Regev's lab in 2009 for her postdoctoral training where she worked on regulation of immune system differentiation. Tal joined Ben-Gurion University of the Negev as a principal investigator on January 2014. Her lab focuses on understanding the changes of the transcriptional network during activation of immune cells of different types, focusing on differences between individuals of different sex, age and species.



Selected Publications

1. Shay T, Jovic V, Zuk O, Rothamel K, Puyraimond-Zemmour D, Feng T, Wakamatsu E, Benoist C, Koller D, Regev A and the ImmGen Consortium (2013). Conservation and divergence in the transcriptional programs of human and mouse immune systems. *PNAS* 110(8): 2946-2951.
2. Jovic V, Shay T, Sylvia K, Zuk O, Sun X, Kang JK, Regev A, Koller D and the ImmGen Consortium (2013). Modularity and regulation of gene expression in the mouse immune system. *Nat Immunol* 14(6): 633-643.
3. Shay T and Kang J (2013). Immunological Genome project and systems immunology. *Trends Immunol* 34(12): 602-609.
4. Kim HD*, Shay T*, O'Shea EK and Regev A (2009). Transcriptional regulatory circuits: predicting numbers from alphabets. *Science* 325(5939): 429-432.

INVITED SPEAKERS (continued)

Prof. Erez Lieberman-Aiden

Erez Lieberman Aiden received his PhD from Harvard and MIT in 2010. After several years at Harvard's Society of Fellows and at Google as Visiting Faculty, he became Assistant Professor of Genetics at Baylor College of Medicine and of Computer Science and Applied Mathematics at Rice University.



Dr. Aiden's inventions include the Hi-C method for three-dimensional DNA sequencing, which enables scientists to examine how the two-meter long human genome folds up inside the tiny space of the cell nucleus. In 2014, his laboratory reported the first comprehensive map of loops across the human genome, mapping their anchors with single-base-pair resolution. In 2015, his lab showed that these loops form by extrusion, and that it is possible to add and remove loops and domains in a predictable fashion using targeted mutations as short as a single base pair.

Dr. Aiden's research has won numerous awards, including recognition for one of the top 20 "Biotech Breakthroughs that will Change Medicine", by Popular Mechanics, membership in Technology Review's 2009 TR35, recognizing the top 35 innovators under 35; and in Cell's 2014 40 Under 40. His work has been featured on the front page of the New York Times, the Boston Globe, the Wall Street Journal, and the Houston Chronicle. Three of his research papers have appeared on the cover of Nature and Science. In 2012, he received the President's Early Career Award in Science and Engineering, the highest government honor for young scientists, from Barack Obama. In 2015, his laboratory was recognized on the floor of the US House of Representatives for its discoveries about the structure of DNA.

Dr. Ruth Scherz-Shouval was born in Jerusalem. She began her academic career as a bachelor student in the Hebrew University of Jerusalem. During her bachelor degree she worked in Prof. David Engelberg's lab where she studied stress responses in yeast. Ruth then moved to the Weizmann Institute of Science for a direct PhD track, studying redox regulation of autophagy in Prof. Zvulun Elazar's lab. She performed a two-year postdoctoral fellowship in Prof. Moshe Oren's lab, studying the role of autophagy in cancer, before moving to the USA for her postdoctoral fellowship in Prof. Susan Lindquist's lab at the Whitehead Institute, MIT. Ruth's postdoctoral work focused on transcriptional regulation in the tumor microenvironment. Ruth joined the Weizmann Institute as principal investigator in August 2015. Her lab studies mechanisms of stromal reprogramming in the tumor microenvironment, with a specific focus on the role of stress responses in transcriptional reprogramming of tumor stroma.



1. Scherz R, Shinder V, and Engelberg D. (2001). "Anatomical analysis of *Saccharomyces cerevisiae* stalk-like structures reveals spatial organization and cell specialization". *J Bacteriol* 183(18):5402-13.
2. Scherz-Shouval R, Sagiv Y, Shorer H, and Elazar Z. (2003). "The C-terminus of GATE-16, an intra-Golgi transport modulator, is cleaved by the human cysteine protease HsApg4A". *J Biol Chem* 278(16): 3671-3678.
3. Elazar Z, Scherz-Shouval R, and Shorer H. (2003). "Involvement of LMA1 and GATE-16 family members in intracellular membrane dynamics". *Biochim Biophys Acta* 1641(2-3): 145-156.
4. Scherz-Shouval R, Shvets E, Fass E, Shorer H, Gil L, and Elazar Z. (2007). "Reactive oxygen species are essential for autophagy and specifically regulate the activity of Atg4". *EMBO J*, 26(7):1749-60.
5. Scherz-Shouval R, Shvets E, and Elazar Z. (2007). "Oxidation as a post-translational modification that regulates autophagy". *Autophagy*, 3: 371-373.
6. Scherz-Shouval R, and Elazar Z. (2007). "ROS, mitochondria and the regulation of autophagy". *TICB*, 17: 422-427.

INVITED SPEAKERS (continued)

7. Shvets E, Fass E, Scherz-Shouval R, and Elazar Z. (2008). "The N-terminus of LC3 is essential for p62/SQSTM1 recruitment into autophagosomes". *JCS*, 15;121(Pt 16):2685-95.
8. Scherz-Shouval R, and Elazar Z. (2008). "Monitoring starvation-induced reactive oxygen species formation". *Methods in Enzymology*, 452:119-30.
9. Scherz-Shouval R, Weidberg H, Gonen C, Wilder S, Elazar Z and Oren M. (2010). "p53-dependent regulation of autophagy protein LC3 supports cancer cell survival under prolonged starvation". *Proc Natl Acad Sci U S A*, 107(43):18511-6.
10. Scherz-Shouval R, and Elazar Z. (2011). "Regulation of autophagy by ROS: physiology and pathology". *Trends Biochem Sci*, 36(1):30-8. Invited review.
11. Vincent BM, Lancaster AK, Scherz-Shouval R, Whitesell L, and Lindquist S. (2013). "Fitness Costs Restrict the Evolution of Resistance to Amphotericin B in *Candida*". *PLOS Biology*, 11(10):e1001692.
12. Wijeratne EM, Xu YM, Scherz-Shouval R, Marron MT, Rocha DD, Liu MX, Costa-Lotufo LV, Santagata S, Lindquist S, Whitesell L, and Gunatilaka AA. (2014). "Structure-Activity Relationships for Withanolides as Inducers of the Cellular Heat-Shock Response". *J Med Chem*, PMID 24625088.
13. Scherz-Shouval R, Santagata S, Mendillo ML, Sholl LM, Ben-Aharon I, Beck AH, Dias-Santagata D, Stemmer SM, Koeva M, Whitesell L, and Lindquist S. (2014). "The reprogramming of tumor stroma by HSF1 is a potent enabler of malignancy". *Cell*, 158(3) 564-78.
14. Bagley AF, Scherz-Shouval R, Galie PA, Zhang AQ, Wyckoff J, Whitesell L, Chen CS, Lindquist S, and Bhatia SN. (2015). "Endothelial thermotolerance impairs nanoparticle transport in tumors". *Cancer Research*, 75(16):3255-67. DOI: 10.1158/0008-5472.

Dr. Adi Barzel began his academic career in Tel Aviv University, as a student in the Adi Lautman interdisciplinary program for outstanding students. Adi did his graduate studies under the supervision of Professor Martin Kupiec at Tel Aviv University, studying the mechanism of homologous recombination in yeast as well as the biology and application of homing endonucleases. Adi then joined Professor Mark Kay at Stanford University for his postdoctoral training where he studied gene targeting in mammals using adeno associated viral



vectors. Adi has developed a new gene therapy technology entitled GeneRide and has implemented it to ameliorate several genetic diseases in mice. Adi is starting a new gene therapy lab in the department of biochemistry in Tel Aviv University in the coming April. In addition to his academic pursuits, Adi is also a co-founder of LogicBio, a gene therapy start-up hoping to translate the GeneRide technology to the clinic.

Selected Publications:

1. Barzel A and Kupiec M, (2008) "Finding a match: how do homologous sequences get together for recombination?" *Nature Rev Genet.* 2008 Jan;9(1):27-37.
2. Barzel A*, Privman E*, Peeri M, Naor A, Shachar E, Burstein D, Lazary R, Gophna U, Pupko T, Kupiec M, "Native homing endonucleases can target conserved genes in humans and in animal models" *Nucleic Acids Research.* 2011 Aug;39(15):6646-59.
3. Barzel A, Obolski U, Gogarten JP, Kupiec M, Hadany L, "Home and away- the evolutionary dynamics of homing endonucleases" *BMC Evolutionary Biology.* 2011 Nov 4;11:324.
4. Barzel, A., Paulk, N.K., Shi, Y., Huang, Y., Chu, K., Zhang, F., Valdmans, P.N., Spector, L.P., Porteus, M.H., Gaensler, K.M. and Kay, M.A., (2014) "Promoterless gene targeting without nucleases ameliorates haemophilia B in mice" *Nature.* 2015 Jan 15;517(7534):360-4.

INVITED SPEAKERS (continued)

Dr. Oren Ram joined the Silberman Institute of Life Sciences as Senior Lecturer in July 2015. As a PhD student at Tel Aviv medical school he studied the combinatorial aspect of alternative splicing. From 2010, he was a postdoctoral at Harvard medical school and Broad institute of MIT and Harvard. During this time, he studied epigenomic regulation and devised novel technologies that enable better understanding of cellular states. His most recent achievement was an innovative single-cell ChIP-seq microfluidic technology, which he used to infer subpopulations of cells based on their distinct histone modification profiles. His research interests are: Epigenomics, chromatin regulation, cellular differentiation, heterogeneity in biological systems and computational biology.



Key publications: * = Equal contribution

1. Rotem A*, **Ram O***, Shores N*, Sperling R, A Goren, Weitz A D and Bernstein E, B. *Single-cell ChIP-seq reveals cell subpopulations defined by chromatin state.* **Nat Biotechnology.** 2015.
2. Rotem A*, **Ram O***, Sperling, R. A., Schnall-Levin Michael, Shores N., Zhang, H., Basu, A., Bernstein, B.E., and Weitz, D.A. *High-Throughput Single Cell Labeling (Hi-SCL) for RNA-Seq using drop-based microfluidics.* **PLoS One.** 2015
3. **Ram O**, Goren A, Amit I, Shores N, Yosef N, Ernst J, Kellis M, Gymrek M, Issner R, Coyne M, Durham T, Zhang X, Donaghey J, Epstein C.B, Regev A and Bernstein BE. *Combinatorial patterning of chromatin regulators uncovered by genome-wide location analysis in human cells.* **Cell.** 147(7):1628-39, 2011.
4. Lev-Maor G*, **Ram O***, Kim E, Sela N, Goren A and Ast G. *Intronic Alus influence alternative splicing.* **PLoS Genet.** 4(9), 2008.
5. **Ram O**, Schwartz S and Ast G. *Multifactorial interplay controls the plicing profile of Alu derived exons.* **Mol Cell Biol.** 28(10):3513-25. 2008.
6. Goren A*, **Ram O***, Amit M, Keren H, Lev-Maor G, Vig I, Pupko T and Ast G. *Comparative analysis identifies exonic splicing regulatory sequences—The complex definition of enhancers and silencers.* **Mol Cell.** 22(6):769-81. 2006.
7. Schwartz S*, **Ram O*** and Ast G. *Detection and removal of biases in the analysis of next-generation sequencing reads.* **PLoS One.** 6(1). 2011.

INVITED SPEAKERS (continued)

Dr. Yonatan Savir received his Bachelor's degree from the Technion in Electrical Engineering and Physics and his PhD from the Dept. of physics of Complex Systems at the Weizmann Institute. He did his postdoctoral training at the Dept. of Systems Biology at Harvard Medical School. Dr. Savir joined the Faculty of Medicine at the Technion as a principal investigator in October 2015. His lab focuses on studying, both experimentally and theoretically, the signal processing that links nutrient sensing, uptake, growth rate and understating its system level failure in disease and in aged cells.



INVITED SPEAKERS (continued)

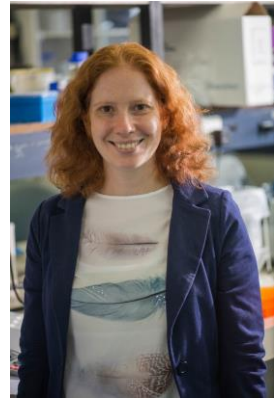
Dr. Naomi Ori was born in Kibbutz Sasa in the north of Israel. In her PhD research in the laboratory of Prof. Robert Fluhr at the Weizmann Institute of Science, she investigated the plant response to pathogens, and isolated the gene conferring resistance to a fungal disease in tomato. In her postdoctoral training in the laboratory of Prof. Sarah Hake in UC Berkeley, she entered the field of plant developmental biology, studying the function of the shoot apical meristem, responsible for producing organs throughout the life of the plant. In 2001 she joined the Faculty of agriculture of the Hebrew University. The main focus of her research is understanding the flexibility with which plants produce organs and design form. She uses mainly leaf development in tomato to address these questions.



Selected publications:

1. Ori, N., Eshed, Y., Chuck, G. Bowman, J. L. and Hake, S. (2000). Mechanisms that control knox gene expression in the Arabidopsis shoot. *Development* 127, 5523-5532.
2. Yanai, O., Shani, E., Doezaal, K., Tarkowski, P., Sablowski, R., Sandberg, G., Samach, A., and Ori, N. (2005). Arabidopsis KNOX1 proteins activate cytokinin biosynthesis. *Current Biology* 15, 1566-1571.
3. Ori, N., Refael-Cohen, A., Etzioni, A., Brand, A., Yanai, O., Shleizer, S., Menda, N., Amsellem, Z., Efroni, I., Pekker, I., Alvarez, J.P., Blum, E., Zamir, D. and Eshed, Y. (2007). Regulation of LANCEOLATE by miR319 is required for compound-leaf development in tomato. *Nature Genetics*, 39, 787 – 791.
4. Berger, Y., Harpaz – Saad, S., Brand, A., Melnik, H., Sirding, N., Alvarez, J.P., Zinder, M., Samach, A., Eshed, Y., and Ori, N. (2009). The NAC-domain transcription factor GOBLET specifies leaflet boundaries in compound tomato leaves. *Development*, 136, 823-832.
5. Shani, E., Ben-Gera, H., Shleizer-Burko, S., Burko, Y., Weiss, D. and Ori, N. (2010). Cytokinin regulates compound leaf development in tomato. *Plant Cell* 22, 3206-3217
6. Ben Gera, H., Shwartz, I., Shao, M. R., Shani, E., Estelle, M. and Ori, N. (2012). ENTIRE and GOBLET promote leaflet development in tomato by modulating auxin response. *Plant J.*, 70, 903-915.
7. Burko, Y., Shleizer-Burko, S., Yanai, O., Shwartz, I., Zelnik, I.D., Jacob-Hirsch, J., Kela, I., Eshed-Williams, L. and Ori N. (2013). A role for APETALA1/FRUITFULL transcription factors in tomato leaf development. *Plant Cell*, 25, 2070-2083.
8. Bar, M., Ben-Herzel, O. Kohay, H., Stein, I. and Ori, N. (2015). CLAUSA restricts tomato leaf morphogenesis and GOBLET expression. *Plant J.*, 83, 888-902.

Dr. Reut Shalgi received her B.Sc. from Tel-Aviv University in Biology and Computer Science. She then continued in her M.Sc. and Ph.D. studies at the Weizmann Institute of Science, where she studied microRNA regulation in cancer and senescence, combining molecular and computational biology, in the labs of Prof. Moshe Oren and Prof. Yitzhak Pilpel. At the end of 2009, Reut moved to Boston to pursue her postdoctoral studies, and became a postdoctoral fellow with Prof. Chris Burge at the Department of Biology at MIT and Prof. Susan Lindquist at the Whitehead Institute. During her postdoctoral studies, Reut discovered a novel mechanism of translational control in mammalian cells, elongation pausing, and that molecular chaperones are involved in translational control under proteotoxic stress. Reut returned to Israel in October 2014, and joined the Rappaport Faculty of Medicine at the Technion as a PI. Her lab is interested in translational control and ribosome-associated chaperones in stress and protein folding diseases, in particular neurodegeneration.



Selected Publications:

1. Shalgi, R., Hurt, J. A., Lindquist, S. & Burge, C. B. (2014). Widespread inhibition of post-transcriptional splicing shapes the cellular transcriptome following heat shock. *Cell Reports* 7, 1362-1370.
2. Shalgi, R., Hurt, J. A., Krykbaeva, I., Taipale, M., Lindquist, S. & Burge, C. B. (2013). Widespread regulation of translation by elongation pausing in heat shock. *Molecular Cell* 49, 439-452.
3. Shalgi, R., Pilpel, Y. & Oren, M. (2010). Repression of transposable-elements - a microRNA anti-cancer defense mechanism? *Trends Genet* 26, 253-259.
4. Christoffersen, N. R., Shalgi, R., Frankel, L. B., Leucci, E., Lees, M., Klausen, M., Pilpel, Y., Nielsen, F. C., Oren, M. & Lund, A. H. (2010). p53-independent upregulation of miR-34a during oncogene-induced senescence represses MYC. *Cell Death Differ* 17, 236-245.
5. Shalgi, R., Brosh, R., Oren, M., Pilpel, Y. & Rotter, V. (2009). Coupling transcriptional and post-transcriptional miRNA regulation in the control of cell fate. *Aging (Albany NY)* 1, 762-770.
6. Brosh, R.*, Shalgi, R.*, Liran, A., Landan, G., Korotayev, K., Nguyen, G. H., Enerly, E., Johnsen, H., Buganim, Y., Solomon, H., Goldstein, I., Madar, S., Goldfinger, N., Borresen-Dale, A. L., Ginsberg, D., Harris, C. C., Pilpel, Y., Oren, M. & Rotter, V. (2008). p53-Repressed miRNAs are involved with E2F in a feed-forward loop promoting proliferation. *Mol Syst Biol* 4, 229. *These authors equally contributed to this work.

INVITED SPEAKERS (continued)

Dr. Yonatan Tzur was born in Jerusalem, and in 1996 he began his academic career at the Hebrew University of Jerusalem. He started his scientific career working on structural and developmental aspects of apoptosis in the laboratory of Professor Yosef Gruenbaum. Yonatan focused on uncovering the molecular mechanism that enable the transfer of the apoptotic signal from the cytoplasm to the nucleus. He joined Prof. Colaiacovo's lab on 2008 for his postdoctoral training where he worked on chromosome dynamics through the meiotic cell divisions and developed the CRISPR-Cas technology in *C. elegans*. Yonatan joined the Hebrew University of Jerusalem as a principal investigator on September 2014. His lab focuses on understanding the reason for the age related failure of chromosome segregations during oogenesis, and the gene expression function that drives gametogenesis by cytology, transcriptomics and genome engineering tools.



Selected Publications

1. **Tzur, Y. B.**, Winter, E., Gau, Jin-Min, Hashimshony, T, Yanai, I., Colaiácovo, M. P. (2015) Spatial transcriptomic analysis of the *C. elegans* germline uncovers a syncytial expression switch. *Nat. Com.*, Submitted.
2. Nadarajan, S., Mohideen, F., **Tzur Y. B.**, Ferrandiz, N., Crawley, O., Montoya, A., Faull, P., Snijders, A. P., Cutillas, P., Jambhekar., A., Arur, S., Blower, M., Schedl, T., Martinez-Perez, E., Harper, W. J., Colaiácovo M. P. (2015) The MAP kinase signaling pathway coordinates crossover designation with synaptonemal complex disassembly during meiosis. *eLIFE*. Submitted.
3. **Tzur, Y. B.**, Friedland, A. E., Nadarajan, S., Church, G. M., Calarco, J. A., Colaiácovo, M. P. (2013) Heritable custom genomic modifications in *C. elegans* via a CRISPR-Cas9 system. *Genetics*. 195: 1181-1185.
4. Friedland, A.E., **Tzur, Y.B.**, Esvelt, K.M., Colaiácovo, M.P., Church, G.M., Calarco, J.A. (2013). Heritable genome editing in *C. elegans* via CRISPR-Cas system. *Nat. Methods*. 10(8), 741-743.
5. **Tzur, Y. B.**, de Carvalho. C.E. , van Bostelen, I., Gu, Y., Chu, D.S., Cheeseman, I.M., Colaiácovo, M.P. (2012). LAB-1 Targets PP1 and Restricts Aurora B Kinase upon Entrance into Meiosis to Promote Sister Chromatid Cohesion. *PLoS Biol*. 10(8):e1001378.
6. **Tzur, Y. B.**, Colaiácovo, M.P. (2009). Genetics: Crossover control in two steps. *Nature* 462, 46-47.

7. **Tzur, Y. B.**, Margalit, A., Melamed-Book, N., Gruenbaum, Y. (2006). Matefin/SUN-1 is CED-4 receptor at the nuclear envelope. *Proc. Natl. Acad. Sci. USA* 103, 13397-13402.
8. **Tzur, Y. B.**, Wilson, K.L., Gruenbaum, Y. (2006). SUN-domain proteins: 'velcro' that links nucleoskeleton to cytoskeleton, *Nat. Rev. Cell. Mol. Biol.* 10,782-788. PMID: 16926857.
9. **Tzur, Y. B.**, Hersh, B. M., Horvitz, H. R., Gruenbaum, Y. (2002). Fate of the nuclear lamina during *Caenorhabditis elegans* apoptosis. *J. Struct. Biol.* 137, 146-153.
10. **Tzur, Y.B.**, Gruenbaum, Y. (2002). Nuclear envelope breakdown and reassembly in *C. elegans*: Evolutionary aspects of lamina structure and function. In "*Dynamics of Nuclear Envelope Assembly in Embryos and Somatic Cells*" Landes Bioscience (USA) Ed. Philippe Collas. 8, 103-111.
11. Cohen, M., **Tzur, Y. B.**, Neufeld, E., Feinstein, N., Delannoy, M. R., Wilson, K. L., Gruenbaum, Y. (2002). Transmission electron microscope studies of the nuclear envelope in *Caenorhabditis elegans* embryos. *J. Struct. Biol.* 140, 232-240.

POSTER PRESENTATIONS

Board No:

1. THE NEW SYNDROME OF HYPOGONADOTROPIC HYPOGONADISM
ARRHYTHMOGENIC RIGHT VENTRICULAR DYSPLASIA, FACIAL
DYSMORPHISM AND ABSENCE OF CORPUS CALLOSUM IS
ASSOCIATED TO TAX1 BINDING PROTEIN GENE MUTATION
Maram Arafat
The Shraga Segal Department of Microbiology, Immunology and
Genetics, Ben-Gurion University of the Negev, Beer Sheva, Israel
2. THE EFFECTS OF THE LENGTH HOMOLOGY ON THE SELECTION OF
DOUBLE-STRAND BREAKS REPAIR, ECTOPIC OR ALLELIC RECOMBINATION
IN SACCHAROMYCES CEREVISIAE
Serkalem Ayanaw, Martin Kupiec
Department of Molecular Microbiology and Biotechnology, Wise
Faculty of Life Sciences, Tel Aviv University, Tel Aviv, Israel
3. DECIPHERING THE NETWORK OF PPI AMONG HUMAN COMPLEX I
SUBUNITS
Gilad Barshad, Maya Schuldiner, Dan Mishmar
Department of Life Sciences, Ben- Gurion University in the Negev,
Be'er Sheva, Israel, Department of Molecular Genetics,
Weizmann Institute of Science, Rehovot, Israel
4. MITOCHONDRIAL 16S RRNA IS METHYLATED BY TRNA
METHYLTRANSFERASE TRMT61B IN ALL VERTEBRATES
Dan Bar-Yaacov, Idan Frumkin, Yuka Yashiro, Takeshi Chujo,
Yonatan Chemla, Amit Blumberg, Orr Schlesinger, Philipp Bieri,
Basil Greber, Nenad Ban, Raz Zarivach, Lital Alfonta, Yitzhak Pilpel,
Tsutomu Suzuki, Dan Mishmar
Department of Molecular Genetics, Weizmann Institute of Science,
Rehovot, Israel, Department of Life Sciences, Ben-Gurion University of
the Negev, Beer Sheva, Israel
5. EXPRESSION HOMEOSTASIS DURING DNA REPLICATION
Yoav Voichek, **Raz Bar-Ziv**, Naama Barkai
Molecular Genetics, Weizmann Institute of Science, Rehovot, Israel

POSTER PRESENTATIONS (continued)

6. MILD INHIBITION OF TRANSLATION AS A NOVEL THERAPEUTIC APPROACH FOR RARE CONFORMATIONAL DISEASES: WHICH WAY THE MUTANT AGT WILL GO?
Ruth Belostotsky, Roman Lyakhovetsky, Yaacov Frishberg
Pediatric Nephrology, Shaare Zedek Medical Center, Jerusalem, Israel
7. DYNAMIC REGULATION OF THE HISTONE VARIANT H1.0 GENERATES INTRATUMOR EPIGENETIC AND FUNCTIONAL HETEROGENEITY
Alva Biran, Cristina Morales Torres, Ayelet-Hashacher Shapira Cohen, Paola Scaffidi, Eran Meshorer
Department of Genetics, Institute of Life Sciences, the Hebrew University of Jerusalem, Jerusalem, Israel, The Edmond and Lily Center for Brain Sciences (Elsc), The Hebrew University of Jerusalem, Jerusalem, Israel
8. NOVEL NGS-BASED APPROACH TO ANALYZE MTDNA TRANSCRIPTION INITIATION: A QUANTITATIVE INSIGHT INTO DIVERSE TISSUES AND ORGANISMS
Amit Blumberg, Charles Danko, Dan Mishmar
Department of Life Sciences, Ben-Gurion University of the Negev, Beer Sheva, Israel
9. REGULATION OF COORDINATION BETWEEN DNA REPLICATION AND TELOMERE ELONGATION MECHANISMS
Shay Bramson, Martin Kupiec
Molecular Microbiology and Biotechnology, Tel Aviv University, Tel Aviv, Israel
10. ANCIENT OUT OF AFRICA MITOCHONDRIAL DNA VARIANTS ASSOCIATE WITH DISTINCT MITOCHONDRIAL GENE EXPRESSION PATTERNS
Tal Cohen, Liron Levin, Dan Mishmar
Department of Life Sciences, Ben-Gurion University of the Negev, Be'er Sheva, Israel

POSTER PRESENTATIONS (continued)

11. MiR181A REGULATORY PATHWAY IN THE INNER EAR
Maya Enoch, Kathy Ushakov, Tal Koffler, Yoni Bhonker, Anya Rudnicki, Karen B. Avraham
Department of Human Molecular Genetics and Biochemistry,
Sackler Faculty of Medicine Tel Aviv University, Tel Aviv, Israel
12. ACCELERATION IN DISCOVERING PATHOGENIC VARIANTS CAUSING HEARING LOSS BY NEXT GENERATION SEQUENCING
Nada Daniel-Farran, Luna Tamer, Zippora Brownstein, Fabio T.A. Martins, Morad Khayat, Gil Ast, Stavit Allon-Shalev, Karen B. Avraham
Human Genetics, Sackler Faculty of Medicine/tel Aviv University,
Tel Aviv, Israel, Human Genetics, The Ruth and Bruce Rappaport Faculty of Medicine, Technion Israel Institute of Technology, Haifa, Israel
13. HISTONE H3 LYSINE K56 HYPER ACETYLATION IS REGULATED BY CTF18 AND DUN1 IN ONE PATHWAY AND ELG1 IN ANOTHER
Lihl Gershon, Martin Kupiec
Molecular Microbiology and Biotechnology, Tel Aviv University, Tel Aviv, Israel
14. HUMAN SEX-SPECIFIC GENE EXPRESSION
Moran Gershoni, Moran Gershoni, Shmuel Pietrokovski
Department of Molecular Genetics, Weizmann Institute of Science, Rehovot, Israel
15. THE KEY FACTORS OF MRNA LOCALIZATION MECHANISM IN MATING PROCESS IN YEAST
Polina Geva, Stella Aronov
Molecular Biology, Ariel University, Ariel, Israel , Mina and Everard Goodman Faculty of Life Sciences, Bar Ilan, Ramat Gan, Israel
16. GENE ORGANIZER: PHENOTYPIC ANALYSIS OF GENE-ORGAN ASSOCIATIONS
David Gokhman, Guy Kelman, Adir Amartely, Guy Gershon, Shira Tsur, Liran Carmel
Genetics, The Hebrew University of Jerusalem, Israel

POSTER PRESENTATIONS (continued)

17. THE EFFECTS OF DNA DAMAGE RESPONSE PLOIDY AND MATING TYPE ON DNA DAMAGE REPAIR IN SACCHAROMYCES CEREVISIAE
Gilad Grinberg, Martin Kupiec
Molecular Microbiology and Biotechnology, Tel Aviv University, Tel Aviv, Israel
18. TORC2 AND ITS EFFECT ON HETEROCHROMATIC REGIONS
Aline Habib, Adiel Cohen, Martin Kupiec, Ronit Weisman
Molecular Microbiology and Biotechnology, Tel Aviv University, Tel Aviv, Israel
19. DATA MINING OF MINIATURE TRANSPOSABLE ELEMENTS IN FOUR TRITICUM AND AEGILOPS GENOME DRAFTS
Danielle Keidar, Khalil Kashkush
Department of Life Sciences, Ben Gurion University of the Negev, Beer Sheva, Israel
20. THE GENOMIC LANDSCAPE OF EVOLUTIONARY CONVERGENCE IN ALL AMNIOTES
Liron Levin, Dan Mishmar
Department of Life Sciences, Ben-Gurion University of the Negev, Beer Sheva, Israel
21. RAPID TELOMERE SHORTENINGS IN THE ABSENCE OF RNR1 OCCUR INDEPENDENTLY OF REDUCED CELLULAR DNTP POOLS AND CANNOT BE RESCUED BY INCREASED TELOMERASE ACTIVITY
Andre Maicher, Inbal Gazy, Andrei Chabes, Martin Kupiec
Department of Microbiology and Biotechnology, Tel Aviv University, Tel Aviv
22. LEPTIN AND INSULIN UP-REGULATE MIR-4443 TO SUPPRESS NCOA1 AND TRAF4, AND DECREASE THE INVASIVENESS OF HUMAN COLON CANCER CELLS
Ari Meerson, Hila Yehuda
Molecular Biology of Chronic Diseases, Migal Galilee Research Institute Ltd, Kiryat Shmona, Israel

POSTER PRESENTATIONS (continued)

23. IN HOUSE MRNASEQ PROTOCOL DEMONSTRATED ACCURATE AND REPRODUCIBLE DATA AS COMPARE TO THE ILLUMINA TRUSEQ RNASEQ KIT
Shmulik Motola, Dan Ben-Avraham, Sima Benjamin, Gilgi Friedlander, Tali Shalit, Shlomit Gilad
G Incpm, Weizmann Institute of Science, Rehovot, Israel

24. IDENTIFICATION OF BREAST CANCER SUBTYPES USING MULTI-OMIC HIGH-THROUGHPUT GENOMIC DATA
Dvir Netanely, Ayelet Avraham, Adit Ben-Baruch, Ella Evron, Ron Shamir
Blavatnik School of Computer Science, Tel Aviv University, Israel

25. C-TO-U RNA EDITING IN C. ELEGANS
Yomiran Nissan, Orna Ben-Naim Zgayer, Ayelet T. Lamm
Department of Biology, Technion – Israel Institute of Technology, Haifa, Israel

26. 3-D CHROMOSOMAL DOMAINS AND THEIR RELATION TO GENOMIC FUNCTION
Idan Nurick, Michal Ozery-Flato, Liat Ein-Dor, Ron Shamir
Blavatnik School of Computer Science, Tel Aviv University, Tel Aviv, Israel

27. A SINGLE POLYCOMB GROUP COMPLEX TARGET GENE TRIGGERS PARTHENOGENESIS IN PHYSCOMITRELLA PATENS
Idan Pereman, Nelly Horst, Aviva Katz, Eva Decker, Ralf Reski, **Nir Ohad**
Department of Molecular Biology and Ecology of Plants, Tel Aviv University, Tel Aviv, Israel, The Manna Center Program for Food Safety & Security, Tel Aviv University, Tel Aviv, Israel

POSTER PRESENTATIONS (continued)

28. UNC80 MUTATION CAUSES A SYNDROME OF HYPOTONIA, SEVERE INTELLECTUAL DISABILITY, DYSKINESIA AND DYSMORPHISM, SIMILAR TO THAT CAUSED BY MUTATIONS IN ITS INTERACTING CATION CHANNEL NALCN
Yonatan Perez, Rotem Kadir, Michael Volodarsky, Iris Noyman, Hagit Flusser, Zamir Shorer, Libe Gradstein, Ramon Y. Birnbaum, Ohad S. Birk
The Shraga Segal Department of Microbiology, Immunology & Genetics, Faculty of Health Sciences, Ben-Gurion University of the Negev, Beer Sheva, Israel
29. AMINO ACID METABOLISM AND TOR SIGNALING IN FISSION YEAST
Sophie Raydman, Martin Kupiec, Ronit Weisman
Molecular Microbiology and Biotechnology, Tel Aviv University, Tel Aviv, Israel
30. ASSOCIATION BETWEEN COPY-NUMBER VARIATIONS (CNVS) AND SAVANT SKILLS AMONG PEOPLE WITH AUTISM SPECTRUM DISORDER (ASD)
Hila Rosenthal, Idan Menashe
The Department of Brain and Cognitive Sciences, Ben-Gurion University of the Negev, Beersheba, Israel
31. DNA:RNA HYBRIDS AT HUMAN TELOMERES ARE DEPENDENT ON TERRA LEVELS AND ASSOCIATED WITH DYSFUNCTIONAL TELOMERES
Shira Sagie, Stella Hartono, Fred Chedin, Sara Selig
Molecular Medicine Lab, The Ruth and Bruce Rappaport Faculty of Medicine, Technion - Israel Institute of Technology and Rambam Health Care Campus, Haifa, Israel
32. A NOVEL-NON CLASSICAL REPLICATION STRESS FOUND IN ONCOGENE EXPRESSING CELLS
Dan Sarni, Batsheva Kerem
Department of Genetics, Institute of Life Sciences, The Hebrew University of Jerusalem, Jerusalem, Israel

POSTER PRESENTATIONS (continued)

33. MAINTENANCE OF GENOME STABILITY BY YEAST ELG1 GENE
Soumitra Sau, Keren Shemesh, Dganit Shkedy, Nishant Singh, Alex Bronstein, Shay Bramson, Martin Kupiec
Department of Molecular Microbiology and Biotechnology, Tel Aviv University, Tel Aviv, Israel
34. DESIGNING GENOME-WIDE MUTAGENESIS APPROACHES FOR NON-MODEL ORGANISMS BY LEVERAGING AN ARTIFICIAL TRANSPOSON, DEEP SEQUENCING AND A STABLE HAPLOID ISOLATE
Ella Segal, Yael Silberberg, Judith Berman
Molecular Microbiology and Biotechnology, George S. Wise Faculty of Life Sciences Tel Aviv University, Tel Aviv, Israel
35. UNDERSTANDING THE FORMATION AND REGULATION OF CONTACT SITES BETWEEN PEROXISOMES AND OTHER ORGANELLES
Nadav Shai, Maya Schuldiner, Einat Zalckvar
Molecular Genetics, Weizmann Institute of Science, Rehovot, Israel
36. STRUCTURE-FUNCTION ANALYSIS OF THE YEAST ELG1 GENE
Keren Shemesh, Martin Kupiec
Department of Microbiology and Biotechnology, Tel Aviv University, Tel Aviv, Israel
37. T-DNA INTEGRATION: REGULATION, DYNAMICS AND EPIGENETICS
Shay Shilo, Cathy Melamed-Bessudo, Pooja Tripathi, Theodore Muth, Avraham Levy
Department of Plant and Environmental Sciences, Weizmann Institute of Science, Rehovot, Israel
38. THE ROLE OF AUXIN AND THE GENE ENTIRE (E) IN LEAF DEVELOPMENT IN TOMATO
Ido Schwartz, Naomi Ori
The Robert H. Smith Institute of Plant Sciences and Genetics in Agriculture, Faculty of Agriculture, The Hebrew University of Jerusalem, Rehovot, Israel

POSTER PRESENTATIONS (continued)

39. ANALYSIS OF GxE INTERACTIONS IN BARLEY HEB-25 POPULATION AND ACCELERATION TO GENE ISOLATION BY THE COMSEQ APPROACH
Roi Silberman, David Bonfil, Klaus Pillen, Noam Shental, Eyal Fridman, Plant Sciences, Aro, the Volcani Center, Bet Dagan, Israel
40. THE RESPIRATION/FERMENTATION SWITCH IN YEAST REQUIRES PROTEIN AGGREGATION
Kobi Simpson-Lavy
Biochemistry and Molecular Genetics, University of Colorado School of Medicine, Aurora, Co, United States
41. DETERMINATION OF PATHOGENIC VARIANTS FOR DEAFNESS BY NEXT GENERATION SEQUENCING
Christina Srouji, Fabio T.A Martins, Bella Davidov, Lina Basel, Moshe Frydman, Zippora Brownstein, Karen B. Avraham
Genetics Institute, Rambam Health Care Campus, Haifa, Israel, Department of Human Molecular Genetics and Biochemistry, Sackler Faculty of Medicine, Tel Aviv University, Israel
42. LINEAR PLASMIDS CARRYING BONA FIDE ORIGINS ARE MAINTAINED AS AUTONOMOUS PLASMIDS IN C. ALBICANS
Mathuravani Aaditiyaa Thevandavakkam, Hung Ji Tsai, Sophia Hirsch, Judith Berman
Department of Molecular Microbiology and Biotechnology, Tel Aviv University, Ramat Aviv, Israel
43. CHARACTERIZATION OF TELOMERIC ABNORMALITIES IN ICF SYNDROME TYPES II – IV
Shir Tubiana, Hagar Katzir, Shiran Yehezkel, Sara Selig
Human Molecular Genetics, Faculty of Medicine, Technion – Israel Institute of Technology, Israel
44. LincRNA GENE EXPRESSION IN THE MOUSE INNER EAR
Kathy Ushakov, Tal Koffler, Yoni Bhonker, Shaked Shivatzki, Igor Ulitsky, Karen Avraham
Department of Human Molecular Genetics and Biochemistry, Sackler Faculty of Medicine and Sagol School of Neuroscience, Tel Aviv, Israel

POSTER PRESENTATIONS (continued)

45. ONE LIBRARY TO MAKE THEM ALL: STREAMLINING YEAST LIBRARY CREATION BY A SWAP-TAG (SWAT) STRATEGY
Uri Weill, Ido Yofe, Maya Schuldiner
Molecular Genetics, Weizmann Institute of Science, Rehovot, Israel
46. CMT AND DNMT3 HOMOLOGS PLAY A NOVEL DE NOVO DNA METHYLATION ROLE IN *PHYSCOMITRELLA PATENS*
Rafael Yaari, Aviva Katz, Nir Ohad
Department of Molecular Biology and Ecology of Plants, Tel Aviv University, Tel Aviv, Israel
47. THE EPIGENETIC BLUEPRINT OF INNER EAR SENSORY EPITHELIUM FORMATION
Ofer Yizhar Barnea, Cristina Valensisi, Kathy Ushakov, Tal Koffler, Kamal Kishore, David R. Hawkins, Mattia Pelizzola, Karen B. Avraham
Department of Human Molecular Genetics and Biochemistry, Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel
48. TETRAPLOID-DERIVED ANEUPLOIDY CONFERS RESISTANCE TO CANAVANINE
Adi Zarenkin, Shay Covo
Microbiology and Plant Pathology, The Hebrew University of Jerusalem, Rehovot, Israel
49. A 612BP DELETION IS ASSOCIATED WITH HIGH TOMATINE LEVEL AND BITTERNESS IN TOMATO RIPE FRUIT
Itay Zemach, Samuel Bocobza, Asaph Aharoni, Dani Zamir
The Robert H. Smith Institute of Plant Sciences and Genetics in Agriculture, Faculty of Agriculture, The Hebrew University of Jerusalem, Rehovot, Israel

