

Higher Education

- 2018 **Researcher (PI)** Scientist, Plant Sciences, unit of Fruit Tree Sciences, Neve Ya'ar Research Center, Agricultural Research Organization, Ramat Yishay, Israel.
Study Regulation of Stomatal Movements in the Face of Global Climate Change.
- 2017- 2018 **Researcher** Independent research at Menachem Moshelion Laboratory, Faculty of Agriculture, Rehovot, Israel.
Advisors: Prof. Schroeder .I. Julian.
Studying the role of starch metabolism and long distance signaling in CO₂ - induced stomatal movement responses.
- 2011-2017 **Post-doc** University of California, San Diego.
Advisors: Prof. Schroeder .I. Julian.
Studying the role of guard cell photosynthesis and starch biosynthesis in CO₂ and ABA -induced stomatal movement responses.
- 2004- 2011 **PhD** Hebrew University of Jerusalem, Robert H. Smith Faculty of Agriculture, Food and Environment.
Advisors: Dr. Yoram Eyal and Prof. Eliezer E. Goldschmidt.
Thesis: "*Regulation of the enzyme chlorophyllase and its role as a key enzyme in chlorophyll catabolism*"
- 1999-2002 **B.Sc. & M.Sc** Special program for excellent students, Bar-Ilan University, The Faculty of Life Sciences, Ramat-Gan, Israel.
Advisors: Dr. Benny Motro. Both degrees were computed with honors.
Thesis: "*The roles of the testicular protein Aykb1 and its interaction with the oncogenic kinase Ayk1/IARK1 in mouse*".

Awards and Scholarships

- 2017-2018 Ministry of Aliyah and Immigration Fellowship-Program for Encouraging Research and Development Personnel to Return to Israel, Menachem Moshelion laboratory, Rehovot, Israel.
- 2017 Travel fellowship- Gordon Research Conferences, The Role of Plant Volatiles in Communication Travel fellowship, Lucca (Barga), Italy.
- 2017 Travel fellowship - ILANIT Conference, Israel, Eilat.
- 2017 Frontiers of Innovation Scholars Program (FISP), UCSD, San Diego, USA.
- 2015 & 2016 Frontiers of Innovation Scholars Program (FISP), UCSD, San Diego, USA.
- 2015 ASPB travel grant to Plant Biology ,Minneapolis, 2015.
- 2011 & 2012 Vaadia-BARD Postdoctoral Fellowship, United States - Israel Binational Agricultural Research and Development.
- 2009 Travel scholarship for research PhD students from the Hebrew University of Jerusalem, Israel.
- 2009 ASPB Plant Biology 2009 annual meeting travel grant award.
- 2007-2009 Eshkol PhD. scholarship awarded by the Israeli Ministry of Science.
- 2007 Research scholarship from the memorial foundation of Haim Gevati.
- 2006 Research scholarship from the association of trustees & friends of agricultural research at the Volcani center in memory of Prof. Judah and Matilda Horin.
- 2004-2006 Research scholarship from the Faculty of Agriculture of the Hebrew University of Jerusalem.
- 1999 Faculty of Life Sciences, Bar-Ilan University award for excellence in biochemical research.
- 1999-2001 Research scholarship from the Bar-Ilan University, Israel.
- 1998 Ministry of Education scholarship.

1997-2001 Eilat Municipality Education scholarship.

List of Publications

- Zhang J, De-oliveira-Ceciliato P, Takahashi Y, Schulze S, Dubeaux G, Hauser F, **Azoulay-Shemer T**, Töldsepp K, Kollist H, Rappel W-J, & Schroeder JI. (2018) Insights into the Molecular Mechanisms of CO₂-Mediated Regulation of Stomatal Movements. *Current Biology* 28(23):R1356 - R1363. <https://www.cell.com/action/showPdf?pii=S0960-9822%2818%2931344-7>
- Negi, J., Munemasa, S., Song, B., Tadakuma, R., Fujita M., **Azoulay-Shemer, T**, Engineer. B.C., Kusumi, K., Nishida, I., Schroeder .I.J., Iba, K. (2018). Eukaryotic lipid metabolic pathway is essential for functional chloroplasts and CO₂ and light responses in Arabidopsis guard cells. *PNAS USA* 115(36):9038-9043. <http://www.pnas.org/content/early/2018/08/17/1810458115>
- **Azoulay-Shemer T.**, Schwankl, N., Rog, I., Moshelion, M. Schroeder, J.I. (2018). Starch biosynthesis by AGPase, but not starch degradation by BAM1/3 and SEX1, is rate-limiting for CO₂-regulated stomatal movements under short day conditions. *FEBS Lett* 592(16):2739-2759. <https://www.ncbi.nlm.nih.gov/pubmed/30025149>
- **Azoulay-Shemer T.**, Hsu, P.K., Schroeder, J.I. (2017). Seeing is believing. News and Views, *Nature Plants*. (3):765-766. <https://doi.org/10.1038/347230a0>
- **Azoulay-Shemer T.** , Bagheri A, Wang C, Palomares A, Stephan AB, Kunz, H.H, Schroeder JI. (2016) Starch biosynthesis in guard cells but not in mesophyll cells functions in CO₂ -induced stomatal closing. *Plant Physiology* 171(2):788-798. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4902578/>
- **Azoulay-Shemer T.**, Palomares A, Bagheri A, Israelsson-Nordstrom M, Engineer CB, Bargmann BO, Stephan AB, Schroeder JI. Guard cell photosynthesis is critical for stomatal turgor production, yet does not directly mediate CO₂ - and ABA-induced stomatal closing. *Plant J* 83: 567-581 (2015) <http://onlinelibrary.wiley.com/doi/10.1111/tj.12916/abstract>
- Engineer CB, Hashimoto-Sugimoto M, Negi J, Israelsson-Nordström M, **Azoulay-Shemer T**, Rappel W-J, Iba K, Schroeder JI. CO₂ Sensing and CO₂ Regulation of Stomatal Conductance: Advances and Open Questions. *Trends in Plant Science* (2015) Volume 21, Issue 1, January 2016, Pages 16-30, ISSN 1360-1385, <http://dx.doi.org/10.1016/j.tplants.2015.08.014>
- **Azoulay-Shemer, T.**, Harpaz-Saad, S., Eyal, Y. and Goldschmidt, E.E. Pathway of Chlorophyll Breakdown in Citrus Fruit Peel, as Compared with Senescing *Arabidopsis* Leaves and Other Plant Systems. *ISHS Acta Horticulturae*. 892 (2011). <http://tinyurl.com/lwfjpmz>
- **Azoulay-Shemer, T.**, Harpaz-Saad, S., Cohen-Peer, R., Mett, A., Gidoni, D., Lovat, N., Krokhn, O., Spicer, V., Standing, G.K., Goldschmidt, E.E. and Eyal, Y. Dual, N and C-terminal, processing of citrus chlorophyllase precursor within the plastid membranes leads to the mature enzyme. *Plant Cell Physiol.* 52(1):70-83 (2011). <http://tinyurl.com/ljdpne5>
- **Azoulay-Shemer, T.**, Harpaz-Saad, S., Belausov, E., Lovat, N., Krokhn, O., Spicer, V., Standing, K.G., Goldschmidt, E.E., Eyal, Y. Citrus chlorophyllase dynamics at ethylene-induced fruit color-break; a study of chlorophyllase expression, post-translational processing kinetics and in-situ intracellular localization. *Plant Physiology* 148: 108-118 (2008). <http://www.plantphysiol.org/content/148/1/108>
- Harpaz-Saad, S., **Azoulay, T.**, Arazi, T., Ben-Yaakov, E., Mett, A., Shibolet, Y.M., Hortensteiner, S., Gidoni, D., Gal-On, A., Goldschmidt, E.E., Eyal, Y. Chlorophyllase is a rate-limiting enzyme in

chlorophyll catabolism and is post-translationally regulated. *Plant Cell* **19**: 1007-1022 (2007).
<http://www.plantcell.org/content/19/3/1007.long>

Work in progress and additional publications

- **Azoulay-Shemer, T.**, Nevo, R., Harpaz-Saad, S., Gal-On, A., Goldschmidt, E.E., Reich, Z. Eyal, Y. Kinetics of photosynthetic apparatus breakdown and synthesis under chlorophyllase triggered de-greening and re-greening in squash leaves. (In-preparation)
- Aslan, H., **Azoulay, T.**, Zilberman, Y., Pelled, G., Li, J., Helm, A.G., Gazit, Z., Gazit, D. A Novel Bone Gene Therapy Platform Based on Nonvirally Transfected Human Mesenchymal Stem Cells *Molecular Therapy* **9**:S313-S314 (2004).
<http://www.nature.com/mt/journal/v9/n1s/abs/mt2004951a.html>

Lectures and Conferences

- 2019 **Azoulay-Shemer, T.**, Bagheri, A., Palomares, A., Wang, C., Stephan, A., Kunz, H.H., Schwankl, N., Rog, I., Moshelion, M. and Schroeder .I.J. The Role of Starch Metabolism in CO₂ Regulation of Stomatal Movement. **Poster presentation:** Keystone Symposia Climate Change-Linked Stress Tolerance in Plants. Hannover, Germany.
- 2019 **Azoulay-Shemer, T.**, Bagheri, A., Palomares, A., Wang, C., Stephan, A., Kunz, H.H., Schwankl, N., Rog, I., Moshelion, M. and Schroeder .I.J. CO₂ Regulation of Stomatal Movements. Transpiration in the Face of Global Climate Change **Lecture presentation:** Stomatal movement regulation, leaf conductance and water use in plants, Volcani Center, Rishon Lezion, Israel. Volcani Center, Rishon Lezion, Israel.
- 2018 **Azoulay-Shemer, T.**, Bagheri, A., Palomares, A., Wang, C., Stephan, A., Kunz, H.H., Schwankl, N., Rog, I., Moshelion, M. and Schroeder .I.J. CO₂ Regulation of Stomatal Movements in the Face of Global Climate Change. **Lecture:** Bi-Lateral UK-Israel Conference on Climate Change and Food Systems, Volcani Center, Rishon Lezion, Israel.
- 2018 **Azoulay-Shemer, T.**, Bagheri, A., Palomares, A., Israelsson-Nordstrom, M., Wang, C., Bargmann, O.R.B., Stephan, A., Engineer, C., Kunz, H.H., Schwankl, N., Rog, I., Moshelion, M. and Schroeder .I.J. CO₂ Regulation of Stomatal Movements: Plant Transpiration in the Face of Global Climate Change. **Lecture:** The Annual Conference for Science and the Environment, Weizmann Institute of Science, Rehovot, Israel.
- 2018 **Azoulay-Shemer, T.**, Bagheri, A., Palomares, A., Israelsson-Nordstrom, M., Wang, C., Bargmann, O.R.B., Stephan, A., Engineer, C., Kunz, H.H., Schwankl, N., Hauser, F., Zhang, J., De-oliveira-Ceciliato, P. and Schroeder .I.J. Molecular Signal Transduction Network in Guard Cells Mediating CO₂ Regulation of Stomatal Movements. **Lecture:** Plant Volatiles, Gordon Research Conference.
- 2017 **Azoulay-Shemer, T.**, Bagheri, A., Palomares, A., Israelsson-Nordstrom, M., Wang, C., Bargmann, O.R.B., Stephan, A., Engineer, C., Kunz, H.H., Schwankl, N., and Schroeder .I.J. Plant transpiration and [CO₂]: The role of guard-cell photosynthesis and leaf starch-biosynthesis in stomatal turgor production and in CO₂-induced stomatal closing. **Lecture and presentation:** 8th ILANIT/FISEB conference, Eilat, Israel.

- 2016 **Azoulay-Shemer, T.**, Palomares, A., Bagheri, A., Wang, C., Israelsson-Nordstrom, Stephan, A., Kunz, H.H., Engineer, B.C., Bargmann, O.R.B., Schroeder .I.J. Schroeder. Guard cell photosynthesis is critical for guard cell turgor regulation, yet is not a direct transducer of stomatal movement responses to CO₂. **Lecture and poster presentation:** ASPB annual Plant Biology meeting at, Austin Texas.
- 2015 **Azoulay-Shemer, T.**, Palomares, A., Bagheri, A., Wang, C., Israelsson-Nordstrom, M., Stephan, A., Kunz, H.H., Engineer, B.C., Bargmann, O.R.B., Schroeder .I.J. Guard-cell photosynthesis and leaf starch-biosynthesis: their roles in turgor production and in CO₂-induced stomatal closing. **Lecture and poster presentation:** Frontiers of Innovation Scholars Program (FISP), UCSD, San-Diego, CA, USA.
- 2015 **Azoulay-Shemer, T.**, Palomares, A., Bagheri, A., Israelsson-Nordstrom, M., Engineer, B.C., Bargmann, O.R.B., Stephan, B.A. and Schroeder I.J. Guard cell photosynthesis is critical for guard cell turgor regulation, yet is not a direct transducer of stomatal movement responses to CO₂. **Lecture and poster presentation:** Food and Fuel for the 21st century, UCSD, San-Diego, CA, USA.
- 2014 **Azoulay-Shemer, T.**, Bagheri, A., Bargmann, B. and Schroeder, I.J. Stomata of guard cell chlorophyll-deficient plants respond to CO₂ shifts. **Poster presentation:** ASPB annual Plant Biology meeting at Portland, Oregon.
- 2012 **Azoulay-Shemer, T.**, Harpaz-Saad, S., Nevo, R., Mett, A., Belausov E, Shibolet Y, Lovat, N., Krokhn, O., Spicer, V., Standing, G.K., Gal-On A, Gidoni, D., Hortensteiner S, Reich, Z. Post-translational regulation of the enzyme Chlorophyllase and the implications on chlorophyll breakdown in *planta*. **Lecture presentation:** Food and Fuel for the 21st century, La Jolla Mesa Plant Biology, UCSD, San-Diego, CA, USA.
- 2010 **Azoulay-Shemer, T.**, Harpaz-Saad, S., Nevo, R., Mett, A., Belausov E, Shibolet Y, Lovat, N., Krokhn, O., Spicer, V., Standing, G.K., Gal-On A, Gidoni, D., Hortensteiner S, Reich, Z. **Lecture presentation:** Post-translational regulation of the enzyme Chlorophyllase and the implications on chlorophyll breakdown in *planta*. Volcani center ARO, Israel.
- 2009 **Azoulay-Shemer, T.**, Harpaz-Saad, S., Mett, A., Gidoni, D., Lovat, N., Krokhn, O., Spicer, V., Standing, G.K., Goldschmidt, E.E. and Eyal, Y. (2009) Regulation of chlorophyll catabolism during fruit color-break; Evidence for post-translational regulation of the rate-limiting enzyme chlorophyllase. **Lecture and poster presentation:** Metabolism, Metabolomics and Metabolic Engineering in Plants Workshop at Ein-Gedi, Israel.
- 2009 **Azoulay-Shemer, T.**, Harpaz-Saad, S., Mett, A., Gidoni, D., Lovat, N., Krokhn, O., Spicer, V., Standing, G.K., Goldschmidt, E.E. and Eyal, Y. (2009) Chlorophyllase regulation during citrus fruit color break: Dual N and C-terminal processing of Chlorophyllase precursor within the plastid membranes lead to the active mature enzyme. **Lecture and poster presentation:** ASPB annual Plant Biology meeting at Honolulu, Hawaii.
- 2006 Hasharoni A., **Azoulay T.**, Zilberman Y., Liebergall M. and D. Gazit. NOVEL EXOGENOUSLY REGULATED GENE EXPRESSION PLATFORM FOR SPINAL FUSION IN VIVO, MONITORED BY QUANTITATIVE MICRO CT AND MOLECULAR IMAGING. *J Bone Joint Surg Br* 88-B: (SUPP II) 341-342. **Abstract published in:** Orthopaedic Proceedings international

meeting. Haifa, Israel.