

Final Report: Junior Research Stay at Hebrew University

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Sustainability: what one can contribute for food-preservation?

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In the middle of November, the temperature in Berlin already dropped below zero. While on the southeastern coast of Mediterranean Sea, the sun is still hanging in the middle of the sky. Warm air moves through palm trees. Leaves rustle as cheering. In the middle of every palm trunk, the sudden shrinks indicate they suffered severe drought during some of the past years. Two o'clock in morning, the irrigation system punctually switches on to make the green grassland prepared for the whole day of ferocious sunshine.

It takes several minutes to walk from the green campus of the Hebrew University to the farmland in the rural area. It's full of the color of sand in this season. The irrigation pipes lay in the field everywhere. Heavy dust was stirred by a passing-by tractor. Two farmers were recycling their irrigation pipes. I greeted "Shalom" to them. They smiled back to me. At this moment, a small patch of potato was just drenched by the drop irrigation. Luckily, it was still green.

Obviously, they make a great effort to produce food. Most of the endeavor is going to be wasted during the long course of food processing and storage. Bacteria and Fungus could be the greatest threat. They not only destroy the food processed or in processing but also produce toxins which result serious health problem to human. Dr. Zvi Hayouka is leading a research group at the Hebrew University, where he is mainly focused on developing new food preservatives based on the substance that we need every day—the amino acids.

Dr. Hayouka and I met with each other for the first time when he visited our lab several months earlier. I am fascinated by his idea using health chemicals to preserve food. However, his research project faces a new puzzle: He is concerned that if the bacteria

develop resistance to the “new” food preservatives, it could in turn threaten human life. This fits right in my expertise. Trained as an evolutionary biologist, I am also very interested in applying my theories to solve the practical problems.

In the Hebrew University, I first presented what I have done at FU Berlin, and how possibly this work can be extended to the practical field. Then I helped to draft a collaborative research proposal during the first week, which sorted out a thorough and further collaboration between the two groups in Israel and Berlin. The proposal was submitted to Deutsche Forschungsgemeinschaft (DFG) and Israel Science Foundation (ISF).

Amino acids were added and conjugated with each other in an automatic synthesis machine. After purification, the peptides, which are chains of amino acids, have incredible power of eliminating pathogenic bacteria and fungi. With these random peptides, I tested its effects on antimicrobial-peptides-resistant bacteria which were selected in our lab in Berlin. It turned out that these random peptides are very effective on resistance bacteria.

Additionally, I also tested the pharmacodynamic properties of these peptides based on the framework established in our lab before. I also evolved bacteria against these peptides and tested whether they will quickly select resistance in the lab condition with intensive selection pressure.

In addition, the UAS scholarship provided me with a great opportunity to experience a different culture and to exchange ideas with people from different academic backgrounds.