

## **Evolve your enemy to understand it**

Özden Baltekin

When we get sick and see a doctor, if the doctor is sure that it is a bacterial disease, we are prescribed with antibiotics for treatment. We generally get better within a few days after taking the first pill if the bacteria are not resistant. What happens is that the antibiotic starts killing the bacteria right after you start using it. Happy ending is that the antibiotic kills all the bacteria that made you sick and when you are done with your treatment, you are cleaned. However this story does not represent the reality. What is known for more than fifty years is that there is a subpopulation of individual bacteria among all those making you sick, and they are not affected by the antibiotics although genetically they are identical to the rest of the population. The reason they are not affected is that they are not actively growing but they are in some sort of a sleeping form. These sleeping forms do exist even when there is no antibiotics around, so it means that this is not an active defence of the bacterium but it is a normal property of the population structure. The fraction of those “sleeping bacteria” among all the others are important yet it is a mystery what is responsible for this sleeper fractions. To be able to kill those sleepers we need to understand what causes them to decide to sleep since it is actually not a good idea to sleep if there is no antibiotics and all the other non-sleepers are growing and reproducing happily. There must be a benefit of such a sleeping behaviour to the bacteria so that such a trait has evolved. This idea is actually crucial for our quest to solve this problem, since we can now evolve bacteria in the laboratory just as we breed horses, wheat and many other animals and plants for our purposes in our farms for thousands of years. My thesis work consisted of such an evolution experiment to evolve higher sleeper bacterium fractions so that we can detect new changes that caused that higher sleeper fractions. It is mimicking the nature to evolve a property of a species so that you can understand that property of that species. The evolution experiment did result in higher sleeper fractions in certain antibiotics. This then enabled us to understand the dynamics of this sleepers better and brought us one step close to getting rid of these otherwise persisting bacteria.