Margarita and more - Manasa Narayan

The name is *Thio*. Short for *Thiomargarita magnifica.* Aside from having the finest name, *Thio* is special in many other ways. It is a centimeter long thread-like bacterium, making *Thio* visible to the naked eye. A paradox? Indeed. This discovery published in mid-2022 has baffled scientists with many open questions, an obvious one being - Can we still categorize *Thio* as a "microorganism"? We do not have the answers yet, but it surely has sparked something interesting. Time shall tell. After all, this is not the first time bacteria have fascinated biologists.

I am a scientist (in progress) and I find bacteria to be spectacular species. They have lived far too long than us humans, they can live in places we dare not dream of setting foot into and they live more selflessly than any human ever will. They are with us from the birth of our lives and not even death could make them part. They are a true testament to the saying "you are never alone". However, it is equally true that some of them do end up being the cause of our death. Some others are growing mightily resistant to their killer drugs and posing a menace to human health. This creates two classes of microbiologists - ones who want to find the cure for a disease and others who are simply passionate about these tiny beings. I belong to the latter. A good balance of both, I believe, is necessary to propel this field of research. To answer any lingering questions in bacteria, "gene regulation" has been a perspective of research for many scientists, irrespective of what their final research goal is. And this knowledge path excites me.

Genes are made up of DNA (deoxyribonucleic acids), molecules that have always enjoyed being at the centre of the limelight. Some of these genes carry important information that is firstly "copied" into molecules called RNA (ribonucleic acids), mRNA (messenger RNA), to be more precise. In the second step, the information from the mRNA is "translated" into a different language giving rise to complex molecules called proteins. This transfer of genetic information from DNA to RNA to protein is the holy "central dogma"! But, here comes the twist. Not all RNA "encode" for proteins, less than 3% of them do. So what's the purpose of *life* for the rest of them? Scientists are now uncovering exciting complex roles for such *other* RNA populations, bringing RNA into the limelight. RNA is much more than just a messenger. They are regulators. They hold the power to control what, when and how the genetic information is "expressed" in a cell. In other words, control how a cell looks, behaves and dies. Some regulatory RNAs own bizarre names like sRNA, siRNA, piRNA and so on. These small RNA molecules carry big tasks on their shoulders. Their versatility and complexity give them the fame they now rightly receive. Studying such complex RNA molecules in a reduced and relatively minimal system adds new levels to our understanding of life. That is where bacteria comes in handy.

One of the bacteria our lab works with is *Campylobacter jejuni*, whom we fondly call *Campy*. I'm sure you have met *Campy* at least once. Recall that one sleepless night where you had to run to the loo every other hour and it felt like a circus troupe had invaded your tummy? Do not be embarrassed. It's not you, it's *Campy*. My bet is *Campy* had poisoned that chicken 65 you heartily ate and then YOU. The little ones are sneaky and love the warmth of your gut. If you try to look at a bunch of living *Campy* under a light microscope, they more-or-less look like center shock struck wiggle worms. They refuse to stay still even for a second! A happy *Campy* beats its tail-like flagella at a speed of about 100 revolutions/second and is a fantastic swimmer. Our lab is interested in knowing *Campy* better, especially its gene regulation and its pool of regulatory RNAs. During the process, we also develop high-throughput techniques to "read" the molecular status of a bacterial cell which we use to decode the network of molecules in *Campy*. My PhD focuses on knowing more about the proteins that chaperone regulatory RNAs that in turn regulate gene expression. Even a single-celled system is extremely intricate, that's what keeps the system going. It is what keeps me going.

Science isn't a smooth-running journey. It comes with high demands and fewer rewards. It can get bitter and competitive. Failure knocks you down more frequently than the push of success. Even if you do succeed in answering that one question, hundreds of others rise. While we, the scientific community, should make an effort in making "working in science" more humane, changing an organized system can take a while. In the meantime, what gets me out of my moping is *Thio*. The giant bacterium reminds me that new discoveries in science never get boring. Science will always have something to sweep you off your feet. So I think of *Thio*. I think of the *margarita*. Peace settles in.