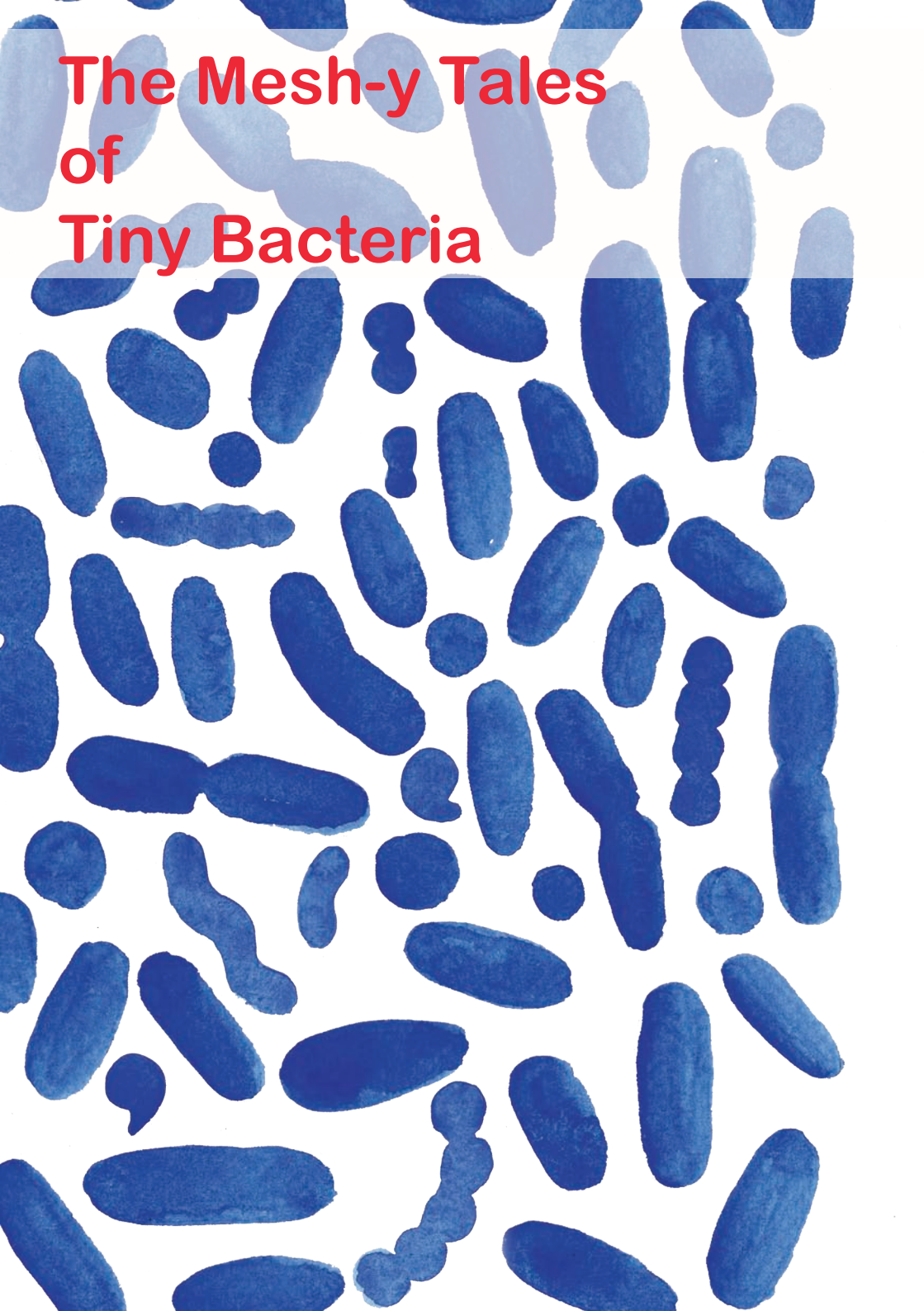
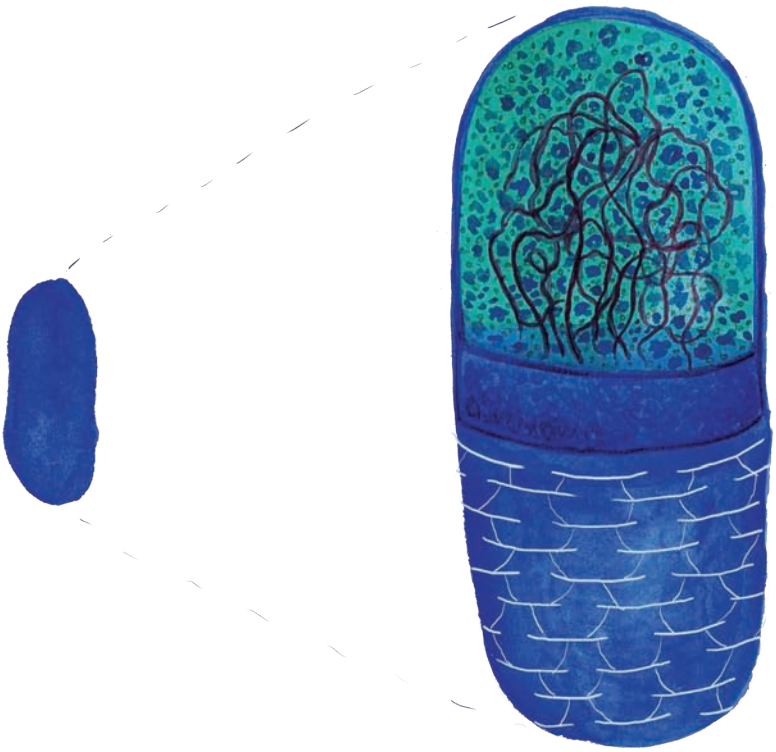
The Mesh-y Tales of Tiny Bacteria



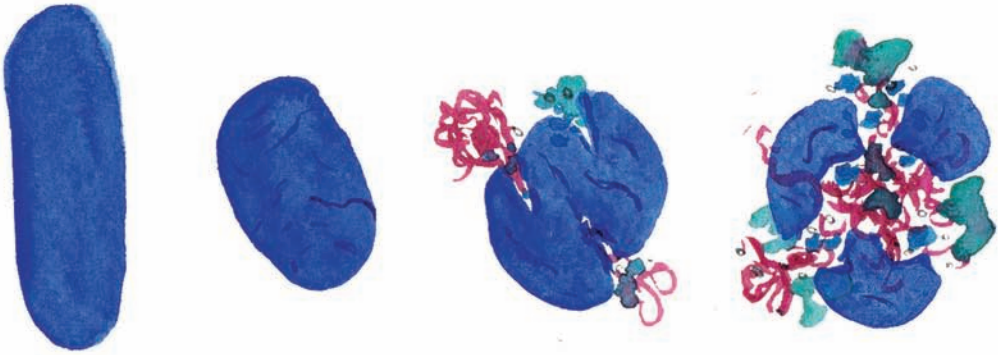
Invisible to human eye but all around and inside us, the unicellular bacteria come in different shapes and influence our lives in multiple ways.



They are amazingly robust, and can sustain many harsh conditions. One of the protective layers that they come with is a cell-wall, made of a peptidoglycan (PG) layer. It is a complex mesh of a simple polymer-glycan chains connected by short peptides.

A bacterial cell can divide as fast as every 20 minutes. A cell grows in size - all the content inside the cell doubles up. And after a point it pinches into two daughter cells.

But what would happen if the contents inside the bacterial cell grow in amount but the PG layer does not increase in size?



Wouldn't the cells crack and burst open?
Actually that does happen, and the cells die.

But bacteria know how to take care of this.
It has special enzymes* that act like scissors**. When the cell is ready to grow bigger, these scissors cut open the PG to accommodate new material.

* proteins that help in different kinds of biochemical reactions in cells
** the enzymes used in this process are called hydrolases, which can break the linkages between the gylcan strands

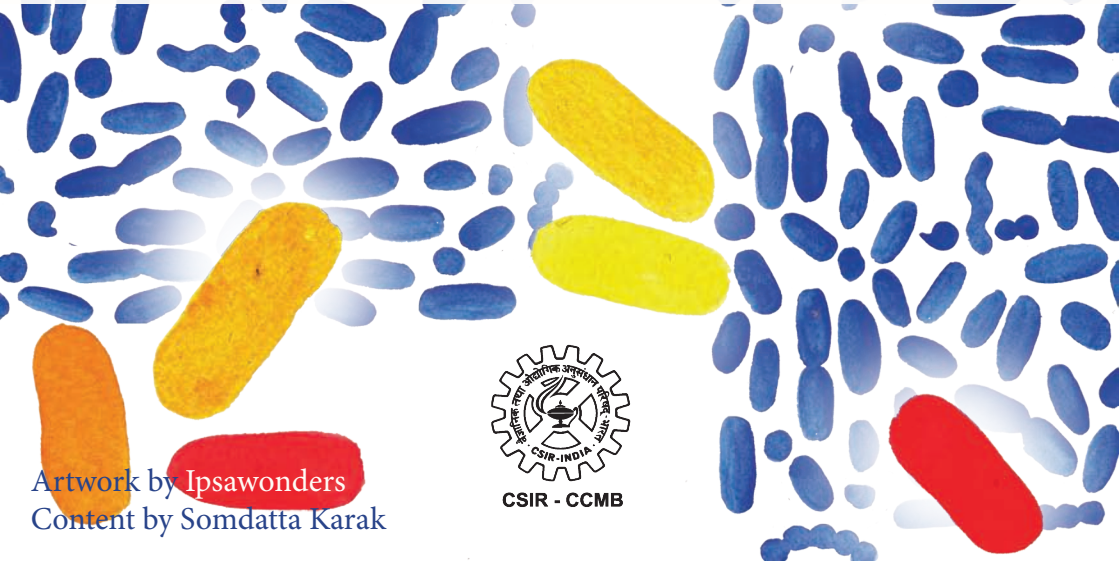
It then allows addition of more raw material to build the extra amount of PG to make the cells larger. Other enzymes come into action then, which help in stitching the newly added material with the existing PG.

The big fat bacterial cell with enough PG is now ready to divide into two daughter cells.

Dr Manjula Reddy at CSIR - Centre for Cellular and Molecular Biology is keen on understanding enzymes that are essential for breaking and stitching the cell-wall during bacterial growth. Her work identifies new molecules to target via antibiotics - drugs that kill bacteria.

Until a century back, deaths due to infections arising out of minor cuts, child birth or wars were a commonplace occurrence. Much of that changed in the last century with the accidental discovery of the first antibiotic, penicillin. Ever since then a variety of antibiotics have been discovered as well as manufactured in industry.

However, over the years, bacteria have grown stronger, and the available antibiotics aren't as effective anymore. Finding new antibiotic targets have now become imperative for us as a society. Work from labs from all across the world towards understanding bacterial growth cannot be ignored in this pursuit.



Artwork by Ipsawonders
Content by Somdatta Karak

CSIR - CCMB