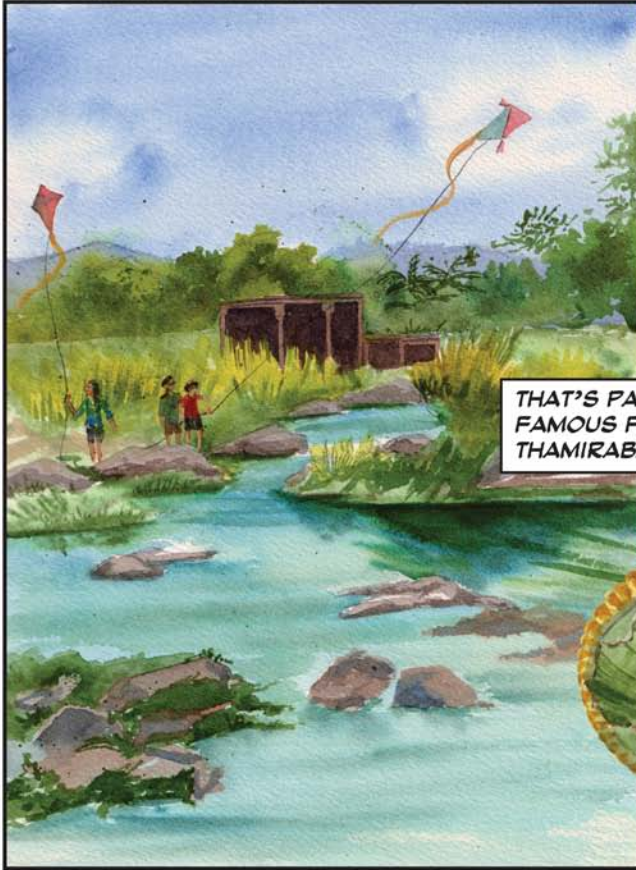


RAJAN SANKARANARAYANAN

EXPLORING QUALITY CONTROL OF PROTEIN SYNTHESIS

MY STORY BEGINS IN PAPANASAM, A SMALL VILLAGE IN TIRUNELVELI DISTRICT OF TAMILNADU.



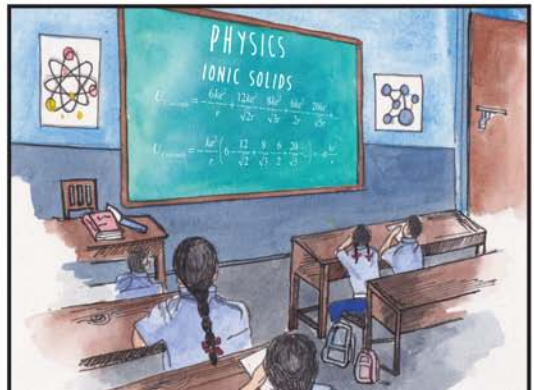
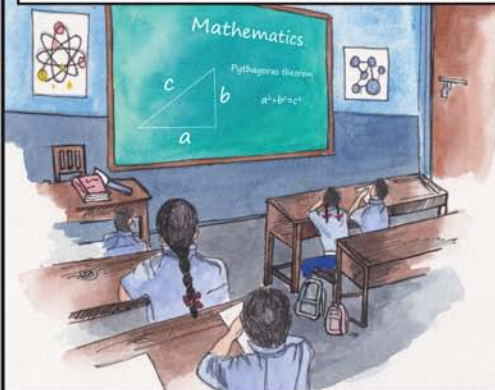
THAT'S PAPANASAM
FAMOUS FOR
THAMIRABARANI RIVER



AND TIRUNELVELI HALWA

LIKE MANY OF YOU I WAS A STUDENT IN GOVERNMENT SCHOOL.

I THOUGHT I LIKED MATHS. BASICALLY, I SCORED WELL IN THE MATHS EXAMS. BUT AS I GREW, IT FELT TOO ABSTRACT.

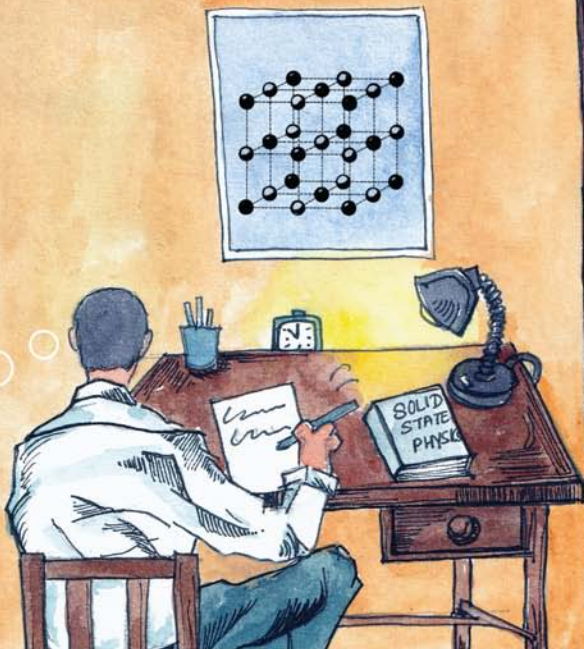


ON THE OTHER HAND, THE TOOLS I HAD LEARNED HELPED ME UNDERSTAND PHYSICS. USING THOSE, I ENJOYED MAKING SENSE OF THE REAL WORLD AROUND ME.

GRADUALLY, DURING MY UNDERGRADUATE AND POSTGRADUATE STUDIES, I GOT DEEPLY INTERESTED IN SOLID STATE PHYSICS. I WANTED TO UNDERSTAND HOW SYMMETRIES AND ORDERS ARE MAINTAINED IN CRYSTALS.

BUT I ALSO COME FROM A GENERATION WHERE LANDING ON A STABLE JOB WAS IMPORTANT AND SOUGHT AFTER.

BUT MY FRIENDS HAVE GOT JOBS IN INSURANCE AND TELECOM COMPANIES. SHOULD I JOIN TOO??!!



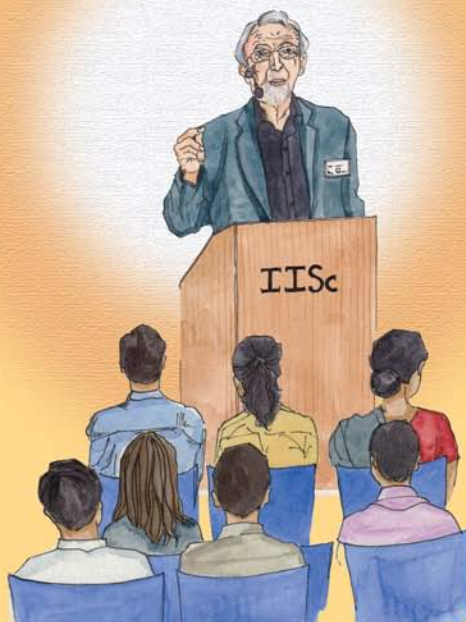
BUT MY TEACHERS THOUGHT...

YOU ARE REMARKABLE IN PHYSICS. A RESEARCH INSTITUTE LIKE THE INDIAN INSTITUTE OF SCIENCES (IISc) WOULD BE AN IDEAL PLACE FOR YOU TO GROW.

MAYBE THE PROFESSOR IS RIGHT. IF IT DOESN'T WORK, THE JOB OFFERS MIGHT STILL BE THERE.



I WAS WORKING AT THE INTERFACE OF PHYSICS, CHEMISTRY AND BIOLOGY WITH MATHEMATICAL TOOLS. IT WAS A LOT OF FUN TO COMBINE SO MANY SUBJECTS THAT I AM FOND OF.



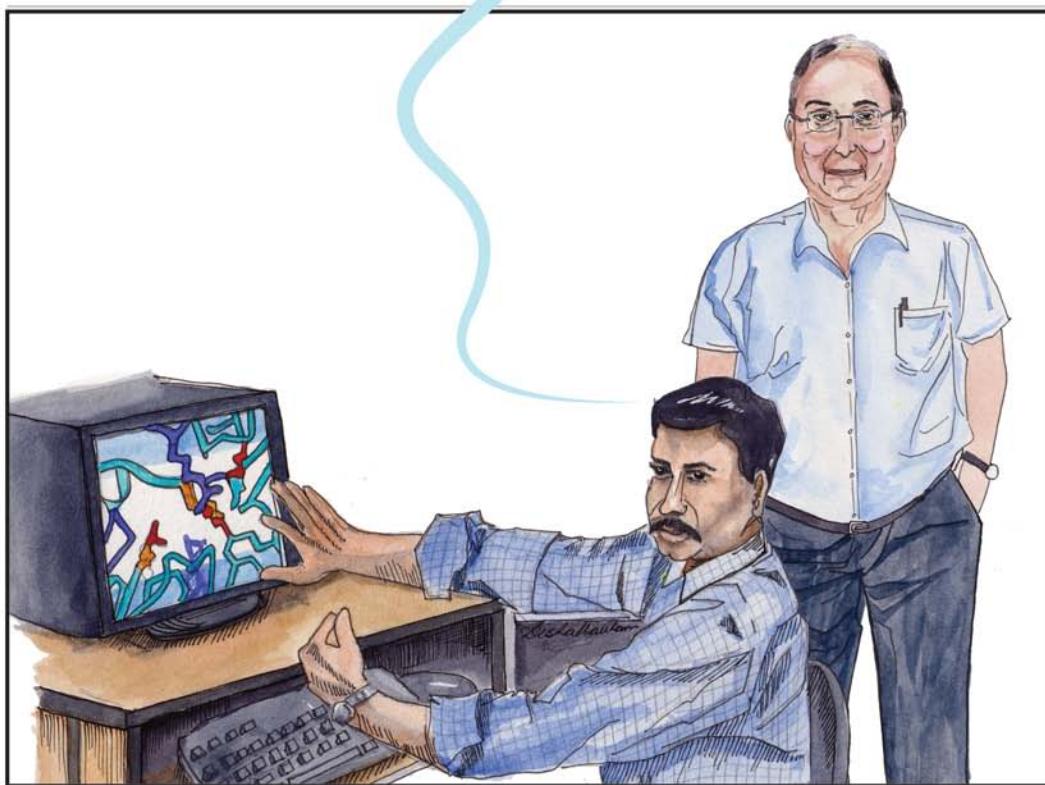
BUT I HAD NOT STUDIED BIOLOGY IN COLLEGE. BOOKS AND TALKS BY EMINENT RESEARCHERS HELPED ME GAIN MY FOOTING.



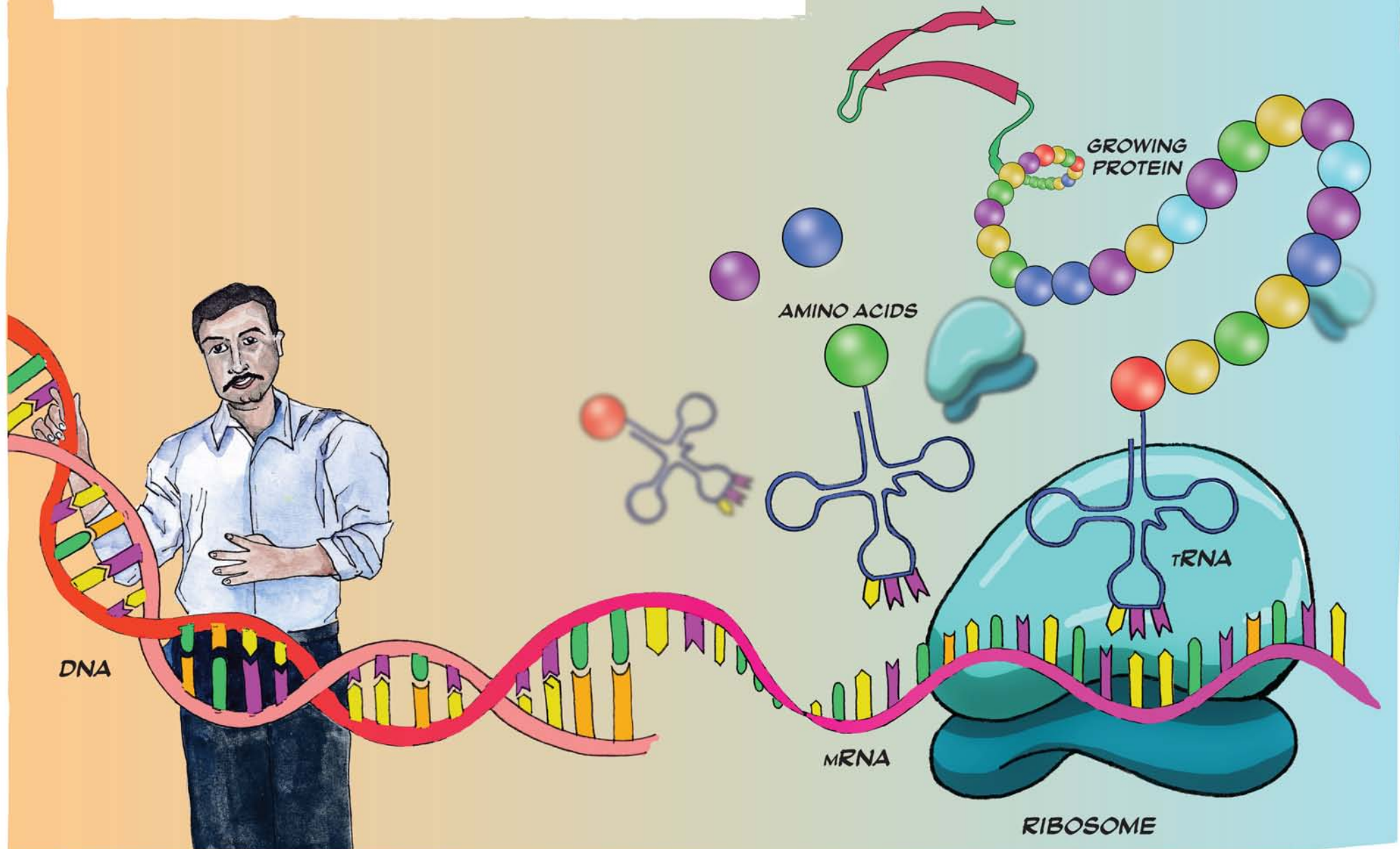
ARMED WITH SKILLS IN LOOKING INTO PROTEIN STRUCTURE DURING MY PHD, I THEN WENT ON TO LOOK INTO THE MYSTERIES OF PROTEIN SYNTHESIS.

I WORKED WITH PROF. DINO MORAS, AN EXPERT IN THE FIELD AT THE INSTITUTE OF GENETICS & MOLECULAR & CELLULAR BIOLOGY IN STRASBOURG, FRANCE.

WE STUDIED HOW CELLS COULD READ INFORMATION ENCODED IN DNA AND BUILD THOUSANDS OF DIFFERENT KINDS OF PROTEINS.



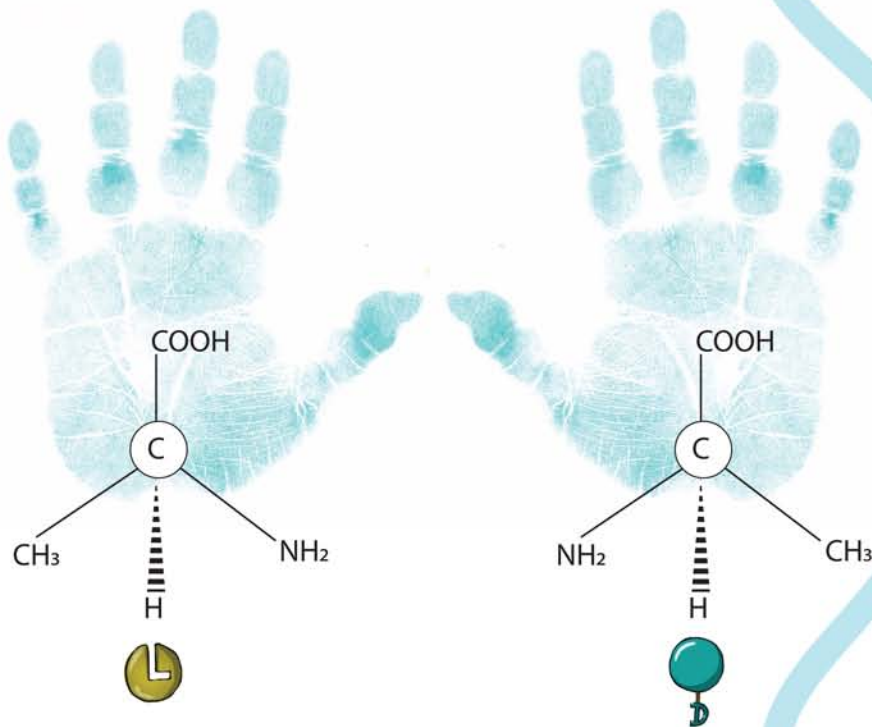
AND UNEXPECTEDLY WE DISCOVERED A PROCESS THROUGH WHICH CELLS COULD CHECK IF THE PROTEIN IS BUILT AS ENCODED IN THE DNA. WE FOUND CELLS HAD WAYS OF CHECKING FOR MISTAKES DURING PROTEIN SYNTHESIS.



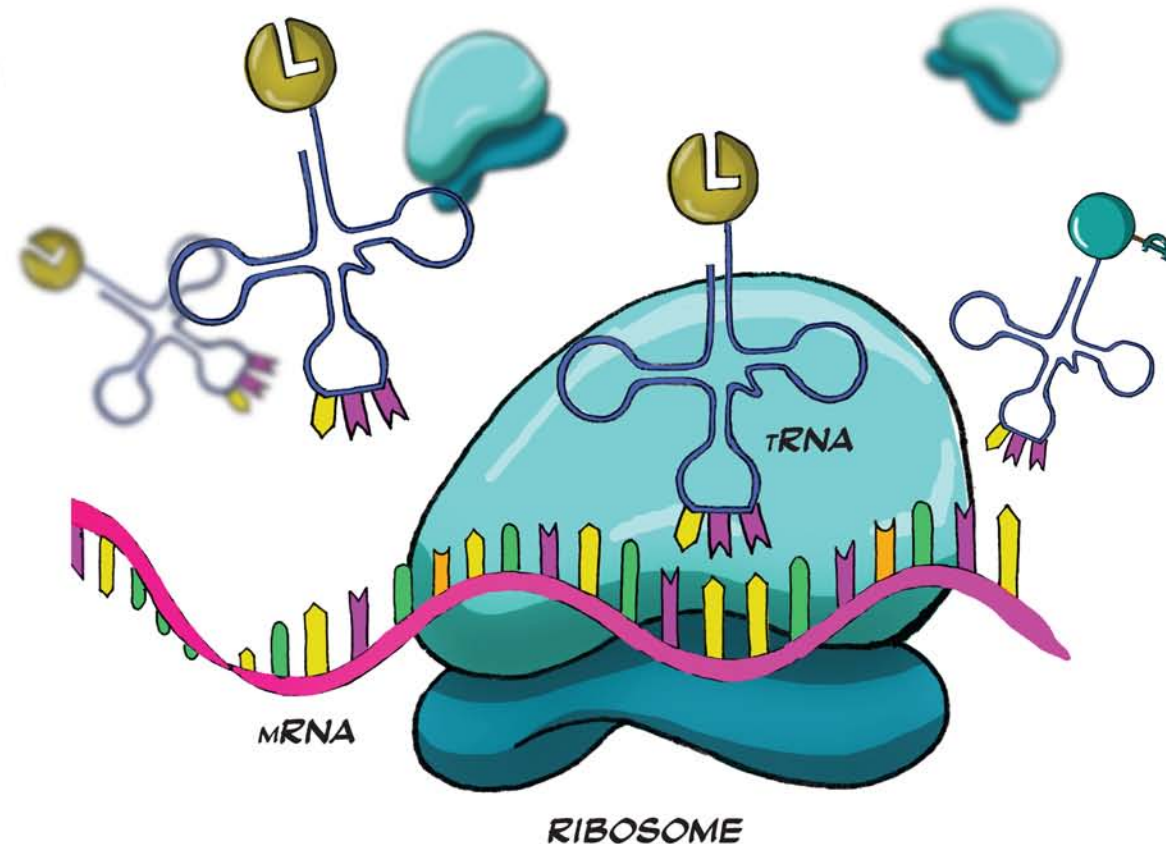
BUT THEN THESE MISTAKES CAN BE OF MANY KINDS.

ONE THAT IMMENSELY INTRIGUED ME WAS THIS..

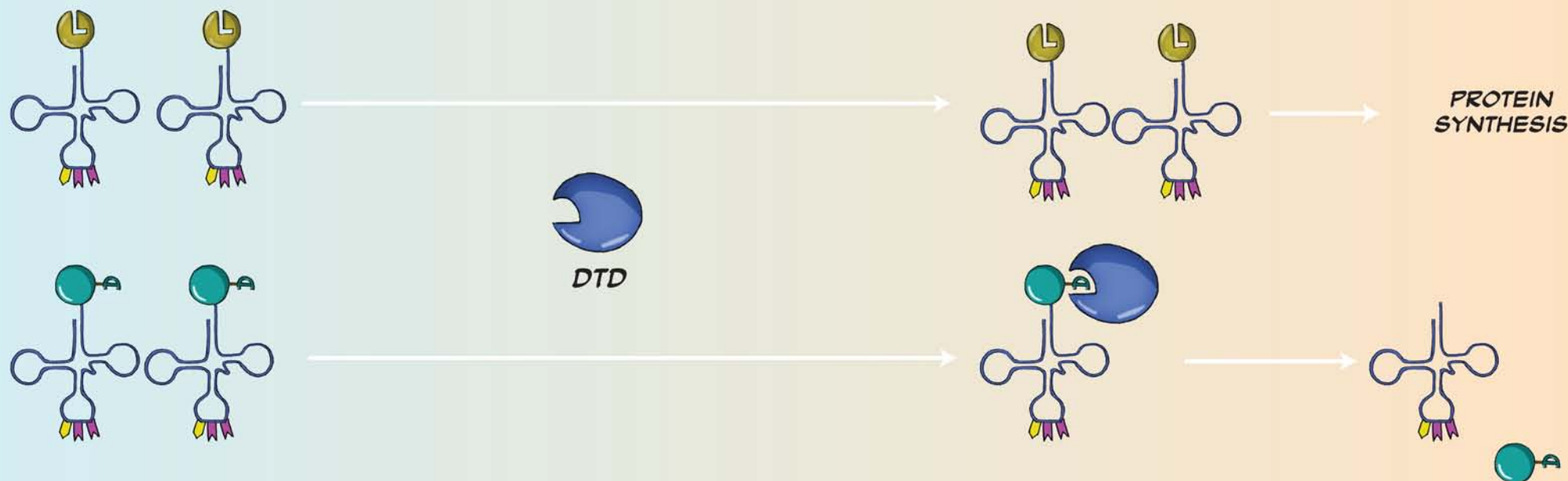
PROTEINS ARE BUILT OF BUILDING BLOCKS CALLED AMINO ACIDS. EACH AMINO ACID HAS A UNIQUE CHEMICAL COMPOSITION. EVEN WITH THE SAME CHEMICAL COMPOSITION, AMINO ACIDS CAN TAKE UP TWO DIFFERENT STRUCTURAL POSSIBILITIES. THEY ARE CALLED D AND L-FORMS. THEY ARE MIRROR IMAGE FORMS OF EACH OTHER- JUST AS OUR TWO PALMS.



THOUGH BOTH FORMS ARE EQUALLY ABUNDANT ON EARTH, ALL LIVING CELLS BUILD PROTEINS ONLY WITH THE L FORMS OF AMINO ACIDS. AN ACCIDENTAL INCORPORATION OF A D-FORM CAN ALSO KILL THE CELL. WHEN A CELL HAS TO PAY SO HEAVILY FOR A WRONG SELECTION, WHAT ARE ITS WAY TO CHECK FOR THE RIGHT INGREDIENTS?



I PURSUE THIS IN MY OWN RESEARCH GROUP AT THE CENTRE FOR CELLULAR & MOLECULAR BIOLOGY, HYDERABAD WITH MANY PHD STUDENTS. WE UNCOVER THE DETAILS OF CELLS' POLICING MECHANISMS THAT ENSURE THE RIGHT INGREDIENTS ARE USED FOR BUILDING PROTEIN AND WE SEE IF THE SAME MECHANISM WORKS ACROSS EVOLUTION.



DTD IS AN ENZYME THAT CAN RECOGNIZE D-AMINO ACIDS WHEN BOUND TO tRNA. THE D-AMINO ACID FITS IN THE POCKET OF DTD AND D-AMINO ACIDS ARE PREVENTED FROM GOING INTO THE RIBOSOME, AND HENCE GETS CLEAVED FROM THE tRNA. WHILE L-AMINO ACIDS PROCEED FOR PROTEIN SYNTHESIS, D-AMINO ACIDS ARE PREVENTED FROM GOING INTO THE RIBOSOME AND HENCE DO NOT BECOME PART OF PROTEIN SYNTHESIS PROCESS. THIS MECHANISM IS TERMED AS CHIRAL PROOFREADING.

THE MORE CLEARLY WE SEE THE INSIDE OF CELLS AND ITS MACHINERY, EASIER IT GETS TO UNDERSTAND ITS WORKING AND TWEAK IT, WHEN NEEDED.

THE HINDU

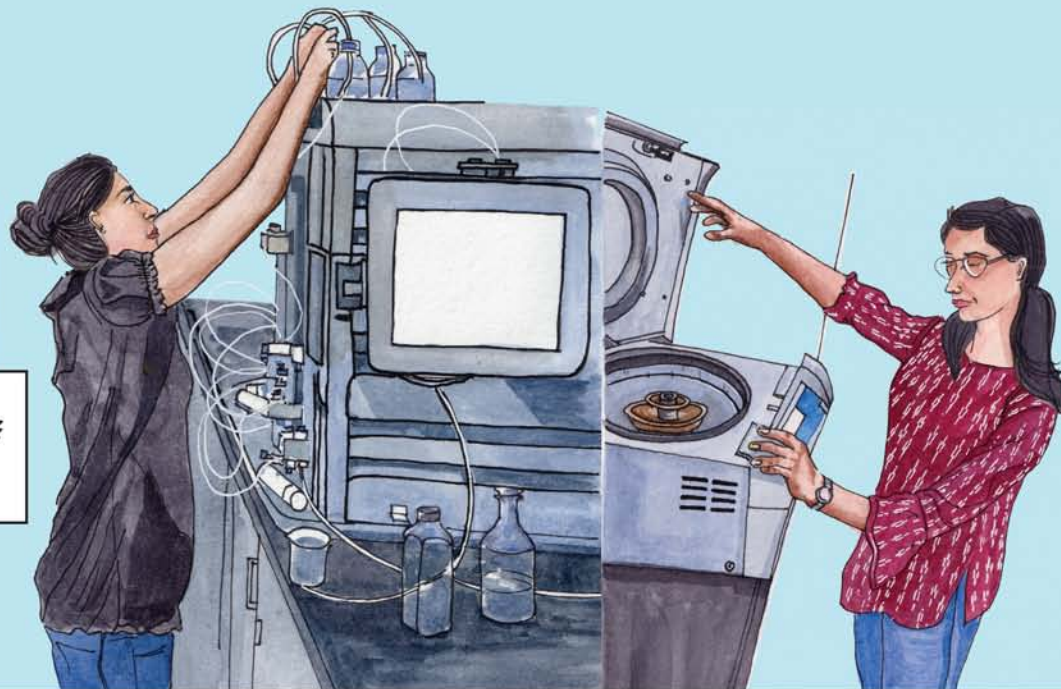
CSIR-CCMB scientist gets Infosys award

Rajan Sankaranarayanan, a structural biologist studying structures of proteins in cells and how accuracy is maintained by cellular machinery ...

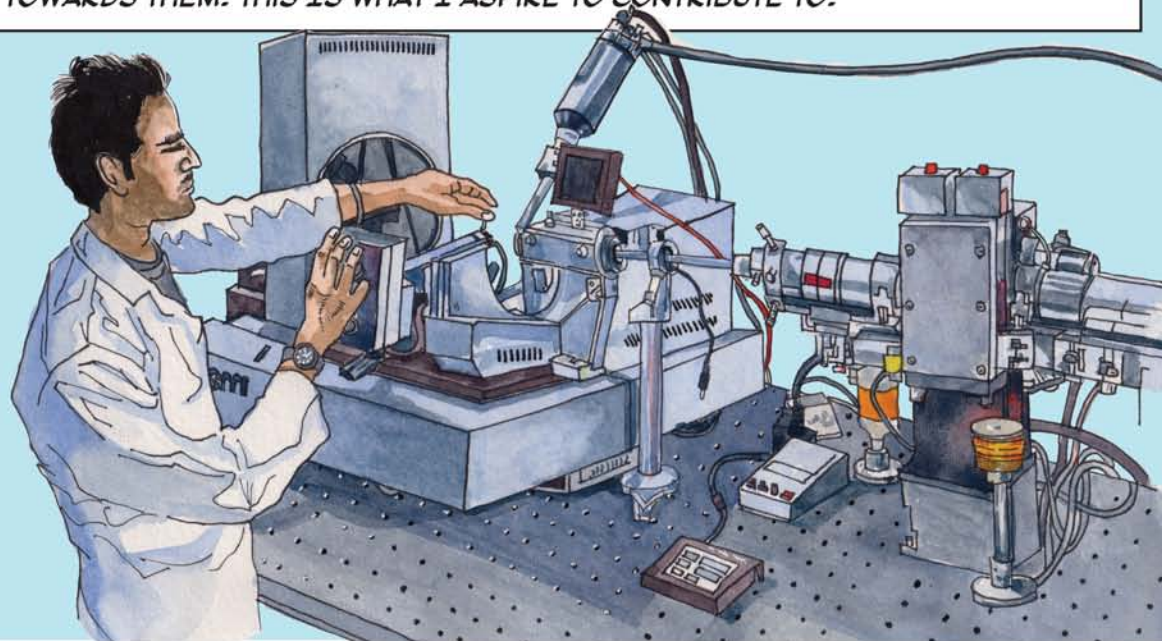
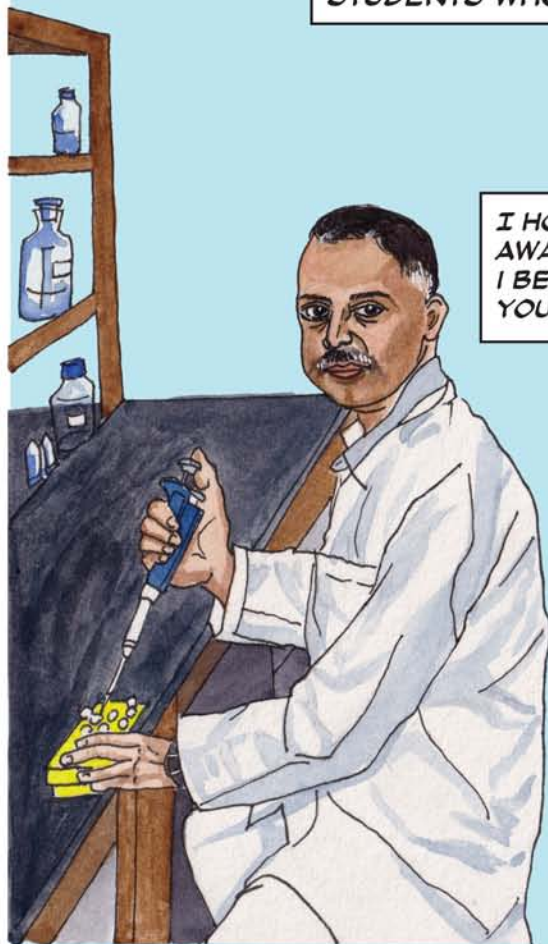
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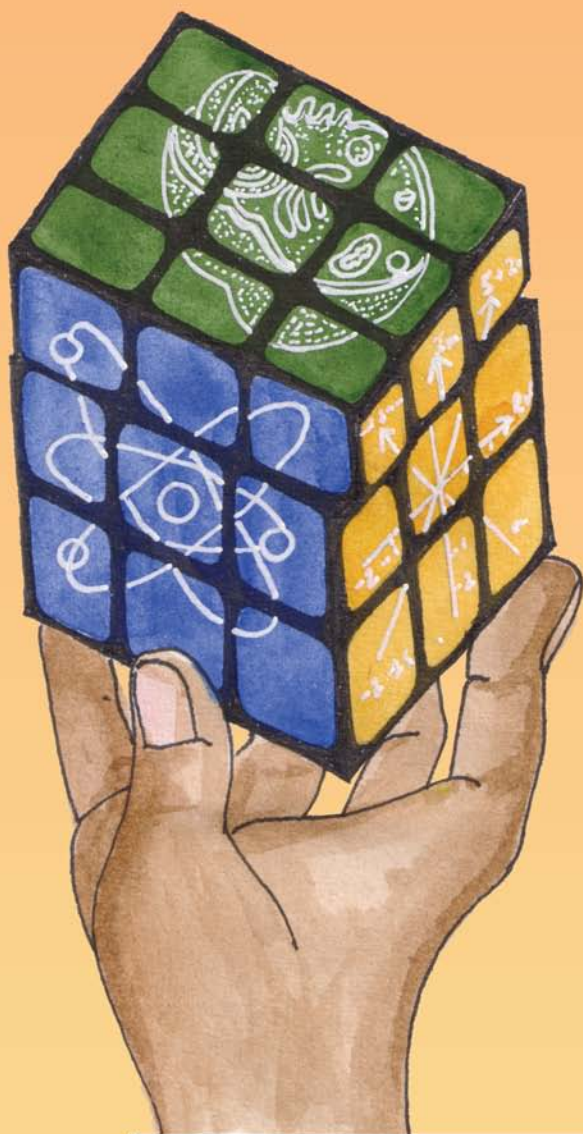


PEOPLE SAY OUR WORK CAN HELP IN DISCOVERING NEW DRUGS. BUT I TAKE THE MOST PRIDE IN GROWING WITH THE STUDENTS WHO WORK WITH ME.



I HOPE TO BE A MENTOR AS I HAVE HAD IN PROFS. VIJAYAN AND MORAS. I TRY TO GUIDE THEM WITHOUT TAKING AWAY THEIR ORIGINALITY. I ENSURE THEY READ, THINK AND DISCUSS SCIENCE BEYOND THEIR PHD THESIS WORK. I BELIEVE THAT MOST DIFFICULT QUESTIONS CAN BE SOLVED, IF WE CAN CHANNELIZE STRENGTHS OF OUR YOUNG AND ENERGETIC MINDS TOWARDS THEM. THIS IS WHAT I ASPIRE TO CONTRIBUTE TO.





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