THE JIGYAASA SHP NEWSLETTER

The Microbial Express

A DBT - STAR COLLEGE ACTIVITY

VOLUME 15 ISSUE 1

KC College

A group of scientists transcribed the song "It's a Small World After All" into the DNA of a bacteria that is resistant to radioactivity, so that in the event of a nuclear catastrophe, we could pass a message on to future intelligent life.

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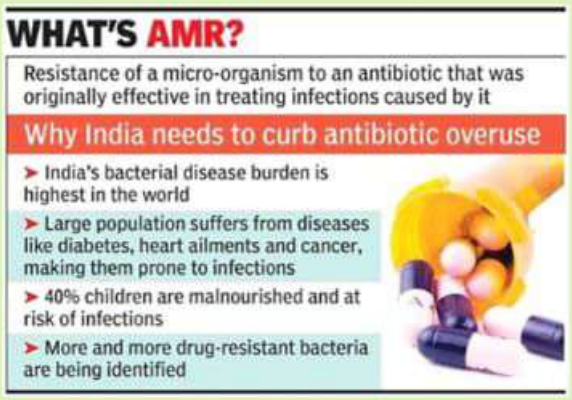
Most healthy Indians resistant to common antibiotics

A study published by the Indian Council of Medical Research (ICMR) has found antibiotic resistant organisms in the digestive tracts of two out of every three healthy persons that it tested, pointing to a rapid spread of antibiotic resistance in the Indian population.

The study was based on analysis of stool samples of 207 individuals who had not taken any antibiotic for at least a month and did not suffer from any chronic illness.Isolates retrieved from 139 out of the 207 individuals were found to be resistant to one or more antibiotic class. The maximum resistance was seen for cephalosporins (60%) followed by fluoroquinolones (41.5%) – two commonly used antibiotics. Our study shows how inappropriate use of antibiotics has transformed thehealthy human intestinal gut flora (microorganisms living in the digestive tract) into a reservoir of antibiotic-resistant organisms. At present, these organisms are resistant to low-end antibiotics but if the misuse persists, these may become resistant to high-end antibiotics as well," Dr Ray said.Inappropriate use of antibiotics such as popping pills for mild ailments like common cold is the biggest cause of drug resistance in humans



Human bites are one of the most dangerous animal bites in the world due to the bacteria in our mouths.

It's Bizarre !!!

The Midas touch: Australian scientists found that a bacterium called Ralstonia metallidurans can turn dissolved gold into solid nuggets.

Can Genetics Influence Whether You Are A Cat Person Or Dog Person ?

Whether you are a 'dog person' or a 'cat person' has been thought to be personal choice. However, recent research suggests that there may be a genetic factor to consider if you prefer dogs. Previous research has shown that exposure to dogs throughout childhood increases a person's chance of a preference for dogs. Although these findings may make common sense, researchers were nevertheless left wondering how much genetics could also be a contributing factor.

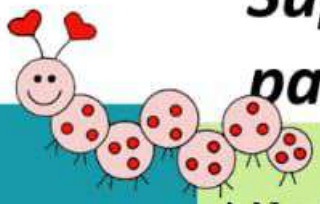
To find out, they conducted a twin study. By studying genetic and behavioural data from people who definitively share their entire genome (monozygotic twins) or 50% of their genome (dizygotic twins), researchersare able to see whether certain behaviours have environmental or genetic roots.

Thus, for this study, they analyzed data from over 85,000 twins in the world's largest twin registry- the Swedish Twin Registry. As Sweden requires all dogs to be registered with the Swedish Board of Agriculture, they then compared this data with data for dog ownership. Of the twins researched, 8,503 of themowned dogs. With these findings, they then set up computer models to identify whether genetic or environmental factors had more of an influence on dog ownership.

In doing so they found that genetics were slightly more predictive of adult dog ownership than the environment. They found that a person's genetics were able to predict 57% of the likelihood of dog ownership in women, and 51% in men.

"Leprosy" disfiguring iconic statues of Easter Island

Within a century the emblematic stone figures that guard remote Easter Island could be little more than weathered rectangular blocks, conservation experts are warning – but Britain could be part of the fix.The giant heads, carved centuries ago by the island's inhabitants, represent the living ancestors of Easter Island's Polynesian people – the Rapa Nui – and have brought it Unesco world heritage site status in its Pacific location more than 2,000 miles off the coast of Chile.But the hundreds of giant Moai statues dominating the hillsides are facing the threat of what locals ominously describe as a kind of "leprosy" – white spots that are appearing on the figures' facades.Caused by lichen, the patches are eating away at the sculptures, softening them to a clay-like consistency and deforming their features. The statues must also contend with coastal erosion, rising sea levels that will worsen with climate change, high winds and damage from freely roaming Livestock, having withstood the elements for more than half a millennium."I imagine that in a century more these Moai will basically be rectangular figures," Tahira Edmunds, the adviser to Chile's National Forestry Corporation (Conaf), who has worked on cleaning the sculptures to remove the lichen, told Reuters during a visit to the island last month.Sonia Haoa, an archaeologist and Easter Island native, is compiling an inventory of its heritage, including the Moai. She estimates that about 70% of the more than 1,000 statues are affected by lichens. While the deterioration can appear shocking to visitors to the remote volcanic island, Haoa said it was still possible to save them, through laborious cleaning and coating with sealant chemicals to curb moisture and prevent the porous volcanic rock collapsing.

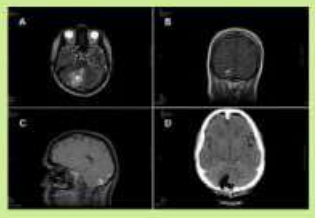


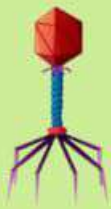
Supposed brain surgery reveals parasite instead of brain tumour

The amount of bacteria on a pair of jeans doesn't increase after about 2 weeks of wear. The study had the test subject wear the jeans non-stop for 15 months, and still it didn't develop an unhealthy amount of bacteria.

Drying your hands with paper towel will reduce the bacterial count by 45 – 60% on your hands. However, using a hand dryer will increase the bacteria on your hands by up to 255% because it blows out bacteria already living in the, conveniently, warm moist environment.

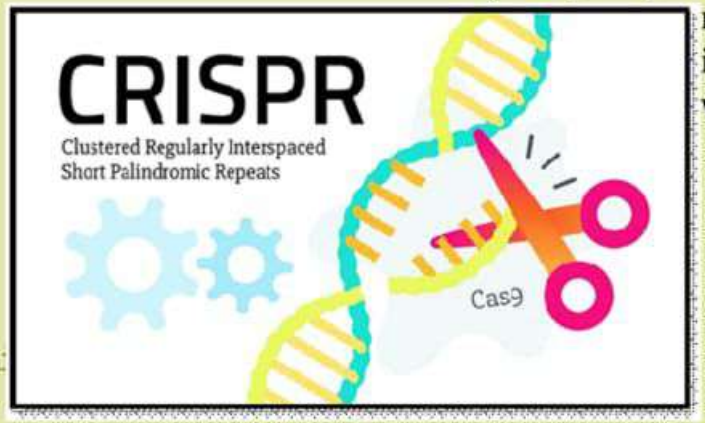
A New York woman began having terrible nightmares, hallucinations, and insomnia, and then she started to drop things. She was making strange phone calls she didn't remember and forgetting where she was. Visits to urgent care did not reveal the cause, and an MRI was eventually done; it revealed a lesion adjacent to an area of the brain controlling speech. Doctors thought she had a malignant tumor and scheduled surgery.Dr. Raj Shrivastava was a member of the Mount SinaiHospital neurosurgical team that was tasked with the operation. He and the team opened her skull, expecting a typical brain tumor that would be soft and spread out. But they saw something else that was encapsulated and firm, and they removed it in one piece. Once it was out, they cut into it. "Sure enough, a baby tapeworm came out of that lesion," said Dr. Jonathan Rasouli, the chief neurosurgery resident at the Icahn School of Medicine at Mount Sinai in New York City and another surgical team member. This occurs when a person first has an intestinal tapeworm, which sheds eggs that end up in their feces. The eggs - larval cysts - can infect tissues, like muscles or the brain. So if feces from a person with a tapeworm contaminates food that gets eaten, then cysticercosis - the parasitic tissue infection - develops. Therefore the disease is far likelier to happen to members of a household in which someone is carrying a tapeworm than to members of households without a tapeworm case. Undercooked pork can, however, cause a tapeworm if larval cysts are in the meat. Tapeworm and cysticercosis happen to people around the world. Rates are highest in areas with poor sanitation practices and pigs that range freely. While it's more common in Asia, Africa, &Latin America, it can also happen in North America when people don't use good handwashing practices. The Centers for Disease Control and Prevention (CDC) has targeted cysticercosis for "public health action" and considers it a neglected parasitic infection. They want to mprove diagnostics and increase awareness of the illness, among other goals.





What Is CRISPR ?

What makes CRISPR so powerful is that it is easy for any molecular or genetic scientist to use, and it works on almost every cell in every organism. CRISPR gene editing technology was developed from a prokaryotic immune system, to make gene-editing faster and more precise. Since its first application in 2011, CRISPR has hastened the gene-editing process and drastically increased scientific advances to include altering human embryonic cells. The time has come for the public and scientists to implement laws regarding how CRISPR is used. Editing embryon sperm, or egg cells is different than other gene therapy because the edits are passed down to offspring. In other words, the new gene is among the .human population the same way the gene for brown eyes or blonde hair is.

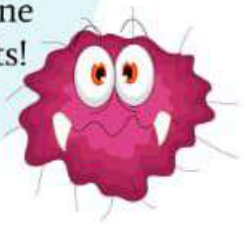


Antidote to Deadly Box Jellyfish Venom Developed Using CRISPR.

One of the deadliest animals on earth is the Australian box jellyfish; they are the most venomous marine creature and the toxins they produce attack skin cells, the heart, and the nervous system. One sting can cause cardiac arrest and death with only minutes, and one box jellyfish has enough venom to kill over sixty people. University of Sydney researchers have now gained insight into how thevenom works, using CRISPR gene editing tools. They have also developed a treatment for the deadly sting. This antidote, reported in Nature Communications, can stop the symptoms caused by the poison if it's administered within fifteen minutes of the encounter.

One teaspoon of the bacterium C. botulinum, if properly distributed, could kill every single human being in the USA

Beef tapeworm is the largest parasite (which causes taeniasis in human), which can easily grow 7½ meters or 25 feet long! Imagine that living in your guts!

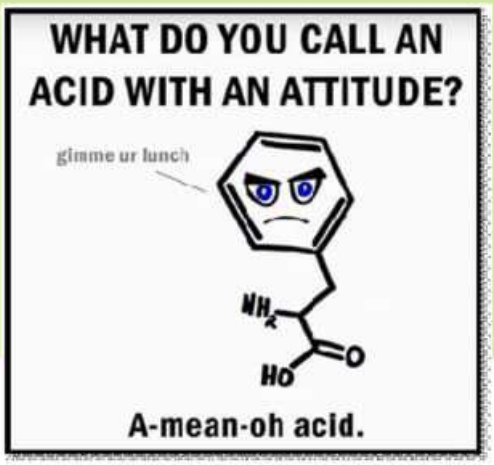


Controversial work adds Human gene to rhesus monkey genome

A team of scientists in China is creating controversy with a new publication reported in the National Science Review, a Beijing journal. They inserted a human brain development gene into the genomes of a group of rhesus monkeys. After the genetically engineered monkeys were born and had a chance to grow, the researchers conducted tests that led them to conclude that the monkeys were performing better on memory tests than un-engineered monkeys. This was the first attempt to understand the evolution of human cognition using a transgenic monkey model," Kunming Institute of Zoology geneticist and research leader Bing Su, commented to MIT Tech Review. The researchers aimed to learn more about how the human brain develops.

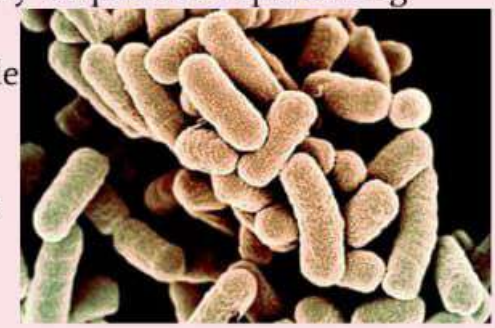
Several research groups have found that a gene called MCPH1 helps control the size of the human brain. Babies that carry dysfunctional copies of the gene are born with microcephaly - an abnormally small head.In this work, the scientists injected a virus that carried the MCPH1 gene into rhesus monkey embryos, so that the gene would be inserted into the genome. Of eleven monkeys that were born successfully, five survived and grew older. They carried from two to nine copies of the gene. The scientists then conducted a variety of tests. They reported that the monkeys' brains were a normal size. However, the genetically engineered monkeys had better memory and processing abilities. Their brains were also slower to develop, and grew at a rate that was more similar to human brains.

The white, bad smelling chunks that you find in your mouth are not bits of food, but hardened sweat and bacteria from your tonsils



Synthetic Genome. Is This Artificial Life?

In a milestone for synthetic biology, colonies of E. coli thrive with DNA constructed from scratch by humans, not nature.A colored scanning electron micrograph of the bacteria E. coli. Scientists in Britain created bacteria with “recoded” DNA.CreditNano Creative/Science Source A colored scanning electron micrograph of the bacteria E. coli. Scientists in Britain created bacteria with “recoded” DNA.CreditCreditNano Creative/Science Source Scientists have created a living organism whose DNA is entirely human-made — perhaps a new form of life, experts said, and a milestone in the field of synthetic biology.Researchers at the Medical Research Council Laboratory of Molecular Biology in Britain reported on Wednesday that they had rewritten the DNA of the bacteria Escherichia coli, fashioning a synthetic genome four times larger and far more complex than any previously created. The bacteria are alive, though unusually shaped and reproducing slowly. But their cells operate according to a new set of biological rules, producing familiar proteins with a reconstructed genetic code The achievement one day may lead to organisms that produce novel medicines or other valuable molecules, as living factories. These synthetic bacteria also may offer clues as to how the genetic code arose in the early history of life.

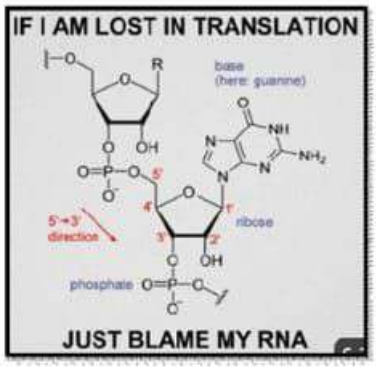


THE MICROBE

Hilaire Belloc (1870-1953)

THE MICROBE is so very small
You cannot make him out at all,
But many sanguine people hope
To see him through a microscope.
His jointed tongue that lies beneath
A hundred curious rows of teeth;
His seven tufted tails with lots
Of lovely pink and purple spots,
On each of which a pattern stands,
Composed of forty separate bands;
His eyebrows of a tender green;
All these have never yet been seen—
But Scientists, who ought to know,
Assure us that is must be so...
Oh! let us never, never doubt
What nobody is sure about!

"The Microbe" is reprinted from More Beasts for Worse Children. Hilaire Belloc. Duckworth, 1912.



Bacteria that can 'eat' pollutants and generate electricity found.

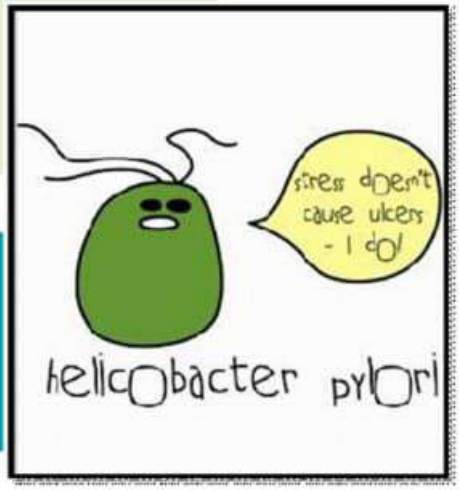
FUN FACT

Kangaroos barely release any methane. Scientists are therefore trying to harvest the bacteria found in their colons so that they can transfer this "skill" to cows to greenhouse gases emission

Tiny creatures that can "eat" pollution and generate electricity in the process have been captured for the first time. Washington State University scientists trekked into the depths of Yellowstone National Park to extract these bacteria, which are adapted to living in geysers and hot springs that can reach over 90°C. The "electrogenic" microbes were targeted due to their ability to produce power, which experts hope could be harnessed to power devices. Some of these bacteria have the power to convert toxic pollutants into less harmful substances. As they do so, the electrons passing through their body as they digest their food are dumped outside their bodies on minerals or metals, using hairlike structures that protrude from their bodies like wires. This produces a stream of electricity in an efficient process that can be used in low-power applications.This was the first time such bacteria were collected in situ in an extreme environment like an alkaline hot spring," said Abdelrhman Mohamed, a PhD student at Washington State University who led the research.

IIT- Bombay researchers find bacteria that may help remove pollutants

While carrying out a routine experiment on degradation of pollutants, researchers from IIT-Bombay have stumbled upon an organism which preferentially feeds on hazardous aromatic pollutants over glucose.
The discovery of this strain of bacterium, called Pseudomonas putida CSV86, can help in eliminating a diverse range of aromatic pollutants such as naphthalene (in household insect repellents), benzoate (in food preservatives), plastics and industrial chemicals.
The findings of the study, which was published in the journal Applied and Environmental Microbiology,
will not only help in getting rid of pollutants in waste water by breaking them down into safer chemicals, but further gene study could have implications in the field of agriculture too.



Each square centimeter of your skin averages about 100,000 bacteria

FUN ZONE

MICRO -SEARCH

M	I	C	R	O	S	C	O	P	E
S	B	R	T	Q	N	S	K	X	E
U	N	N	Z	M	A	P	J	T	L
E	U	X	L	N	F	C	U	Y	N
R	C	E	T	Y	P	H	O	I	D
U	L	P	Y	L	B	G	P	L	F
A	E	U	O	S	H	F	I	O	D
S	U	D	A	N	B	L	A	C	K
U	S	F	T	G	P	A	B	E	E
E	G	A	H	P	O	R	C	A	M

1 Causitive agent for food poisoning
2 Most common microbe in the gut
3 Device used to observe microbes
4 Disease caused by S typhi
5 Primary stain in lipid staining
6 Cell that helps in immune response
7 Difference in prokaryotes and cukaryotes

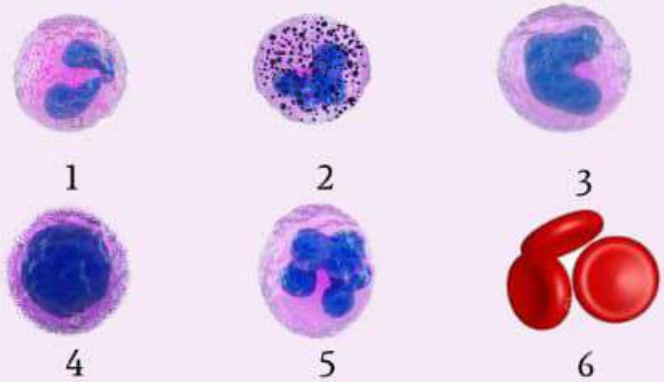
1. The cell was first discovered by
a. Robert Hooke
b. Louis Pasteur
c. Anton Van Leeuwenhoek
d. Alexander Fleming

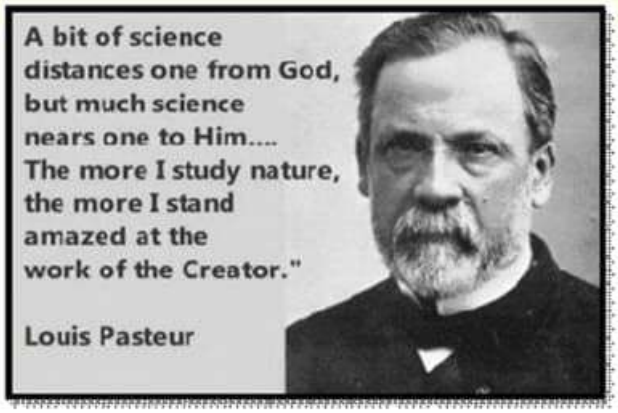
2. Liam was injured in a card accident & will require lot of blood due to it. He will require a blood transfusion. He has AB+. blood group What group of blood will he able to accept?
a. A+
b. B-
c. AB+
d. All of the above

3. Who is credited with the invention of the microscope?
a. Isaac Newton
b. Anton Van Leeuwenhoek
c. Albert Einstein
d. Thomas Edison

4. Substances that are naturally produced by certain micro-organisms that can inhibit or destroy other microorganisms are called ?
a. Antibiotics
b. Synthetic drugs
c. Natural Drugs
d. Dyes

Identify Different Blood Cells





Nimbu paani's yuck ingredient: E. coli

A robust 77 per cent of samples of nimbu paani collected by BMC from street vendors across 24 wards in the city were found to be contaminated by the bacteria, assumed to come from sewage water.E.coli may be the stomach-churning ingredient in a refreshing glass of street-sidedrink. A robust 77 per cent of samples of nimbu paani collected by BMC from streetvendors across 24 wards in the city were found to be contaminated by the bacteria, assumed to come from sewage water.Gola fared no better: Of 250 samples of ice, the base ingredient, only 40 were found to be fit for human consumption. Of 204 lemonade samples collected, only 47 were safe for consumption.Ubiquitous blocks of common ice may be the culprit as pinned down by BMC survey in March 2018. Of the ice samples collected and tested from restaurants, hotels and juice centres across the city, 98 per cent were found to be contaminated."E-coli bacteria can cause diarrhoea, urinary tract infection, gastroenteritis and typhoid," said Dr Padmaja Keskar, BMC's executive health officer."We mainly check the samples for e.coli as it is an indicator of contamination. Lack of hygiene in stall owners and adulterated ice could be the source.""Citizens should maintain personal hand hygiene and avoid eating food handled by glove-less vendors," said Dr Akash Shukla, head of Sion Hospital's department of Gastroenterology. "Citizens should immediately inform the civic authority if they find a water pipeline or sewageline leaking."

ANSWERS

QUIZ

1. Robert Hooke
2. Antibiotics
3. Anton Van Leeuwenhoek
4. All of the above

WORD SERCH

1. Saureus
2. Ecoli
3. Microscope
4. Typhoid
5. Sudanblack
6. Macrophage
7. Nucleus

IDENTIFICATION OF BLOOD CELLS

1. Eosinophil
2. Basophil
3. Monocyte.
4. Lymphocyte
5. Neutrophil
6. Red blood cells

In 2012, scientists found 1,458 new species of bacteria living just in the bellybutton of human beings.

Departmental activities and achievements:

. Name of the department- Microbiology
- Name of the head of the department- Dr. Sejal Rathod
- Department activities-

1. Mr Vijay Thigle was superannuated after 38 years of dedicated service in the Microbiology Department of KC College.
2. Microfiesta3.0 under the aegis of STAR-DBT, an intercollegiate working model competition related to different fields of Microbiology was organized by the department as a part of SCiCodE#18. The event was attended by a total of 290 participants including 116 school students from four different schools, 41 junior college students and 111 degree college students, as well as teachers and parents.
3. A National Seminar on "Recent Advances in Diagnostics" was organized by the Department of Microbiology on the 27th February, 2019.
4.. Workshops and Training – The department organized various workshops like a training programme for teachers on 'Operation and Calibration of automated liquid handling instruments and dispensers', 'Holistic development' and 'Analysis of character strengths and development of research attitude' for the TYBSc students.
5. Visits to Glenmark Pharmaceuticals R and D unit, Mahape; Rhythm winery, Pune; National Center for cell Biology Pune, Karnala Bird Sanctuary,Panvel Advanced Centre for Treatment, Research and Education in Cancer (ACTREC),Kharghar and Indian Women Scientist association Science Exhibition, Vashi were carried out.

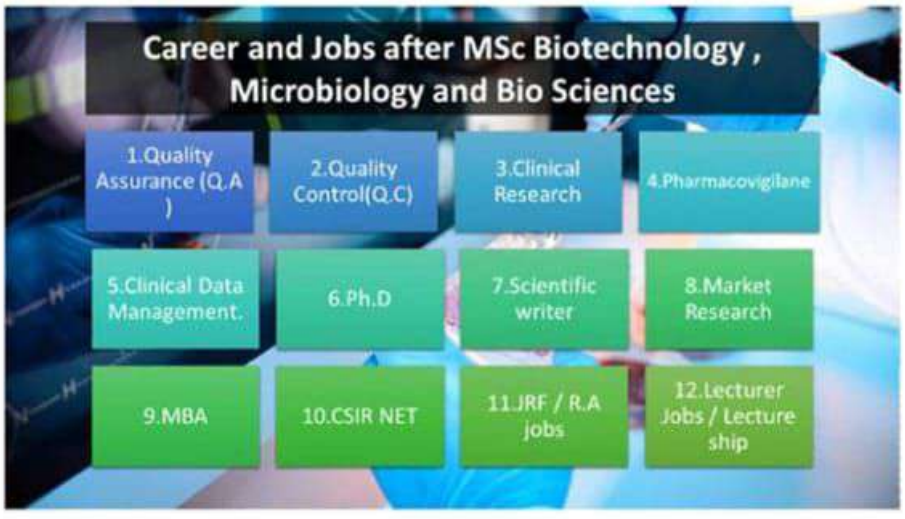
Achievements

1. Dr. Sejal Rathod judged in a Zonal Round at 'Aavishkar' university research convention and has two research publications.
2. Dr. Pratibha Shah was awarded with 'KC Rajmani' awards for Exemplary work
3. Mrs Rajitha Satish was awarded with a 2nd prize in 'National level poster presentation' at the 14th National Research Scholars meet held at ACTREC and judged at 'Microexplore', an exhibition of Microbiological models and posters, departmental festival at SIES College.
4.Ms. Amina D cleared her JRF NET with an AIR of 70.
5.Ms. Priyanka Y. cleared her SET exam.

Student achievements-

- Ms Kiran Prakash Mishra got selected for National Initiative on Undergraduate science (NIUS) program in Biology organized by Homi Bhabha Centre for Science Education (HBCSE) at Tata Institute of Fundamental research (TIFR)

Microbiology Future Prospectus



THE TEAM
Janice Elangikal
Shahida Gaziani
Gitika Kothari
Kiran Yadav
Tanisha Chouhan
Netra Jain
Chaitanya Kadam
Mohit Kalani
Shaik Mohammed Anas
Jay Chaurasia