MES College of Arts, Commerce & Science

Malleswaram, Bengaluru – 03

Department of Zoology

SPIRITUS

Inspired thoughts....

NEWS 'N' VIEWS

2018 - 2019

PREFACE

What began as a humble activity within the department in the year 2007, supported by the enthusiasm & contribution of students, has today transformed into a notable knowledge disseminating initiative.

We at the Department of Zoology take this opportunity to share with you readers a unique collection of articles under the name "SPIRITUS" meaning „life" in Latin. These articles are authored by our students from I, II and III B.Sc. in the form of contributions to the bulletin board maintained by the department called News "N" Views.

The bulletin board was envisaged as an ideal platform to share recent and intriguing developments, dialogues and discussions in the stream of life sciences. Any student of Zoology at the under – graduate level is welcome to contribute to the bulletin board. As a small token of appreciation & encouragement, the Department selects the top three articles at the end of every semester and awards them cash prize.

With this **fifth edition** of our **e-newsletter "SPIRITUS",** we bring to our readers, **62 articles** from the month of July 2018 to March 2019. We hope this small initiative grows into a mutually rewarding experience, for us at the Department, our students and you, dear readers!

RELEASE OF THE FIFTH EDITION OF "SPIRITUS"

E-NEWSLETTER OF THE ZOOLOGY DEPARTMENT

The release of the inaugural edition of "SPIRITUS" the e-newsletter of the Zoology Department, MES College, was held on 12th March, 2019. The newsletter is a consolidation of the contributions featuring on the Department bulletin board, "NEWS 'N' VIEWS".

During the programme, prizes were awarded to the best 3 articles and a consolation prize for the academic year 2018 - 19.

The winners were –

- Nirmala S I B.Sc 'I' ---------- I Prize
- Bindushree N I B.Sc 'B' ---------- II Prize
- R Sivashree I B.Sc 'B' ---------- III Prize
- Hurshitha Vasudevan II B.Sc 'I' ---------- Consolation

This is Fifth edition of "SPIRITUS" has **62 articles**, written by students of life sciences of 1st, 2nd & 3rd year B.Sc.

Index

THIS MAN GOT A SEEMINGLY HARMLESS BUG BITE WHICH TURNED INTO A "FLESH EATING" INFECTION!!

CASE:-

What started as a simple bug bite on a young man's knee soon turned life threatening when the itchy bump developed into an infection with "flesh eating" bacteria.

The 21-year-old man went to the emergency room after his right knee became swollen and painful, and he had trouble in walking, according to the report published in the November issue of "The American Journal of Emergency Medicine."

An exam was conducted by Dr. Paulis revealed that he had a bump on his knee that was discharging pus and tissue in the area had started to die or become necrotic.

An X-ray of his knee showed that there was air underneath his skin tissue, which can be a sign of a "flesh eating" bacterial infection, known medically as "necrotizing fasciitis." The man's blood and wound site tested positive for the bacteria Methicillin - Resistant Staphylococcus aureus (MRSA), which caused his infection.

Test also revealed that the man's infection had caused him to develop yet another rare complication - a "septic" pulmonary embolism. This is a clot containing bacteria that travels from the site of infection to the lungs, where it blocks blood flow and causes abscesses.

The man was treated with intravenous antibiotics and surgery to remove dead tissue in his infected knee. He recovered fully and was able to leave the hospital after a few weeks, Dr. Paulis said.

WHAT IS "MRSA"?

Methicillin-resistant Staphylococcus aureus (MRSA) or staph is a bacterium that causes infections in different parts of the body where skin acts as a medium. Staph can usually be treated with antibiotics. But over the decades, some strains of staph have become resistant to antibiotics that once destroyed it. "Methicillin-resistant" means the bacteria that cannot be killed by Methicillin, a type of antibiotic that used to be able to kill them. It is now resistant to amoxicillin, penicillin, oxacillin, and many other common antibiotics. Hence sometimes it is called as "super bug."

There are several types of bacteria that can cause necrotizing fasciitis, including group A Streptococcus (group A Strep), Klebsiella, Clostridium, Escherichia coli and Staphylococcus aureus, according to The Centre for Disease Control and Prevention (CDC).

CAUSES:-

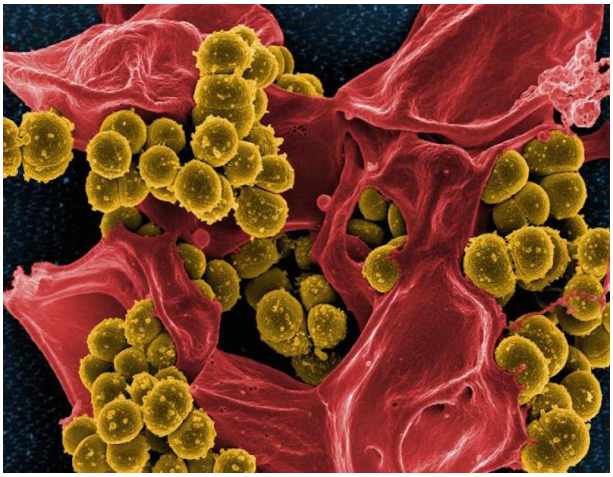
Most commonly, people get necrotizing fasciitis when the bacteria enter the body through breaks in the skin, including cuts and scrapes, burns and surgical wounds, the CDC says.

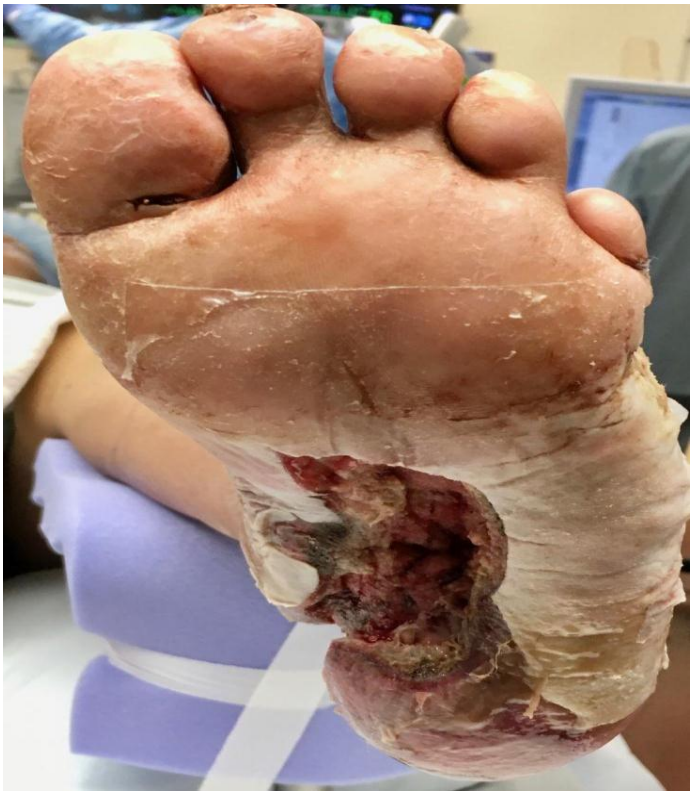
But the bacteria may also enter the body through insect bites. If a person scratches a bite hard enough, they can break open the skin, allowing bacteria to enter.

The symptoms of MRSA depend on where you are infected. Most often, it causes mild infections on the skin, like sores or boils. But it can also cause more serious skin infections or infect surgical wounds, the bloodstream, the lungs, or the urinary tract.

TREATMENT:-

On a positive note - MRSA infection can be treated with antibiotics that the bacteria have not yet become resistant to. Most MRSA infections can be treated with the following antibiotics: Vancomycin or teicoplanin which are normally given by injection or through a tube straight into vein and Linezolid which can be given into a vein or swallowed.





Scanning electron micrograph image of MRSA. (credit : National Institute of Allergy and Infectious Diseases)

Aiswaria P
III B.Sc B Sec

A BROTHER AND SISTER

A brother and sister born in Australia in 2014 have joined an exclusive club of siblings who share an extremely rare bond - they are the second pair of 'semi-identical twins ever found. The twins each received a jumble of DNA from dad, but the genes they've inherited from mum are 100 percent identical. Not only is there only one other such case known, but this pair was the first to be detected before they were born.

"The mother's ultrasound at six weeks showed a single placenta and positioning of amniotic sacs that indicated she was expecting identical twins," says foetal medicine specialist Nicholas Fisk, who looked after the young family while based at Royal Brisbane and Women's Hospital four years ago.

"However, an ultrasound at 14 weeks showed the twins were male and female, which is not possible for identical twins."

Typically speaking, twins come in just two varieties. There's the non-identical 'dizygotic' sort, which are the result of two ova each fertilized by a separate sperm.

Then there are those who are identical, or 'monozygotic', where a solitary fertilized ovum divides completely into distinct individuals before settling into its expected program of growth and foetal development.

Before 2007, the very idea of a third 'sesquizygotic' category was more theoretical than established fact. Then came a random discovery of twins born in the US who proved to be genetic chimeras.

Both of those infants possessed a mix of cells, some with two X chromosomes and others with a Y chromosome. If one of the infants hadn't been born intersex, it's possible we'd be none the wiser to their genetic secret.

Similarly, while neither of the Australian twins physiologically present as intersex, both have an assortment of cells carrying either XX or XY chromosome pairs.

Testing of cells taken from their respective sacs of amniotic fluid also showed that while the maternal DNA of each was 100 percent identical, only 78 percent of the paternal DNA matched.

One possible explanation for this assortment of genomes in a single person is that the mother's ova may have prematurely copied itself prior to being fertilized by two sperm, but didn't fully separate.

There is another possibility, one favoured by the specialists investigating the most recent case.

"It is likely the mother's egg was fertilized simultaneously by two of the father's sperm before dividing," says Fisk.

Like that friend who's tagging along on a first date, an extra selection of genes should spell disaster for any budding romance, meaning such a newly fertilized embryo usually wouldn't be expected to make it.

"In the case of the [Australian] sesquizygotic twins, the fertilized egg appears to have equally divided up the three sets of chromosomes into groups of cells which then split into two, creating the twins," says clinical geneticist Michael Gabbett from Queensland University of Technology, Australia.

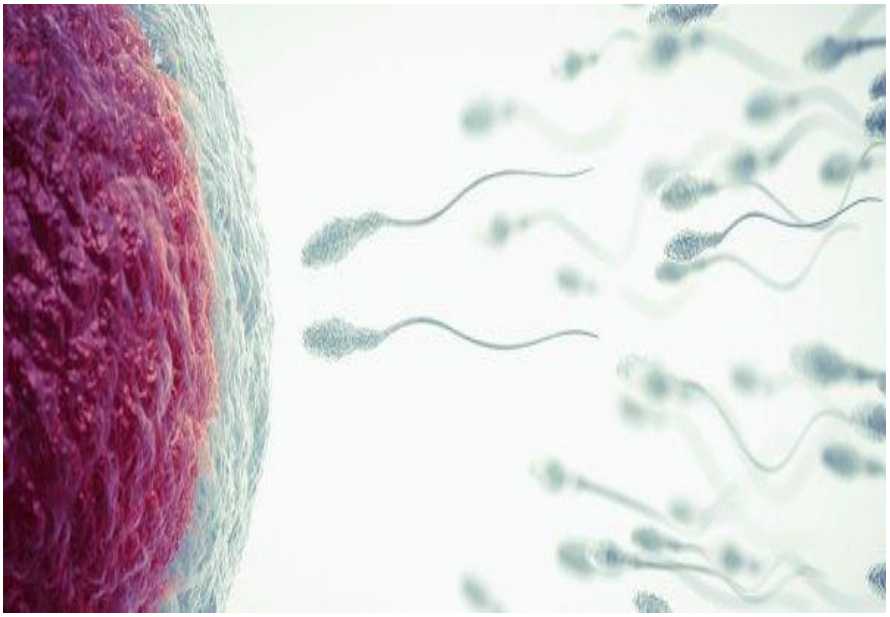
With so few examples to go on, it's hard to know for certain which explanation is more accurate, or if each set of twins developed in slightly different ways.

It's also difficult to estimate how many twins thought to be non-identical actually share the same selection of their mother's DNA.

An investigation of global databases on twins suggests if there are others out there, they're still incredibly rare examples. "We at first questioned whether there were perhaps other cases which had

been wrongly classified or not reported, so examined genetic data from 968 fraternal twins and their parents," says Fisk." However, we found no other sesquizygotic twins in these data nor any case of semi-identical twins in large global twin studies."

Such rarity rules out any case for routine genetic screening for chimerism in twins, at least for now. Advances in genetic screening and expanding databases of medical data could lead to the discovery of more semi-identical twins in the future, however, and possibly help us better understand the fertilization process in better detail. In the meantime, these sets of twins can legitimately claim to be just two of a kind. This research was published in The New England Journal of Medicine.



Amrutha R
III B.Sc B Sec

MOVING CONTINENTS CREATED NEW CENTIPEDE SPECIES ETHMOSTIGMUS CENTIPEDES DISPERSED ACROSS PENINSULAR INDIA TO FROM NEW SPECIES

Fossils and advanced genetic methods to study relationships between species now tell an intriguing story about a group of tropical centipedes. Continental drift (the moving apart of continents) almost 100 million years ago created many species of Ethmostigmus centipedes in the world's tropics. In the Indian peninsula, these centipedes first originated in the southern and central Western Ghats, and then spread across the ranges here, finds a study published in BMC Evolutionary Biology.

Diversity of species

India is home to six, fairly large Ethmostigmus centipedes: four dwell in the Western Ghats, one in the Eastern Ghats and one in north-east India. Africa, south-east Asia and Australia are also home to other species of Ethmostigmus centipedes. What explains its distribution across continents and the diversity of species in peninsular India?

To find out, scientists Jahanavi Joshi and Gregory Edgecombe of the Natural History Museum (London, United Kingdom) turned to genetics, using genetic data of 398 Ethmostigmus centipedes from published studies, they constructed a species 'time-tree' – a network that reveals how species are related to each other and when now species emerged – of nine species (across peninsular India, Africa, Australia and southeast Asia). They used three fossil centipedes to calibrate the DNA tree, which gave them the approximate times that the species originated in the past.

Common ancestor

The results suggest that a single ancestor gave rise to all Ethmostigmus centipedes in the ancient supercontinent of Gondwana (continents including Australia, Africa and peninsular India comprised this single landmass then). The subsequent breakup of Gondwana and the drifting away of different landmasses shaped the early evolutionary history of Ethmostigmus, and the Ethmostigmus in peninsular India are very unique, says co-author Joshi.

"They started evolving at a time when peninsular India was moving towards South Asia," she says. This started around 72 million years ago, in the southern and central western ghats. Following this, the Ethmostigmus here dispersed to the eastern ghats (now home to E. tristis).

From there, Ethmostigmus dispersed to the southern western ghats. Ethmostigmus centipedes also reached the northern ghats from the south-central ghats too, and later dispersed back to the central ghats again from there.

The formation of wet forests in these areas during this time could have aided this dispersal (for all existing peninsular Indian Ethmostigmus centipedes now dwell only in wet forests.

Arun Kumar N
III B.Sc B Sec

UTERUS TRANSPLANTATION

In medical terms, **transplantation** can be defined as the transfer (engraftment) of human cells, tissues or organs from a donor to a recipient with the aim of restoring function(s) in the body. {Def. given by W.H.O}.

There are several transplants in the world which has been medically successful be it Heart, Brain, Liver, Cornea etc. But in recent years doctors and researchers are working for uterus transplantation which was a tough task to achieve but their hard work paid off when the transplantation was done successfully and resulted in conceiving of mother who got uterus transplantation. The following article by **Liza Johannesson and Stina Järvholm** gives a new aspect to my article.

Abstract

Even if reproductive medicine has been remarkably successful during the past few decades, with the introduction of in vitro fertilization in the late 1970s and intracytoplasmic sperm injection in the early 1990s, it has been repeatedly mocked by infertility due to an absolute uterine factor. No treatment has been available for the women suffering from an absent or dysfunctional uterus, in terms of carrying a pregnancy. Approximately one in 500 women suffer from absolute uterine infertility and the option so far to become a mother has been to either adopt or utilize gestational surrogacy. As of today, a total of eleven cases of human uterus transplantations have been reported worldwide, conducted in three different countries. The results of these initial experimental cases far exceed what might be expected of a novel surgical method.

Introduction

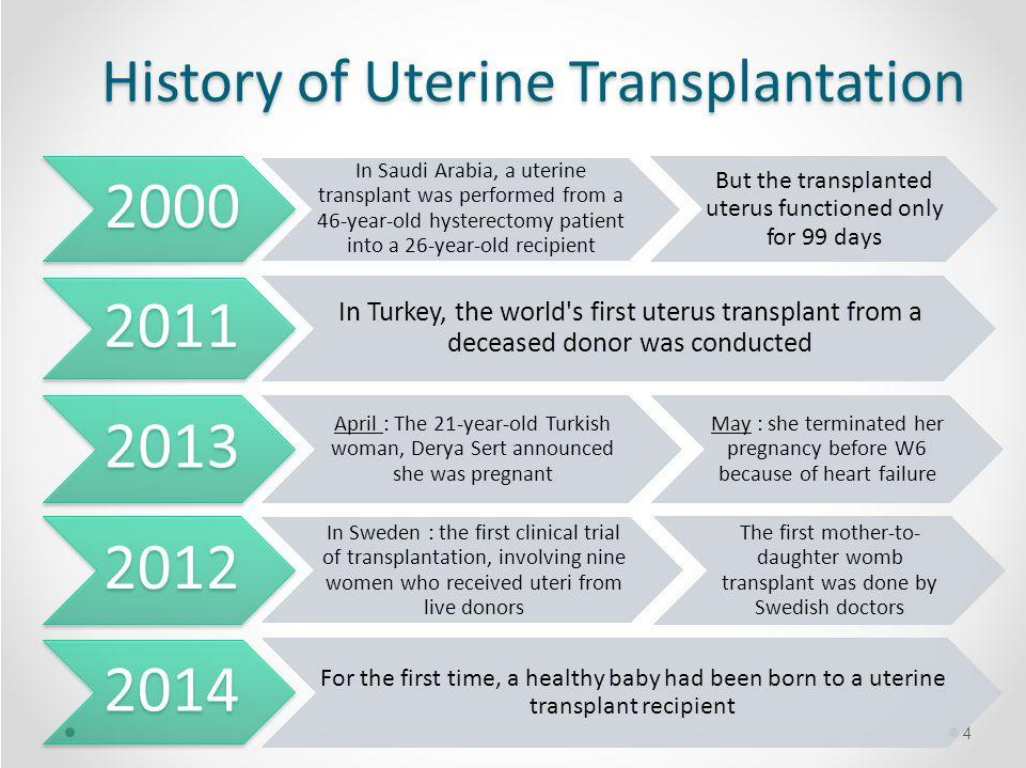
Infertility due to a lack of anatomical uterus or functional uterus, i.e., an inability of the uterus to carry a pregnancy, has eluded reproductive medicine for a long period of time. Uterine factor infertility is estimated to affect thousands of women worldwide and can be caused by either congenital **Müllerian malformations**, such as in **the Mayer–Rokitansky–Küster–Hauser (MRKH) syndrome**, or more commonly acquired as in the cases of women suffering from **Asherman's syndrome**, **pregnancy interfering myomas, or hysterectomies**. Since no successful treatment has been available for absolute uterine factor infertility, the options for these women to become mothers have been either to adopt or to go through with gestational surrogacy, a procedure that is currently banned in many countries.

Uterus transplantation is a complex procedure and is surrounded by not only medical and psychological implications but also ethical, moral, and cultural concerns and expectations.

The research and the effort of the doctors has made this day possible to transplant an organ like uterus which has not only high risks but also self-beliefs and sentiments attached.

Researchers and doctors have been working in this field from more than 15 years and they have succeeded also after a long time period.

Risky, yet an alternative method.



Timeline showing various achievements in this field.

Donation: donors can be of two categories LIVE and DECEASED in which uterus can be transplanted from a donor whose menopause has occurred. Whereas in deceased donors the availability of suitable donors is rare.

The risk of transplanting uterus from a live donor is more than the deceased donor but to meet the need of the number of patients doctors prefer live donors for the transplantation. In a live donor setting, the selection of the ovarian veins will only be possible in postmenopausal donors. The upper part of the uterine vessels, i.e., the vessels connecting the uterine vessels to the ovarian vessels, may provide an adequately good substitute for anastomosis. With the development of techniques of uterus transplantation further, the risks of surgical complications are likely to decrease and new less-invasive methods such as laparoscopic or robotic-assisted surgery may prove to be a useful tool for parts of the surgical retrieval procedure.

Uterus transplantation and immunology

Since the induction of tolerance, precluding the need for maintenance immunosuppression, has proven to be elusive, immunosuppressive drugs are still used to minimize graft rejection, following organ transplantation. Finding the most favourable level of immunosuppression in solid organ transplantation is a balancing act between preventing rejection and the adverse effects of immunosuppressive drugs causing morbidity. The need for immunosuppressive medications is not constant, and the required initial high blood levels of immunosuppression can shortly be reduced to a lower maintenance blood level after transplantation. Induction therapy, i.e., perioperative prophylactic immunosuppression, is commonly used to prevent acute rejection in the 1st month after transplantation. The maintenance therapy is normally given as a combination of drugs with different pharmacokinetic mechanisms in order to minimize potential side effects.

Pregnancies and live births

The major issues of uterus transplantation regarding immunosuppression and rejection can be summarized in three different areas of concern:

- **The effect of pregnancy on graft rejection**-Throughout pregnancy, intake of immunosuppressive agents is vital to prevent organ rejection. All common medications used to avoid ep-

isodes of rejection cross the placenta barrier and subsequently reach the foetal circulation, thus exposing the child to potentially teratogenic agents during important developmental phases.

- **The effect of the transplanted graft on pregnancy-**During pregnancy, uterine and placental physiologic and hemodynamic changes occur, inducing changes in the plasma concentrations of drugs; hence, these need to be monitored thoroughly.
- **The effect of immunosuppression on both the fertility and the pregnancy outcome-** Immunosuppressive doses often need to be increased during pregnancy and decreased in the postpartum period to achieve constant trough levels. Some studies report pregnant recipients requiring an almost twofold increase in doses compared with pre-pregnancy doses in order to keep trough level in a therapeutic window.

Future prospects

The future of uterus transplantation is prone to hold modifications of the procedure. New methods to evaluate the recipients, donors, and organs, like angiographic mapping of vessels, preoperative or even perioperative, will possibly simplify the procedure and improve the outcome. There will certainly also be other surgical options, such as laparoscopic and robotic-assisted methods, giving the possibility to reduce the surgical duration and concurrent risks for both recipients and live donors. Extensive efforts are currently made in the area of bioengineered organs for transplantation purpose, the uterus not being an exception. The organ-engineering technology, being still in its infancy, pursues two ways of solution:

- Donated organs, not suitable for transplantation, that is de-cellularized and
- Different types of synthetic matrices would then after a re-cellularization process by the recipients own stem cells to be transplanted and in theory, function as good as any transplanted organ with the major benefit that no immunosuppression would be needed.

At the time when uterus transplantation will enter the clinical arena in a wider perspective, the participants will express a broader diversity, both medically and psychologically.

Conclusion

The concept of uterus transplantation will though surely be expanded to be demonstrated in other settings in the near future. All the current successful cases have been performed at a single institution, after years of meticulous research in several animal models.

The years of extensive collaboration between gynaecological and transplant surgeons, pathologists, and anaesthesiologists' is the single most important factor in achieving such a remarkable good outcome of this novel procedure uterine transplantation is a new and viable therapeutic option for patients with uterus-related infertility who wish to have a child, as long as this transplantation is performed at centres of expertise that specialize in human reproduction and transplantation techniques and related skills.

Ankita Varshney
III B.Sc B Sec

RELATION BETWEEN HUMAN SERUM ALBUMIN STRUCTURE AND FLUORESCENCE DECAY PARAMETERS OF TRYPTOPHAN RESIDUE 214

The purpose of this article is to study the relation between fluorescence decay parameters of tryptophan residue in human serum albumin (HSA) and the protein structure. HSA contains a single tryptophan residue, and thus, there will be no ambiguity on the data obtained.

HSA comprises a single polypeptide of 585 amino acid residues with only one tryptophan residue. Tryptophan fluorescence is very sensitive to the local environment. Global form and structure of HSA are pH dependent. Thus, in this article, behavioral changes and fluorescence characteristics of tryptophan within HSA were studied at different pH values (2–12) and in the denatured state in the presence of guanidine hydrochloride solution.

In an environment with a low pH (at pH values 2 and 3), tryptophan emits at a maximum of 330 nm. The peak position shifts to 340 nm at higher pH. Peak position values indicate no protein denaturation but a structural modification. The loss of the tertiary protein structure (complete denaturation) induces a shift in tryptophan fluorescence to 352 nm.

At all pH values, tryptophan residue emits with three lifetimes. Lifetime measurements at different pH values along the emission wavelengths allowed us to differentiate the different forms of HSA. In the denatured state, tryptophan emission occurs also with three lifetimes. However, values and contributions of these lifetimes to the global emission decay differ between the native and denatured states.

We have considered that fluorescence emission occurs from tryptophan substructures, each substructure is characterized by one lifetime along with its pre-exponential. Populations of the substructures, characterized by the pre-exponential values of the fluorescence lifetimes, are dependent on the microenvironment of the fluorophore and on the global protein structure.

Chaitra M. Handi
III B. Sc B Sec

SYNTHETIC WOMB

Place of discovery: Philadelphia
Team: Foetal and paediatric surgeon: Alan Flake
Foetal physiologist: Marcus Davy
Reason of work: Premature birth is the leading reason of death of for newborns.

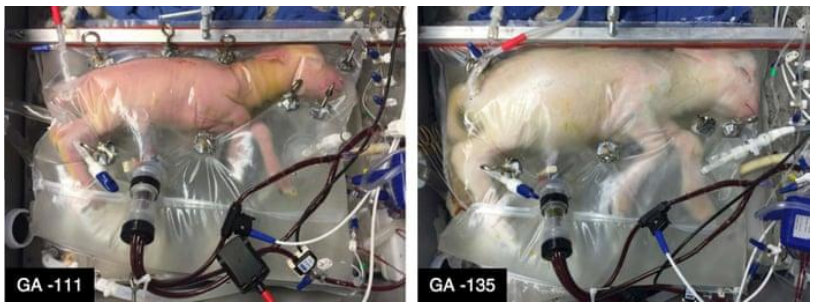
The physicians have created a uterus like "bio-bag" that is capable of sustaining life. In this experiment they have been able to sustain a foetal lamb. They also have successfully recreated the amniotic fluid.

THEORY

An infant is considered premature when they are born before 37 weeks of development (gestation period =40 weeks). This exposes them to a host of chronic health condition as their lungs and brains are still in very early stage of development. The synthetic womb does not allow a foetus to develop for an entire 9 month term, but, it does allow incubating them soon after conception and allows them to complete the development in natural conditions

EXPERIMENT

The lambs were placed in the transparent bio-bag just 105 days after they started development (the gestational period is 142 to 152 days). This 105 days is equivalent to about 22 weeks of human development (gestational period is 40 weeks). The lambs were kept in the bio-bags for 4 weeks. During this time, they grew hair, lungs developed and they reached the stage where they could survive own their own.



Experimental conditions

- The synthetic womb is in a-placenta conditions (work on artificial placenta gap begun).
- The lambs were kept active up to 237 hours in amniotic tanks thorough a process called extra corporeal membrane oxygenation (ECMO) this is a technique used in neonatal wards to infants with medical problems involving gas exchange and lungs.
- Temperature is maintained at 37 degree Celsius.
- They have a simulator which has a 24 hour clock where the foetus is given the sense of touch that is the working and the sleeping hours arm stimulated (activity is never ceased).
- The artificial endometrium is got about by coxing the growth pluripotent stem cells.

RESULT

Remarkably, the 8 lambs in the trial developed normally in the artificial womb and each survived proving that the bio-bag successfully mimicked natural conditions found in the uterus and thus paving the way for a new life saving device.

PRESENT STAGE OF EXPERIMENT

The team of physicians are already in talks with U.S Food and Drug Administration and the clinical trials are slated to begin in the next 2 to 3 years

Chitra K
III B.Sc B Sec

ARTIFICIAL SYNAPSES MADE FROM NANOWIRES

Reference: Forschungszentrum Juelich, December 5, 2018.

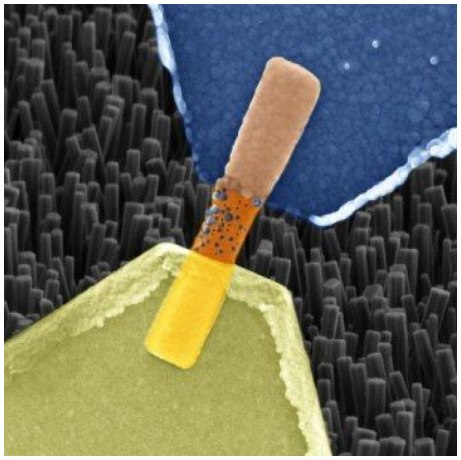


Fig: Image captured by an electron microscope of a single nanowire memristor.

Scientists from Julich together with other scientists from Aachen and Turin have produced a memristive element made from nanowires in much the same way as a biological nerve cell. Component is able to save and process information, as well as receive numerous signals functioning similar to the neurons.

Resistive switching cell made from oxide crystal nanowires is the ideal candidate for use in building bio inspired "neuromorphic" processors which is able to take over wide range of functions of synapses and neurons.

Due to rapid progress in artificial intelligence, we are now able to drive cars, translate texts, defeat world champions at chess and also one of the greatest challenges lies in the attempt to artificially reproduce the signal processing in the human brain. In neural networks, data is stored and processed in high degree in parallel, traditional computers on the other hand function rapidly through tasks in succession and clearly distinguish between storing and processing of information.

Systems with neuromorphic chips imitating the way the human brain works offer significant advantages. Experts describe this type of bio-inspired computer as being able to work in a decentralized way, having at its disposal multitude of processors, which are connected like neurons in the brain. If they break down, another takes over its function.

Dr. Ilia Valov, Forschungszentrum, Julich, states that their nanowire devices made from zinc oxide crystals can process and even store information; though it is compact, it is energy efficient. Memristive cells have been ascribed as the best chances of being capable of taking over the functions of neurons and synapses in bio-inspired computers. They alter electrical resistance depending on the intensity and direction of the electric current flowing through it. Their last resistance value remains intact even when the current is switched off. Hence, it is fundamentally capable of learning.

In order to create these properties, scientists used a single zinc oxide nanowire, measuring approximately one tenth-thousandth of a millimeter in size, and also is over a thousand times thinner than a human hair. Resulting material not only takes up tiny amount of space, but is able to switch much faster than flash memory. They offer promising physical properties, compared to other solids and are used in development of new types of solar cells, sensors, batteries and computer chips. Their manufacture is also simple; they result from the evaporation of specified materials onto a suitable substrate, where they grow on their own.

In order for it to be made into a functional cell, both ends of the nanowire must be attached to

suitable metals like silver or platinum. Metals act as electrodes, release ions on applying electric current.

Hence ,we can conclude that this artificial synapse is going to substitute the neurons in the following years and may make a new mark in curing brain diseases thus decreasing many brain related problems and increasing the life span of those who suffer from brain related problems.
Since it uses artificial intelligence, it will make life more easy and convenient in the coming years.

Panchami P
III B.Sc B Sec

MUSIC THERAPY: ALTERNATIVE ONCOLOGICAL TREATMENT

References:
Karen Popkin and Jyothirmai Gubili,July 25, 2017(ASCO post)
Lynne Eldridge,November 06, 2017

What do we know about music therapy for cancer patients? We know that music makes us happy when we are stressed, it can also make us sad, or cry, and controlling our emotions and feelings. It can take us out of a robotic "do" mode and put us in touch with our "feeling side." But what about people living with cancer? Do studies tell us what our hearts do—that music can make a difference?

Research states that music plays an important role in climbing the mountain, i.e., cancer treatment. There are now more than 30 cancer institutes using music therapy as a technique for the treatment of cancer patients.

Case study was done on a patient who is a 72-year-old woman with medically complex issues including recurrent lymphoma and intraparenchymal hemorrhage with expressive aphasia. Her physical and occupational therapists enter and ask to administer co-treatment, adding, “she’s more alert with the music.”

The patient is offered a more upbeat song, and as the music therapist strums a samba pattern on the guitar, she follows instructions to reach with her arms and shift her weight. The rehabilitation therapists help her to sit up straight. The patient comments, “Oh this feels good!” and sings along with the therapist. Music therapy can be multifaceted, providing benefits such as sensory stimulation, mood enhancement, and a facilitated ease of movement, to name a few.

Overview

Used since ancient times, music was used to affect human spirit and heal, it emerged as a formal discipline in the United States in the 1940's. It involves use of music to effect clinical change, including psychiatry, drug and alcohol rehabilitation, development disability ,palliative care, surgery etc. The goal of music therapy is to improve both the physical and mental well-being of patients who have serious illnesses and are receiving associated treatments.

Music therapy benefits for patients with cancer

Several studies have evaluated and documented the value of music therapy in reducing challenging symptoms -both physiological and psychological experienced by cancer patients .According to recent studies an review of 52 clinical trials involving 3731 patients music produced beneficial effects on anxiety, pain, fatigue, quality of life with small effects on heart rate, respiratory rate, blood pressure

etc. It also reduces mood disturbance, and to improve coping and social integration in cancer patients undergoing haemopoietic stem cell transplantation, procedure known to cause significant physiological distress.

Music is also useful especially in pediatric patients, who are considerably impacted by cancer treatments, music increase comfort in hospitalized children, also reduces pain during procedures and also anxiety, and also for those undergoing radiotherapy, live music sessions conducted during the procedure through closed-circuit television resulted in higher success rate without general anesthesia.

Cancer is a family disease, because it not only affects the cancer victims but it also affects the lives of their families, who are busy meeting their needs. These care givers were given a music therapy, which resulted in double benefit for caregivers. This program helps caregivers forget their sorrows and find their own joy, and gives them strength and will power and makes them empowered. This strength lasted beyond the loss of their loved ones and filled their brain with happy memories and sentiments of hope.

The functional imaging data indicate that music modulates the activity of several limbic and paralimbic brain structures, of them, the ventral striatum, the dorso medial mid brain, and the hippo campus are especially interesting because of their involvement in the pathophysiology of pain, anxiety and depression. Structures house a large number of ligand receptors, including those associated with endogenous opioids, GABA, dopamine, suggesting that music may affect neuronal pathways leading to functional changes

Music therapy has the least side effects among all the treatments given to cure the patients from cancer. Usually observing the immune function, it is found that "alkaline music" is considered one of the best music for therapy. It includes soothing classical music, east Indian music, harp music, instrumental music etc. It depends on the preferences of the patients.

Finally we can conclude that with rising cancer rates, it is important to determine effective preventions to alleviate symptom burden. As there are no side effects from this therapy, and also as it is easily available, we can say that it is the best form of therapy to cure the patients. Music therapy is pleasant, cost-effective. Although it cannot directly cure cancer, it plays its important role in strengthening the person, set their mood right, keep them happy,

Also, as a music learner and a lover, I certainly feel that this is the best form of treatment, as I conducted a small experiment on my grandfather who suffered from prostate cancer who was in his 3rd stage. I used to observe that he used to worry a lot about his pain, with the cancerous cells spreading all over, we made him listen to some classical music to divert his mind and thoughts, he did however show some signs of slight relief and motivation and we were partially fruitful in the act of distracting him. Self-pitying is the most harmful thing. So it is always better to keep a positive environment around the cancer patients. Hence, I can conclude that music therapy is one of the safe alternative oncological treatments

Panchami P
III B.Sc B Sec

POLYMERS IN NEPHROLOGY

A **polymer** is a large moelcule made up of cahins or rings of linked repeating subunits, which are called **monomers**.

The word is derived from Greek prefix 'poly' means **many** and suffix 'mer' means **parts.**

ABSTRACT:

Polymer employed as biomaterial in nephrology serve for several different applications such as:

- They for membranes for dialysis,
- Plasmapheresis – similar to dialysis but used exclusively forremoval of antibodies from plasma portion of human blood,
- They make up tubing- systems for extracorporeal circuits and in the form of beads acts as adsorber columns for haemoperfusion or immunoadtion.

When used in medical applications following are the properties of polymers to be kept in mind-

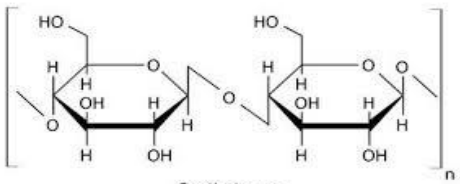
- Polymers must show a high purity,
- Uncontrolled leaching of oligomers from the polymer backbone or of additives from or during the manufacturing process must be avoided,
- Blood and other body fluids are extremely effective in extracting any loosely bound polymers,
- Polymers should show an excellent bio stability and not degrade during their ageing process,
- To be able to stand high temperatures in order to survive steam sterilisation.

INTRODUCTION:

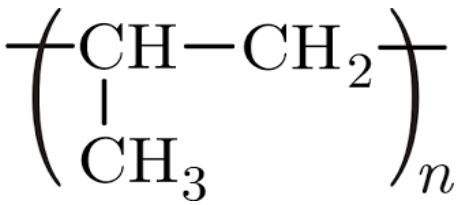
The goal to introduce biomaterials like polymers in medical was to reduce the immunological reactions or allergic reaction following blood flow or material contact.

Many years of application have proved the advantages of using the following polymers:

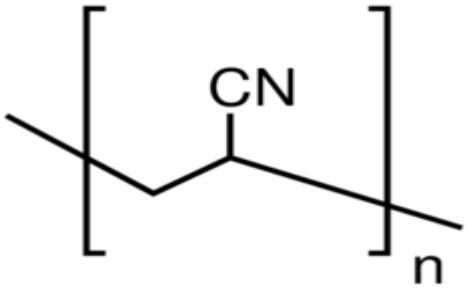
- Polyvinylchloride (PVC)is used for blood tubing and bags for peritoneal dialysis,
- Polycarbonate (PC) and Polypropylene (PP) are used in dialyser housings,
- Polyurethane (PUR) is applied as a potting material for capillary membranes at both ends of the dialyser to separate the blood compartment from the dialysis fluid compartment,
- silicone rings guarantee that there is no blood leakage between the dialyser housing and its header
- membrane polymers are typically those materials that are used in the textile industry



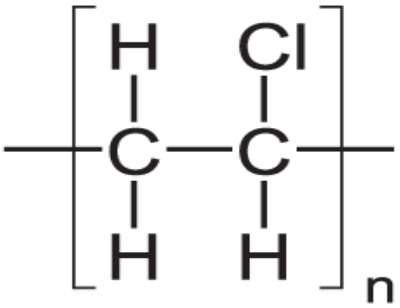
Cellulose



Ppolyprolylene

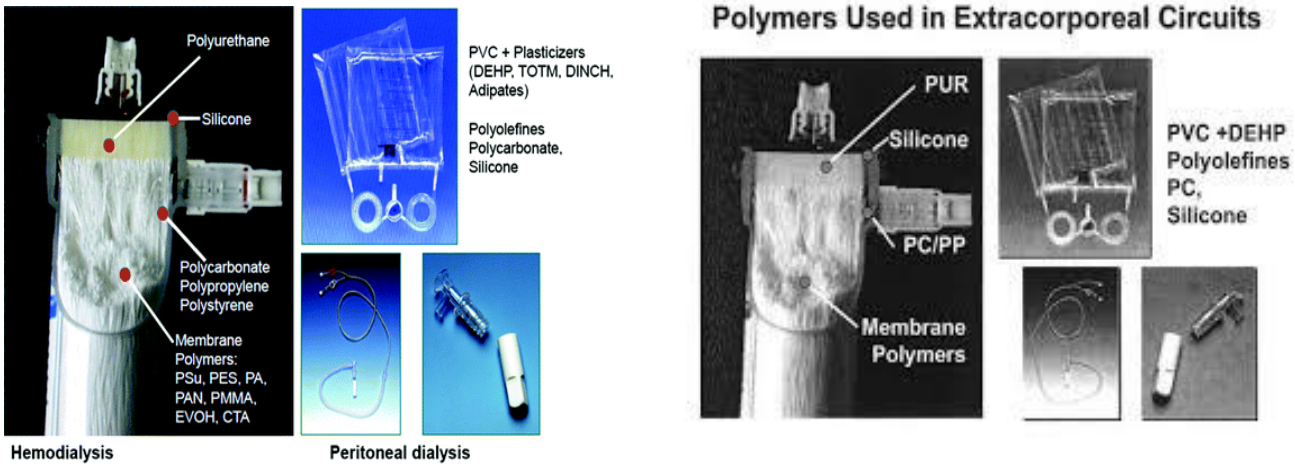


Polyacrylonitrile



Polyvinylchloride

Some important biomaterials and their structure used in medical purposes.



Applications of different types or polymers in medical equipment.

There are several issues yet to be dealt with to implement the above polymers as barriers like **haemocompatibility** comes in between which in-turn can be divided in two more sub issues which are discussed below briefly-

- Protein adsorption- When blood is in contact with artificial surfaces protein deposition and adsorption occurs. This reaction occurs within milliseconds and affects polymer performance. Protein adsorption should, therefore, be carefully controlled when developing biomaterials for dialysis.

- Contact phase activation- Occurs when blood comes into contact with a variety of negatively charges surfaces, not only in dialysis but also in LDL-apheresis using negatively charged dextran-sulphate beads and after contact with bio-materials. The contact phase implies the activation of the intrinsic coagulation.

Careful observations of changes in the polymer surface following protein deposition, and control of age-related polymer degradation, as well as the correlation of quality-control tests with polymer properties will help to overcome major side-effects.

Future developments will focus on drug-polymer interactions as exemplified in unfavourable effects associated with the use of ACE-inhibitors and negatively charged biomaterials. The development of

next generation polymers may include positive effects of drug-polymer interactions in terms of a controlled bioactive feedback after blood-material contact.

CONCLUSION-

The application of polymers in nephrology must always be considered under the aspect of a system's approach. It includes manufacturing processes as well as the final application in the patient.

Polymers in nephrology represent a success story. Their mechanical stability, surface variability and sterilisability mean that a safe and standardized treatment is possible for more than a million kidney patients each year, worldwide.

Therefore in the end we would like to conclude-
"The future of polymers in dialysis is bright and possibly limited only by cost pressure in today's healthcare environment".

The above article has been referred to the following paper written by Mr Joerg Vienken *(Polymers in Nephrology Characteristics and Needs*.

Available from: https://www.researchgate.net/publication/11301211_Polymers_in_Nephrology_Characteristics_and_Needs.

Tejaswini. M.D
Ankita Varshney
III B.Sc B'sec

ROCKING THE BED PROMOTES DEEP SLEEP AND IMPROVES MEMORY

Rocking allows the brain to slowly fall in synchrony with the rocking stimulation and speed, promoting deep NERM sleep

Most families invariably have a cradle, be it made of sandalwood and swung by silk ropes or a poor mother's make-do one using a saree hung from a tree - it is the rocking that puts the baby to sleep. The lullaby is to soothe the baby's mood. That music soothes the brain is known and is being understood in neurobiological terms. Thus, in the cradle the music is a bonus.

The rocking is sleep-inducing even in adults, particularly senior citizens who sit in a rocking chair trying to read a book after lunch. What is it about rocking that promotes sleep? This question is being answered recently by a Swiss neurobiology group. The group decided to recruit 18 young adults as volunteers, put in small metal electrode discs on their scalps and recorded the activity of their brains using a computer device called an electroencephalogram or EEG. Each volunteer was put on a bed, and the bed was rocking rhythmically the whole night at a slow speed for 8 hours. For comparison, they were again asked to sleep later on the same beds, but this time with no rocking and their EEG recorded. All other conditions of the environment were the same, so that they could study the effect of rocking on the sensory processing of the brain. Comparison of the brain waves revealed that rocking promoted the volunteers falling asleep sooner, sleep more deeply and wake up less frequently.

Stages of Sleep

Sleep in humans occurs in two different steps. During sleep, our eyes actually move even when closed. One phase when the eyes more rapidly (referred to as rapid eye movement or REM sleep) and the other where REM does not occur or NREM. Most dreams occur during REM sleep and it is thought to play a role in memory, mood and learning. During rocking, the EEG pattern showed slow oscillations. Rocking allowed the brain to slowly fall in synchrony with the rocking stimulation and promoting deep NERM sleep.

How does this entrainment or synchrony occur? The brain has a central part called the thalamo-cortical network. This is a system of neural fibres that pass on electrical signals in the brain connecting the thalamus and the cortex regions and integrates the sensory information into so that the brain "feels"; it also plays a role in memory.

Does rocking help during sleep? In order to test this, the group gave the volunteers a simple test of pairing two words appropriately. The test was given after they had a night's sleep in the rocking bed and again after they slept on the same bed which was not allowed to rock. The volunteers did better in the morning test when they were rocked! Thus the group concludes that rocking boosts deep sleep, sleep maintenance and memory in healthy sleepers. How does this translate to rocking babies in cradles? Or should one test a set of volunteer senior citizens napping on a rocking chair post-lunch, and again when they nap when the chair does not rock? Interesting!

When You Rock

The group wanted to know whether rocking promotes sleep on other mammals too. They decided to use mice as experimental animals. They placed electrodes on their heads and monitored the EEG (and also electromyograph patterns or EMG, which record how the skeletal muscles are affected) signals while the mice were sleeping in rocking cages and in stationary cages. Mice needed a faster rocking rate than us humans, but otherwise behaved the same way as humans do.

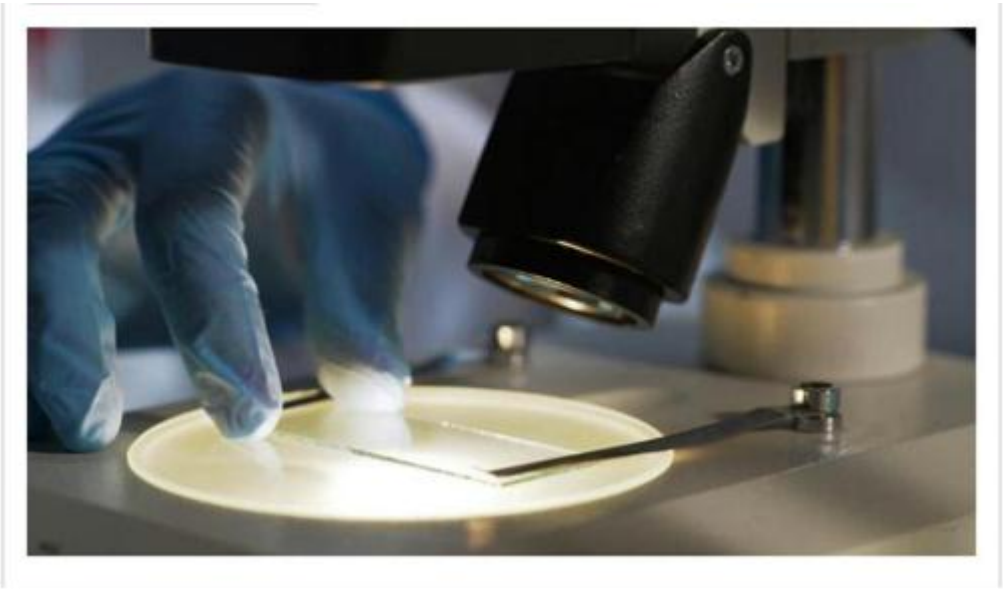
It has been believed that the effects of rocking are mediated through the vestibular system in the head. The vestibular system starts from the inner ear and goes to the central part of the brain. It is what helps us keeping balance while walking, feel the movement of an elevator going up or down, and lose balance just upon hearing Deepavali crackers). The role of the vestibular system in the mouse experiments become clear when the scientists tried the experiments using mice that have vestibular deficiency; these animals were insensitive to rocking. Based on these experiments with mice and men, the authors extrapolate to how they may be relevant to people with insomnia, mood disorder and memory impairment. They suggest that it might help such people, and even ageing

populations, if they use rocking chairs while happing, and if possible, try and obtain a gently rocking bed.

If lullaby soothes the baby, should senior citizens too have any kind of soothing tunes as they nap? One site – sleepadsvisor.org – suggests a list of best relaxing music for sleeping, and that listening to music that has relaxing tones is best. Classical music pieces that have repeating slow tempo and no high note are good, and meditation music and nature sounds are excellent.

Vinutha S Asundi
III B. Sc B Sec

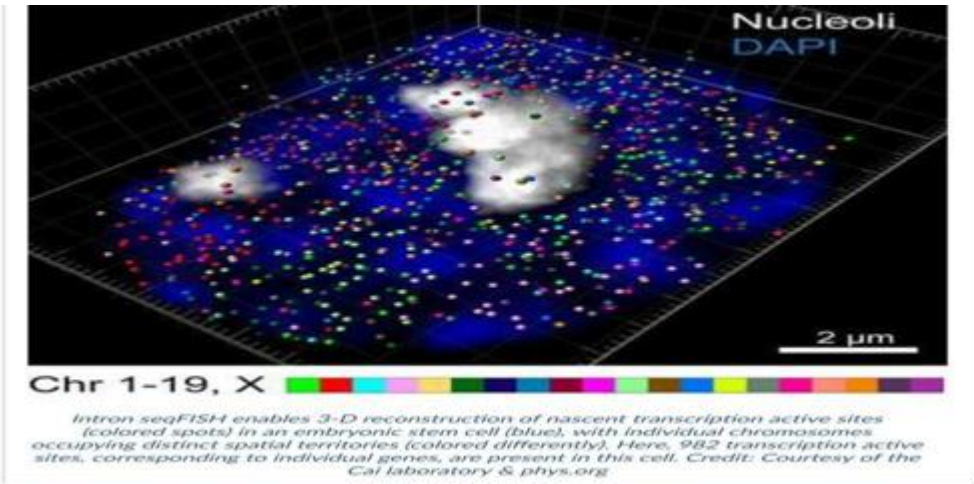
SeqFish- THE BIOLOGICAL FISHERMAN



Scientists can now capture 10,421 genes at once within an individual cell using a new technique developed by the scientists at Caltech.

The new technique called Sequential fluorescence in situ hybridization (seqFISH) is a major breakthrough in bioscience, where scientists are able to identify the processes within a specific cell genome at a microscopic level. In the past, researchers could only capture four to five genes using a microscope. In this new advancement, scientists leverage "introns" to scale the first seqFISH developed in 2014 and 2017 up to a genomic level. This allows researchers to see approximately half of the total number of genes in mammals within a single cell. Introns are specific regions within a cell that carries specific DNA sequence. It is responsible for giving an image of how a cell performs at an accurate moment of gene expression.

Intron seqFISH Technique



Intron seqFISH enables 3-D reconstruction of nascent transcription active sites (colored spots) in an embryonic stem cell (blue), with individual chromosomes occupying distinct spatial territories (colored differently). Here, 982 transcription active sites, corresponding to individual genes, are present in this cell. Credit: Courtesy of the Cai laboratory & phys.org

To turn the genetic instructions into functioning proteins, the scientists at Cai Laboratory induced transcription in cells to produce the "bursts" effect. The gene is then read and copied into a precursor messenger RNA, or pre-mRNA. At a microscopic level, the genes are jotted down and edited at a

speed of light. The editing process allows "introns" to break free from the pre-mRNA, exposing thousands of images within a cell. Using a unique fluorescent barcode, scientists are able to identify which introns are turned on in every cell, pinpoint their location, and determine how strongly they are expressed.

Through the intron seqFISH technique, the team discovers the so-called "nascent transcriptomes" – a newly synthesized gene expression. The phenomenon leads to the further discovery of short-term gene transcription across many genes called "oscillation." Normally, it takes at least 12 to 14 hours for a cell to complete the replication process. However, through oscillation, cells replicate to more than 10,000 copies in approximately two hours only. Another notable observation is the ability to magnify the individual location of genes within a chromosome. Through the new technique, the team was thrilled to discover that most active protein-encoding genes actually rest on the chromosome's surface and not inside it.

Oscillation Phenomenon

This is the first time that the scientists are able to observe the oscillation phenomenon amidst the various barcoding techniques done previously.

According to the researchers, their prompt discovery was halted for several reasons. First, the cells across different genes fluctuate in an inversely different manner causing the two-hour oscillations to vary. Second, the high accuracy of the seqFISH method makes them believe that what they observed represents real biological fluctuations rather than technical noise. Lastly, using mRNA molecules in mammalian cells causes the two-hour oscillations to be incomprehensible considering their time-consuming replication process.

Cai, a collaborator on the Human Cell Atlas Project says that the new technique can be applied to any tissue. "The Intron seqFISH will help identify what every cell type in a specific gene does and give researchers a magnified view of the chromosome structure."

Anithashree.S
III B.Sc H Sec

THE ALGAE OPERA

Synthetic Biology is the application of engineering and computer science to biology. It is very useful in the field of bioremediation, green agriculture, production of biofuels, and interesting symbiotic association. One such association is discussed below.

Opera singer is transformed with biotechnology to form a unique relationship with algae. The algae, which are a photosynthetic plant-like organism, feeds on the carbon dioxide in the singer's breath. As an important future food source, the singer's algae can also be eaten.

Alongside listening to her music, the audience can also taste her song. To increase the growth of the algae the body of the singer is trained to use her extraordinary large lung capacity to produce the highest quality algae-product. The composition of the song and the singer's vocal technique are redesigned to specifically produce algae and enrich its taste. To do this, the composer and singer use the new science of sonic enhancement of food where different pitches and frequencies make food taste either bitter or sweet.

So in the age of biotechnology not only can the audience listen to her talent but they can also savor her unique blend of algae that are enriched by her song.

The role of transformation in The Algae Opera is a physical and cultural one. We identified the opera singer as the perfect body morphology for the production of algae. The singer's large lung capacity was perfect to exhale the maximum CO2 to feed the algae. To facilitate the process further, the singer, Louise Ashcroft, worked with composer, Gameshow Outpatient, to re-design her singing technique.

The opera aspect of the piece was a second crucial component as we wanted to explore some exciting new research like that carried out by Charles Spence, Professor of Experimental Psychology at the University of Oxford called sonic food enhancement. Gameshow Outpatient and Louise redesigned many conventional operatic techniques. Gameshow Outpatient's Matt Rogers described the process as:

"We wanted to create a vocal ritual overtly focused on breath as much as singing, since breath is a fundamental connection between singer and algae, with breath control a technical fundament of singing itself. With this in mind we revisited traditional singing techniques to make explicit the role of breath and breath control in them, the impact on tone colour and stamina for example, seeking to explore 'fragility' as much as 'strength'. We wanted the piece to represent an imaginary 'folk' music, born of a Human/Algae symbiote culture where breath itself is the revered symbol of existence.

Louise's role as a singer was also re-examined and she reflects on the process:

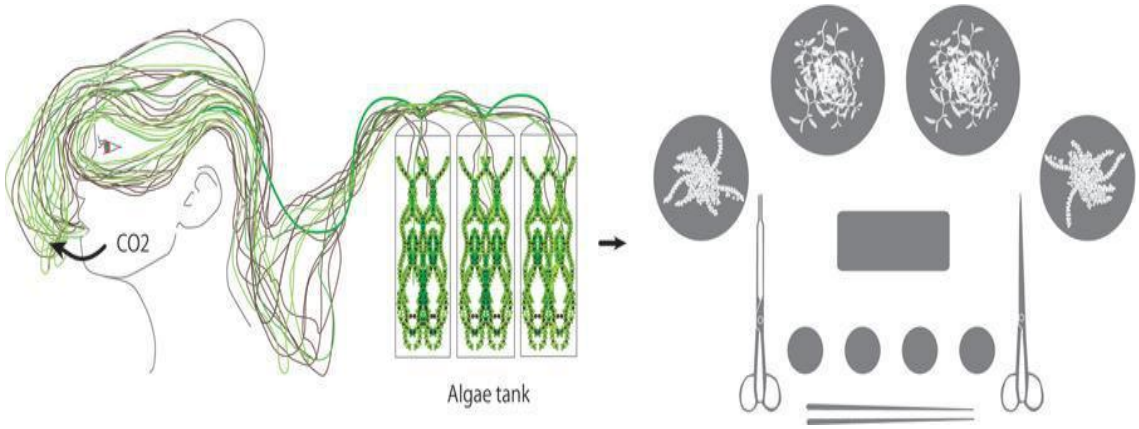
"I have to make a significant shift in the use of breath. The algae mask captures CO2 to grow the algae and requires a non-reflexive breath cycle to maximize CO2 output. This means the singer

needs to take the breath cycle to the point of collapse. In today's opera tradition, this type of breath cycle is considered inefficient and undesirable due to the issues surrounding sustainability and aesthetic. However, in The Algae Opera, a breath cycle based on a point of collapse is considered efficient and ultimately desirable, for it produces more algae.

In terms of the sonic enhancement of the algae, our relationship to pitch, tone and vocal colour also changes. Tone and colour in the algae framework is no longer linked just to text and texture, but also to flavour. What this means for me as a trained singer, is that I have to re-think technique, the purpose of the voice and explore a new vocal aesthetic to ensure that an algae sound creates food to feed you and me."

As shown in the diagram, the algae suit/mask works by pumping CO2 from the singer to the algae in the tanks. With a little fertilizer the algae feed and grow. Over a couple of performances the algae population is sufficient enough to harvest.

In the opera piece, a chef strains the algae and uses it to make a sushi-like meal that is fed to the audience. The two acts of the opera are composed to consist of sound pitches to enhance the audience's taste of bitterness and sweetness as they eat. As such, they consume the performer's talent.



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ouise's journal blog **Sitting next to the future**.
nextnature.net: *Algae Opera" Nourishes Algae with a Singer's Breath*, 1st March 2013.

Anithashree.S
III B.Sc H Sec

NOVEL GENE EDITING THERAPY TO REVERSE AGEING

Ageing is a risk factor for a variety of ailments, including cardio vascular disease, cancer, and Alzheimer's disease. This increases the demand for therapies drastically. Scientists at the Salk Institute, United States have come with a novel CRISPR/Cas9genome-editing therapy that may suppress accelerated ageing in mice with progeria syndrome– a genetic disorder which afflicts humans. Study published in journal Nature Medicine highlights the molecular pathways involved in accelerated ageing and also focuses on ways on how to minimize the toxic proteins via gene therapy. As per Juan Carlo Izpisua Belmonte–a professor at Salk's Gene Expression Laboratory, Progeria is an ideal disease model to study ageing as it allows to devise an intervention, refine and to test it again in a shorter time period. Progeria with fast progression is one of the most severe forms of degenerative disorders caused by a mutation in the LMNA gene. Signs of ageing can be seen in both mice, as well as humans with progeria which includes DNA damage, cardiac dysfunction, and dramatically shortened life span.

Two similar proteins are produced by the LMNA gene inside a cell: lamin A and lamin C.

Progeria shifts the production of lamin A to progerin. Progerin is a short toxic form of lamin A that accumulates with age and is exacerbated in those with progeria. A staff researcher named Hsin-KaiLiao from Izpisua Belmonte lab stated that–the main aim behind this study was to remove the toxicity from the mutation of the LMNA gene which is the prime cause for accumulation of progerin with in the cell. In order to deliver the gene therapy in to the cells of the progeria mouse model CRISPR/Cas9system was utilized for expressing Cas9.

It was observed after two months from the delivery of the therapy that the mice were stronger and more active with an improvement in cardio vascular health as well. The mice showed decreased degeneration of a major arterial blood vessel and an abnormally slow heart rate, which are the two issues commonly observed in progeria and old age. After the study, it was seen that the treated progeria mice had activity levels similar to normal mice, and their life span was increased roughly by 25 percent. Pradeep Reddy-a post-doctoral fellow from the Izpisua Belmonte lab stated that- they will be able to increase life span further once we improve the efficiency of our viruses to infect a wide range of tissues.

Anithashree.S
III B.Sc H Sec

café antes que nadie

(COFFEE BEFORE ANYONE ELSE)

Rutgers scientists have found a compound in coffee that may team up with caffeine to fight Parkinson's disease and Lewy body dementia, two progressive and currently incurable diseases associated with brain degeneration.

The discovery, recently published in the *Proceedings of the National Academy of Sciences,* suggests these two compounds combined may become a therapeutic option to slow brain degeneration.

Lead author M. Maral Mouradian, director of the Rutgers Robert Wood Johnson Medical School Institute for Neurological Therapeutics and William Dow Lovett Professor of Neurology, said prior research has shown that drinking coffee may reduce the risk of developing Parkinson's disease. While caffeine has traditionally been credited as coffee's special protective agent, coffee beans contain more than a thousand other compounds that are less well known.

The Rutgers study focused on a fatty acid derivative of the neurotransmitter serotonin, called EHT (Eicosanoyl-5-hydroxytryptamide), found in the bean's waxy coating. The researchers found that EHT protects the brains of mice against abnormal protein accumulation associated with Parkinson's disease and Lewy body dementia.

In the current research, Mouradian's team asked whether EHT and caffeine could work together for even greater brain protection. They gave mice small doses of caffeine or EHT separately as well as together. Each compound alone was not effective, but when given together they boosted the activity of a catalyst that helps prevent the accumulation of harmful proteins in the brain. This suggests the combination of EHT and caffeine may be able to slow or stop the progression of these diseases. Current treatments address only the symptoms of Parkinson's disease but do not protect against brain degeneration. EHT is a compound found in various types of coffee but the amount varies. It is important that the appropriate amount and ratio be determined so people don't over-caffeinate themselves, as that can have negative health consequences.

Mythri S V
III B.Sc H Sec

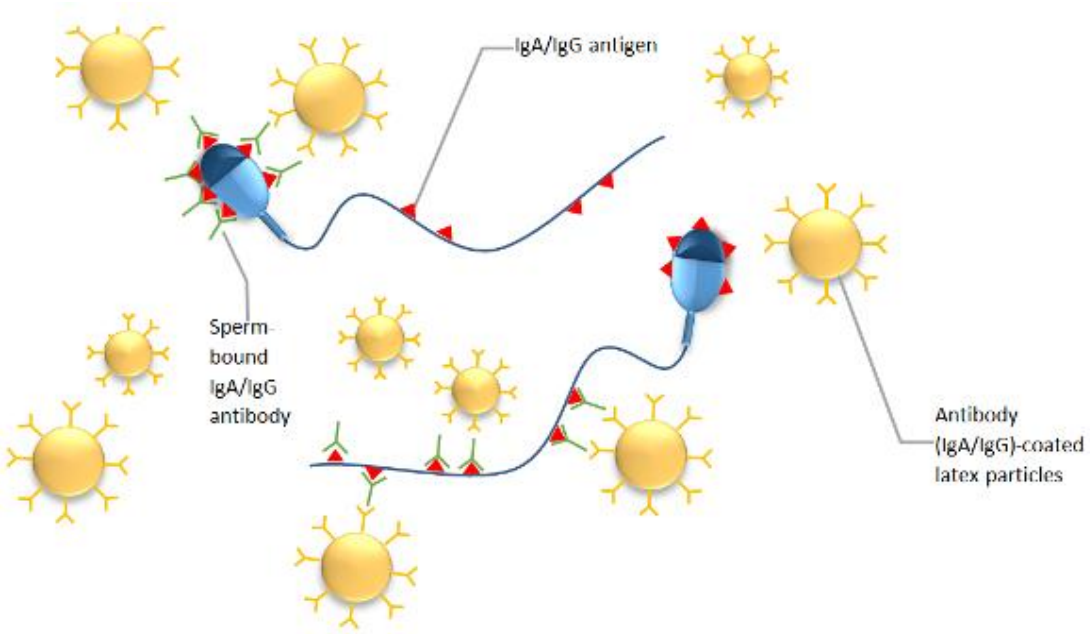
WHY ARE ANTIBODIES NOT PRODUCED AGAINST SPERMATOZOA BY THE FEMALE'S IMMUNE SYSTEM?

Some women do develop antibodies to sperm. This can be confirmed by doing tests on the serum (blood) for anti-sperm antibodies or by doing sperm-cervical mucus (secretion from the neck of the uterus) interaction test. In 25% of infertile women and even in some fertile or pregnant women and antisperm antibodies are demonstrable.

Why some women develop and others do not develop anti sperm antibodies is difficult to explain.

Sperms are foreign to both the man who produces them and the woman who receives them. In normal life, in normal man, the sperms are kept away from the blood stream by the blood-testes barrier formed by the sertoli cells in the testes. This barrier is as strong as the blood-brain barrier. Breach of this barrier, as occurs with infections or injuries, may lead to the formation of antisperm antibodies in men. Besides, semen also contains immune-suppressive agents secreted by seminal vesicles.

In normal women, sperms are deposited in the vagina and they gain access to the cervix and uterus within minutes. The acidic environment in the vagina kills the remaining sperms. And under normal circumstances the sperms do not gain access to the blood stream and hence do not lead to an immune response.



The reasons for development of antisperm antibodies in some women may be due to the breach of the blood-tissue barrier in some women due to vaginal injuries and possible exposure of the women to sperms in adequate quantities.

Secondly, the immune response may vary from person to person in each woman and is individualistic. The precise role of antisperm antibodies in causing infertility is not clearly deduced. It is also believed that the occurrence of antisperm antibodies may be the cause of infertility in both man and women.

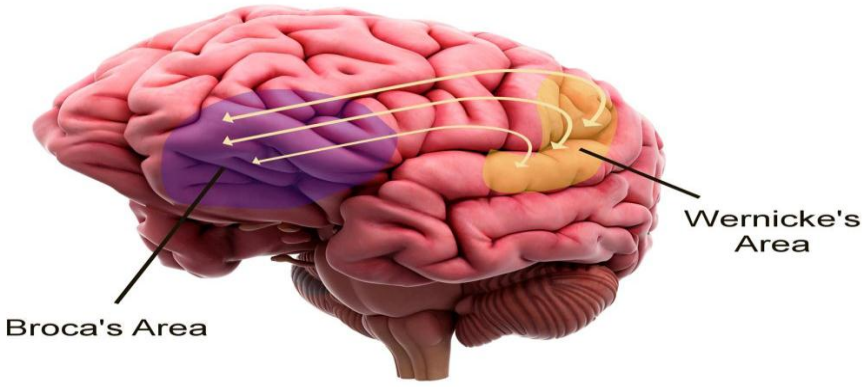
Mythri S V
III B.Sc H Sec

IDIOMA IMPORTANTE!

Amnesia is the act of losing memory wholly or partly. But, when a person loses his memory (amnesia) in an accident, he forgets everything, even his name, but not language. Language plays an important role is the translation of the title in Spanish.

There are two types of amnesia namely retrograde and anterograde amnesia. Retrograde is the inability to retrieve information about events before the date of accident, whereas anterograde amnesia targets recent memory of our brain and in severe case it attacks far back memories.

Neural pathways of new memories are not stronger than older ones, hence new memories are easily lost. This amnesia follows damaged areas of brain beside hippocampus. Long term memories are stored in synapses (different regions).



Amnesia doesn't affect Broca's area which stores language. There are two types of memory - explicit or episodic memory and implicit or procedural memory. Explicit memory is the collection of past incidents and information but implicit memories are motor skills like languages we speak, ability to ride bike, etc.

Hippocampus processes both types of memories but explicit moves to cortex and implicit goes to cerebellum; therefore, amnesia affects only cortex part, that's why amnesia patients forget everything other than motor skills like languages.

Mythri S V
III B.Sc H Sec

WHAT IF I SAY TELEPORTATION IS POSSIBLE!

Welcome to the world of teleportation where you can wake up in a remote corner of the world, teleport to work in Mumbai and end the day by catching up with your friends in Bengaluru. This idea of beaming from one place to another used to be just the stuff of science fiction, but now scientists are starting to uncover the technologies that can make it a reality.

Now few questions can strike you like: would it be dangerous? How can it change the look of our planet? Here's what would happen if teleportation was possible. The likely way that humans will start teleporting will be through something called quantum teleportation. Quantum teleportation involves scanning an object and transmitting its information to another location, where that information is used to reassemble the object from different molecules and atoms. But would this work for entire human bodies? The prospect of human teleportation could lead to a pretty different looking life for us. Our bridges and roads could become desolate wastelands, dense cities might become a thing of the past, and space exploration might accelerate at a pace that we're not ready for. But before we get too far ahead of ourselves, let's look at how this would actually work. It all starts with a little thing called quantum entanglement. Quantum entanglement involves linking particles together, and keeping them connected, even across vast distances. When particles are "entangled," it means that they're forced to hold mutually exclusive states; so we if know the state of one, then we'll know the states of the other. Think of it like this, if you have ordered a paneer burger and a cheese burger from a fast food place, you wouldn't be able to tell which one is which without opening the boxes. But once you open one box, you automatically know what's in the other one, and that knowledge doesn't change, no matter how far away the other box is. It's little complicated but the main takeaway for us is that once two or more particles are entangled, we can teleport information between them. Researches in China have already proven this to work by transferring properties of a particle to a satellite in space, but how does that translate to teleporting humans beings? Well, every human body is made up of billions upon billions of atoms and each atom is a set of data describing the type of atoms, location, energy state and so on. So theoretically we should be able to scan the atomic information of a human body, teleport it to a far-off location, and rebuild the body just the way it was. But of course, it can't be that simple! To find out the physical states of every atom that makes 'you', you'd have to disintegrate your entire body. That means every time you'd teleport, you'd essentially be dying and getting reborn on another end.

Well at the day of the day we should be thinking that nothing is impossible and keep ourselves busy in exploring new things around us. In few decades it's so possible, for us to travel places through teleporting. Isn't it beyond our imagination? Let's be ready to experience this in reality very soon.

Spoorthi B V
III B.Sc H Sec

BIOMIMICRY - TOOL TO DESIGN A BETTER FUTURE

Sometimes the best solution to a problem isn't always the most complex, and similarly, the best answer is a new tone always. While us humans may just be getting our feet wet (relatively speaking) with ingenuity, the animal kingdom has millennia of evolutionary trial-and-error to learn.

Biomimicry is the quest for innovation inspired by nature. Biomimicry is an approach to innovation that seeks sustainable solutions to human challenges by emulating nature's time-tested patterns and strategies. The core idea is that nature has already solved many of the problems we are grappling with. Animals, plants, and microbes are the consummate engineers.

Survivor locating spider

The ability to squeeze through tight spaces and turn on a dime makes the spider an ideal model for lifesaving robots that could make their way through rubble after a disaster to locate survivors. Normally, seeing a gigantic arthropod making its way toward you would be terrifying, but in this case, it would be a relief. Researchers at Germany's Frauenhofer Institute say this robot can be cheaply reproduced using 3D printers. This spider like robot features a new way of moving that closely resembles the way that real life spiders move. It has hydraulic bellows that move its legs and four or more legs are on the ground at once to keep it stable. "This high-tech assistant is still a prototype, but future plans envision its use as an exploratory tool in environments that are too hazardous for humans, or too difficult to get to. After natural catastrophes and industrial or reactor accidents, or in fire department sorties, it can help responders, for instance by broadcasting live images or tracking down hazards or leaking gas."

Antimicrobial film mimicking shark-skin

Sharks are well known for their acute sense of smell and regenerating teeth, new research has actually point to the species' skin as it is most evolved. Shark skin is covered with so-called "dermal denticles." Think of these as flexible layers of small teeth. When in motion, these dermal denticles actually create a low-pressure zone. This leading edge vortex essentially "pulls also helps to reduce drag. Needless to say, there are plenty of applications for such as design.

Speedo notoriously incorporated biomimetic sharkskin into a line of swimsuits for the 2008 Olympics. According to the Smithsonian, 98 percent of the medals at the 2008 Olympics were won by swimmers wearing this sharkskin swimwear. Similarly, while many aquatic species are known to host other marines species on their bodies (such as barnacles) sharks remain relatively "clean". Navy has since to speak developed a material, known as sharklet, based on this skin pattern to help inhibit marine growth on ships. Based on this same idea, many hospitals are also using a biomimetic sharkskin film to combat cross-contamination.

Spoorthi B V
III B.Sc H Sec

HUMAN TOUCH CAN DETECT EVEN MOLECULAR DIFFERENCE

The above article appeared in "THE HINDU" dated on 19th December 2017.

The Human touch is sensitive enough to feel the difference between surfaces that vary by just a single layer of molecules, according to scientists including one of Indian origin. Humans can easily feel the difference between many everyday surfaces such as glass, metal, wood and plastic. This is because these surfaces have different textures or draw heat away from the fingers at different rates.

However, the researchers wanted to study if humans could detect the difference if the changed only the topmost layer of molecules.

According to Darren Lipomi, a professor at University of California, San Diego in USA "This is the greatest tactile sensitivity that has ever been shown in humans,"

Receptors processing sensations from our skin are phylogenetically the most ancient but far from being primitive they have had time to evolve extraordinarily subtle strategies for discerning surfaces. This is one of the first to demonstrate the range of sophistication and exquisite sensitivity of tactile sensations. It paves way, perhaps, for a whole new approach to tactile psychophysics. This fundamental knowledge will be useful for developing skin prosthetics that can feel, advanced haptic technology for virtual and augmented reality and more. But reproducing realistic tactile sensations is difficult because the researchers don't yet fully understand the basic ways in which materials interact with the sense of touch.

SUPER-SENSITIVE TOUCH

According to the researchers, human subjects can feel these differences because of a phenomenon known as stick-slip friction, which is the jerking motion that occurs when two objects at rest start to slide against each other. This phenomenon is responsible for the musical notes played by running a wet finger along the rim of a wine glass, the sound of a squeaky door hinge or the noise of a stopping train. In this case, each surface has a different stick-slip frequency due to the identity of the molecules in the topmost layer.

The researchers conducted several tests on various subjects and concluded that "A human may be slower than a Nano bit per second in terms of reading digital information, but this experiment showed a potentially neat way to do chemical communications using human sense of touch instead of sight,"

BASIC MODEL OF TOUCH

The researchers also found that these surfaces can be differentiated depending on how fast the finger drags and how much force it applies across the surface. The researchers modeled the touch experiments using a "mock finger," a finger-like device made of an organic polymer that was connected by a spring to a force sensor. The mock finger was dragged across the different surfaces using multiple combinations of force and swiping velocity. The researchers plotted the data and found that the surfaces could be distinguished given certain combinations of velocity and force. Meanwhile, other combinations made the surfaces indistinguishable from each other.

"The results reveal a remarkable human ability to quickly home in on the right combinations of forces and swiping velocities required to feel the difference between these surfaces. They don't need to reconstruct an entire matrix of data points one by one as researchers did in their experiments."

"It's also interesting that the mock finger device, which doesn't have anything resembling the hundreds of nerves in our skin, has just one force sensor and is still able to get the information needed to feel the difference in these surfaces. This tells it is not just the mechanoreceptors in the skin, but receptors in the ligaments, knuckles, wrist, elbow and shoulder that could be enabling humans to sense minute differences using touch," researchers added.

WHAT DO WE UNDERSTAND BY THIS:

By reading this article one can know that human touch is more sensitive and has the capability to distinguish between each and every object because these objects have different textures or draw heat away from the fingers at different rates. . This fundamental knowledge will be useful for developing skin prosthetics that can feel, advanced haptic technology for virtual and augmented reality and more.

This is considered useful for mankind as the knowledge of touch and sense can help is the greater growth of medical field and technological field as it can become a boon to develop skin and other body prosthetics which can function like an original body part as it can feel and sense in the same way like the other body parts.

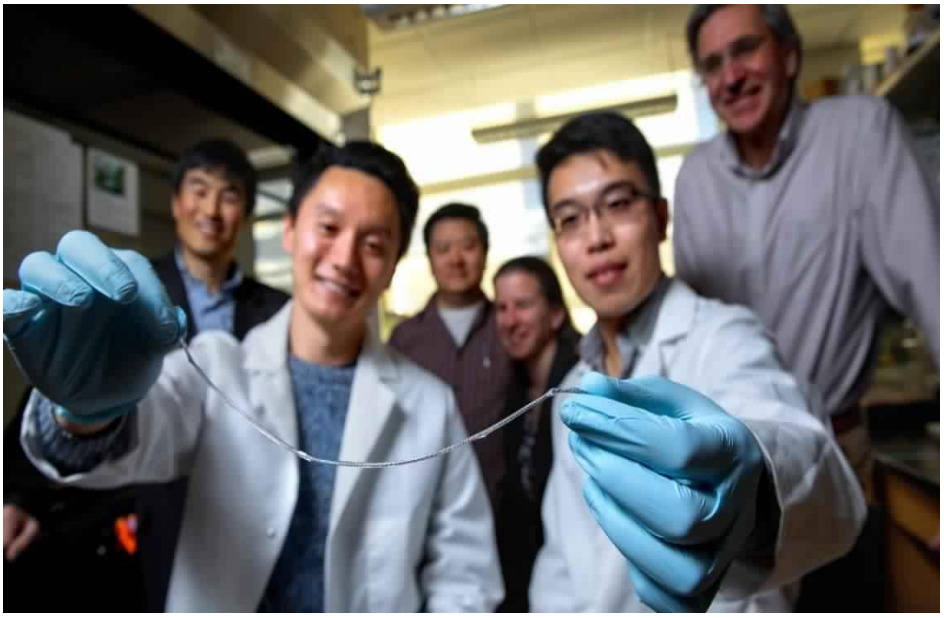
The knowledge of human touch can also be used to develop unsophisticated haptic technologies for virtual and augmented reality which exist in the form of rumble packs in video game controllers or smartphones.

Soundarya Sarathy

III B.Sc H Sec

SPIDER WEB INSPIRED IMPLANT MAY CONTROL TYPE 1 DIABETES

The article was taken from Deccan Herald dated 3 January 2018.



Dubbed TRAFFIC (Thread-Reinforced Alginate Fiber for Islets encapsulation), this implantable thread is a potentially game-changing medical...

Dubbed TRAFFIC (Thread-Reinforced Alginate Fiber for Islets encapsulation), this implantable thread is a potentially game-changing medical device(Credit: Lindsay France/University Photography)

A team of researchers has developed a revolutionary new method for treating type 1 diabetes. Inspired by a spider's web, the team created an easily implantable nanoporous thread that can hold hundreds of thousands of insulin-producing islet cells and be easily removed when they need to come out.

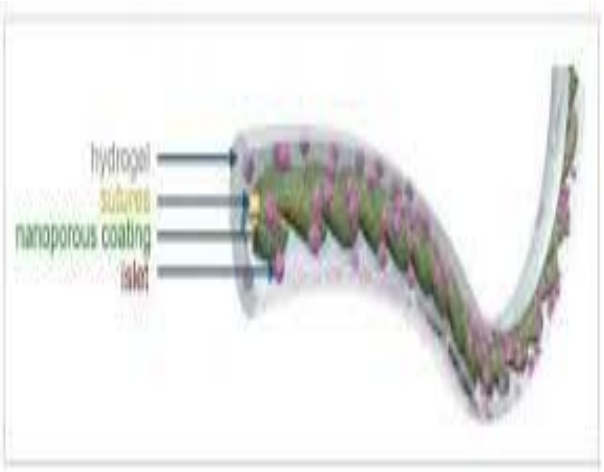
Type 1 diabetes is characterized by the way the immune system destroys the body's insulin-producing cell clusters in the pancreas, called islets. For several years researchers have worked to find an effective way to transplant new, functioning insulin-producing islet cells into the body, but immune system rejection has been a major hurdle resulting in patients needed extreme immunosuppressive drugs.

A way to overcome the body rejecting the transplant is encapsulating the islet cells in a coating that protects them from the body's immune response. Of course the new problem raised by this method is that as these encapsulated cells are all disconnected from each other and nearly impossible to effectively remove from the body. A major issue arises when the cells either have a finite functional lifespan or have potentially cancerous side effects.

"When they fail or die, they need to come out," says lead on the research Minglin Ma. "You don't want to put something in the body that you can't take out. With our method, that's not a problem."

This new method starts with a nanoporous polymer thread that is then covered with an alginate hydrogel which holds the insulin-producing islet cells. The hydrogel coating protects the islet cells

from any immune system attack and the polymer thread allows the entire device to be easily implanted or removed through a simple laparoscopic surgical procedure.



Dubbed TRAFFIC (Thread-Reinforced Alginate Fiber For Islets encapsulation), the team successfully demonstrated the thread in mouse models showing a one-inch length effectively reducing the animals' blood glucose levels to normal within two days of implantation. Ten-inch samples were also tested for retrievability in dogs with easy laparoscopic removal demonstrated one month after implantation.

"There have been other devices sort of like this, but this one seems to have so much promise," explains James Flanders, a veterinary surgeon working on the project. "It's minimally reactive, it protects the islet cells, it allows them to sense glucose, they don't attach to anything, and it can be easily removed. To me, it sounded like a win-win."

If further research shows this method to be effective in human experiments it could be applied to a variety of other hormone-deficient diseases and endocrine disorders. The novel, scalable, and easily retrievable method is potentially game-changing in how it offers a way to deliver new cell mass into a body while avoiding the problems of immune system rejection.

The study was published in the journal Proceedings of the National Academy of Sciences.

Source: Cornell University

TAGS #CORNELL UNIVERSITY #DIABETES #INSULIN

My views:

Type 1 diabetes happens when the immune system destroys cells of pancreas called beta cells which is responsible for the production of insulin. Insulin is a hormone that helps move sugar or glucose into the body tissues. Due to type 1 diabetes glucose doesn’t move into the cells due to lack of insulin instead glucose gets accumulated in blood and the cells starve which leads to symptoms like heavy thirst, dry mouth, frequent urination, fatigue etc. If untreated it may lead to serious problems like retinopathy, kidney damage, poor blood circulation and nerve damage.

For individuals having diabetes of type 1, everyday infusions of insulin are actually a vital issue. A research on this field by group of scientist created a product which solved the problem of type 1 diabetes.

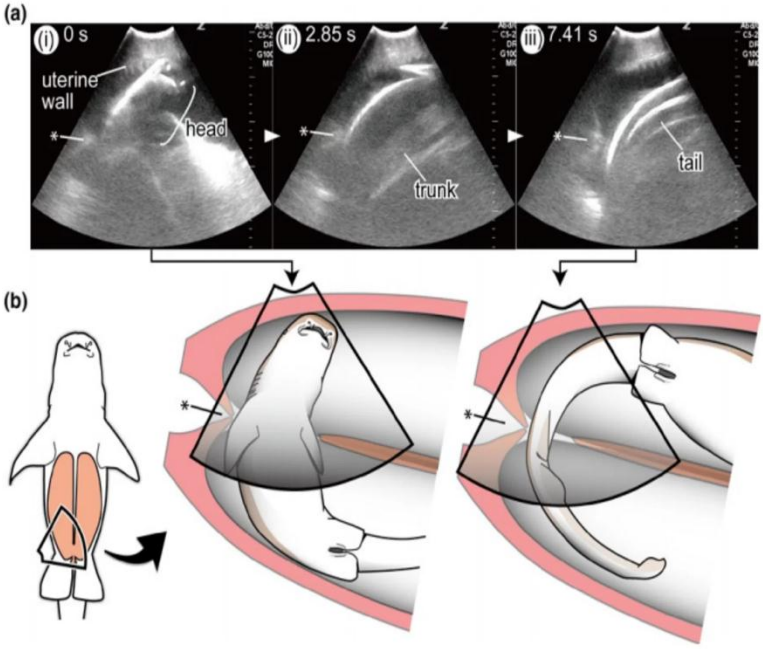
With inspiration from the way water clings or forms a bead like structure on spider-webs , Minglin Ma and his research group undertook an activity involving the association of the islet cells containing cases through a string. This implant is removable. It was successfully implanted in mouse and was found to be effective which reduced the blood glucose level within 2 days.

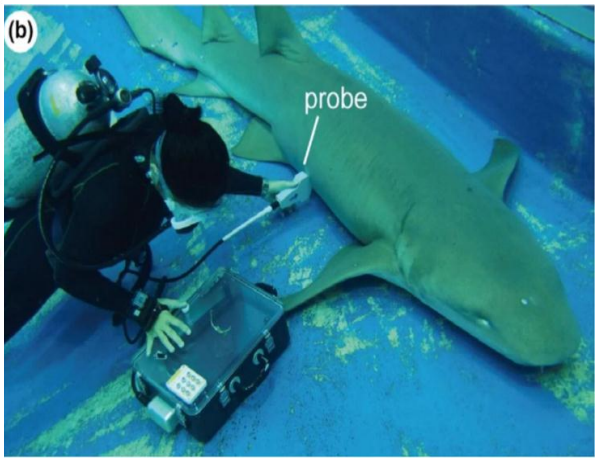
Vijaya S
III B.Sc H Sec

THESE BABY SHARKS SWIM FROM ONE UTERUS TO ANOTHER TO EAT THEIR UNFERTILIZED SIBLINGS

INTRODUCTION:

Try to imagine the feeling of foetus deciding it was bored with your uterus, flipping itself around, and swimming into another one.





- A series of ultrasound images shows a shark embryo swimming from one uterus to another.

That's something tawny nurse shark moms have to deal with, according to a new paper published on 17th of December 2018 in the journal Ethology. The researchers used underwater ultrasound machines — a new technology — to study captive, pregnant tawny nurse sharks. (Unlike many other fish, some shark species give birth to live young, not eggs.) The ultrasounds revealed something incredible: shark embryos ducking out of one of a shark's two uteruses and into the other. (Yes, sharks have two uteruses.) More often, however, they'd catch the moving embryos after the fact, when they'd check on a shark and find that the total count of shark embryos in one uterus had gone down, while the count in another uterus had risen by the same amount.

-Researchers giving a pregnant shark an underwater ultrasound to find out what really happens inside.

- That makes tawny nurse sharks (Nebrius ferrugineus) unusual in the animal kingdom, especially when compared with mammals, which, the researchers noted, can often barely move in the womb before birth. And there are at least three shark species where recent evidence has shown that embryos can move only their mouths.

- This bizarre behaviour has been observed only once before, the researchers wrote. In a 1993 documentary that aired on The Discovery Channel, a camera crew witnessed embryos swimming between uteruses through a hole cut in the side of a pregnant sand tiger shark. However, this wasn't conclusive evidence that sand tiger embryos do this regularly, the authors added, because "it is not an observation under natural conditions."

- "Their data also showed that the cervix of the tawny nurse shark sometimes opens," the researchers wrote, "and the embryo exposes its head out of the uterus through the cervix. "In other words, sometimes not-yet-born tawny nurse shark embryos decide to poke their noses out and take a peek at the outside world.

CONCLUSION:

- Researchers don't know for certain why tawny nurse sharks or sand tiger sharks would be able to swim around like this in utero, but they have a pretty good guess: Both species feed they're not-yet-born young through a process called "oophagy."
- This means that the embryos gobble up unfertilized eggs inside their mothers as food — and sometimes, the nearest egg is in the uterus next door.
- As this research done on sharks have revealed a mystery that happens inside a shark's uterus specifically in Tawny nurse shark uterus, which nobody can even think off.
- It works on a lot of biological and neurological impulse that make the fertilized baby to move into the other uterus and eat up the unfertilized egg. And it might be like the movement of the shark might be due to its casual movement and eating up of unfertilized egg might be the part of growth wise as in a part of feeding habit it eats up that unfertilized egg without knowing that it's the sibling that is its food.

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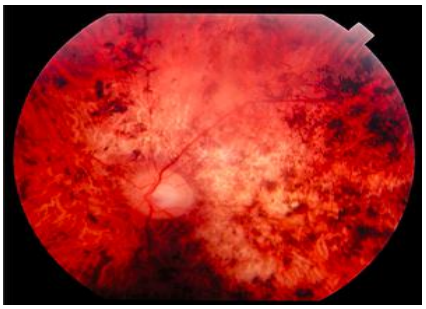
Athulya Aravind
III B.Sc I Sec

CONE-ROD DYSTROPHY

INTRODUCTION:

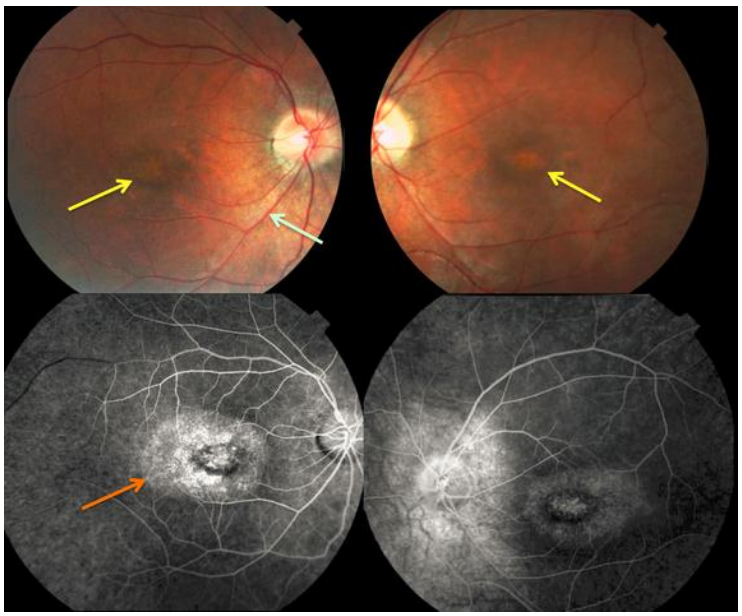
A cone dystrophy is an inherited ocular disorder characterized by the loss of cone cells causing proportionately more degeneration



*Fundus of a 34-year-old patient with **cone rod dystrophy** due to Spinocerebellar Ataxia Type 7 (SCA7).*

of cones than rods and the photoreceptors responsible for both central and colour vision, which becomes more severe over time. Inheritance may be autosomal dominant or recessive. This disorder affects the retina, which is the layer of light-sensitive tissue at the back of the eye. In people with cone-rod dystrophy, vision loss occurs as the light-sensing cells of the retina gradually deteriorate.

- The main cause of cone rod dystrophy according to research methods is due to **Mutations** in more than 30 genes. Approximately 20 of these genes are associated with the form of cone-rod dystrophy that is inherited in an autosomal recessive pattern. Mutations in the ABCA4 gene are the most common cause of autosomal recessive cone-rod dystrophy, accounting for 30 to 60 percent of cases. At least 10 genes have been associated with cone-rod dystrophy that is inherited in an autosomal dominant pattern.
- Mutations in the **GUCY2D** and **CRX** genes account for about half of these cases. Changes in at least two genes cause the X-linked form of the disorder, which is rare The identity of the specific cells of the adult retina that express CRX was determined in human retinal sections by in situ hybridization with an antisense riboprobe (Figure 3D) encompassing the homeodomain and most of the C terminus of the protein..

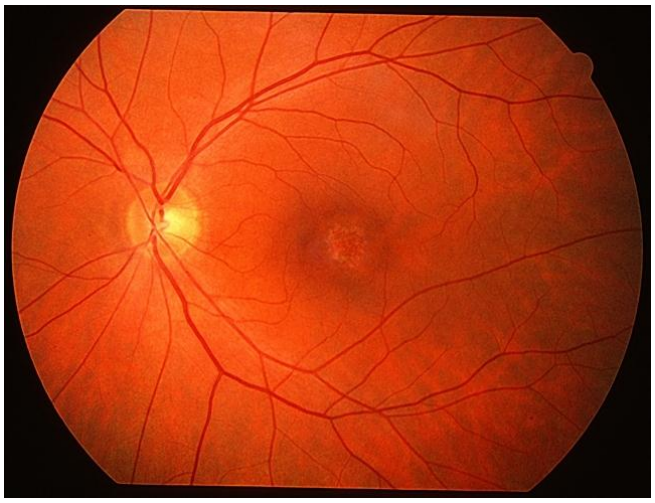


- Some of the genes associated with cone-rod dystrophy are also associated with other eye diseases, including a group of related eye disorders called **rod-cone dystrophy.**
- The first signs and symptoms of cone-rod dystrophy, which often occur in childhood, are usually decreased sharpness of vision (visual acuity) and increased sensitivity to light (photophobia). These features are typically followed by impaired colour vision (dyschromatopsia), blind spots

(scotomas) in the centre of the visual field, and partial side (peripheral) vision loss , in more severe cases, it drops to "counting fingers" vision. Colour vision testing using color test plates (HRR series) reveals many errors on both red-green and blue-yellow plates. Over time the cones typically break down before rods and affected individuals develop night blindness and a worsening of their peripheral vision, which can limit independent mobility. Decreasing visual acuity makes reading increasingly difficult and most affected individuals are legally blind by mid-adulthood.

INHERITANCE PATTERN:

- Cone-rod dystrophy is usually inherited in an autosomal recessive pattern, which means both copies of the gene in each cell have mutations. The parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene, but they typically do not show signs and symptoms of the condition.
- Less frequently, this condition is inherited in an autosomal dominant pattern, which means one copy of the altered gene in each cell is sufficient to cause the disorder. In most of these cases, an affected person has one parent with the condition.
- Rarely, cone-rod dystrophy is inherited in an X-linked recessive pattern. The genes associated with this form of the condition are located on the X chromosome, which is one of the two sex chromosomes. In males (who have only one X chromosome), one altered copy of the gene in each cell is sufficient to cause the condition. In females (who have two X chromosomes), a mutation would have to occur in both copies of the gene to cause the disorder. As a result males are affected by X-linked recessive disorders much more frequently than females. Females with one copy of the altered gene have mild vision problems, such as decreased visual acuity.



*fundus photograph of a patient with **low vision** and **hemeralopia** and typical bull's eye in cone dystrophy*

CONCLUSION:

- Though there is no treatment for Cone dystrophy, certain supplements may help in delaying the progression of the disease.
- The beta-carotenoids, lutein and zeaxanthin, have been evidenced to reduce the risk of developing age related macular degeneration and may therefore provide similar benefits to Cone dystrophy sufferers.
- Consuming omega-3 fatty acids has been correlated with a reduced progression of early AMD, and in conjunction with low glycemic index foods, with reduced progression of advanced and may therefore delay the progression of cone dystrophy.
- **Ayurvedic treatment** in cone dystrophy is also seen,as this starts with vitiation of Pitta in eyes. In Ayurveda classics, it is defined as Pitta Vidagdha drushti. Virechana, thakradhara, tharpana helps in pacifying Pitta and to provide strength to vision. Regular maintenance of disease is required with Panchakarma netra kriya kalpas and Ayurveda medicines. By adopting a 3600 approach, the disease can not only be controlled but vision also improves with reduction in

symptoms. Medicines like 20-30 ml amla juice mixed with 1 tablespoon honey is a good antioxidant on everyday basis and it is said to help prevent the progress of disease.

- As a Conventional Treatment there are no ways to slow down or reverse degredation of rods or cones due to genetic mutations that have appeared at birth, nor any method for slowing development in progressive dystrophies. Doctors do sometimes recommend tinted eyeglasses and sunglasses as well as magnification tools. **Gene therapy** and **stem cell** therapy does hold some promise for the future. A study in 2012 replaced damaged lab animals' photoreceptor cells with transplants of precursor rod cells which then developed to a new layer of rods and cones. 1

- The conclusion just tells us about the temporary prevention of this being progressed for a time being and not a permanent one but as said in coming years stem cell therapy and gene therapy can come out as treatment with permanent cure for cone rod dystrophy as with the new advanced technology on scientific medicinal fields.

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Athulya Aravind
III B.Sc I Sec

CROCODILES HAVE COMPLEX PAST

Modern-day crocodiles and alligators came from variety of surroundings

Alligator in Myakka River State Park, Florida.

A new study throws into question the notion that today's crocodiles and alligators have a simple evolutionary past.

Previous research has pointed to crocodiles and alligators starting with a land-based ancestor some 200 million years ago and then moving to fresh water, becoming the semi-aquatic ambush predators they are today.

But a new analysis, published online today in the journal *Scientific Reports*, offers a different story. Modern crocodiles and alligators came from a variety of surroundings beginning in the early Jurassic Period, and various species occupied a host of ecosystems over time, including land, estuarine, freshwater and marine.

As University of Iowa researcher and study co-author Christopher Brochu says, "Crocodiles are not living fossils. Transitions between land, sea, and freshwater were more frequent than we thought, and the transitions were not always land-to-freshwater or freshwater-to-marine."

Brochu and colleagues from Stony Brook University pieced together crocodile and alligator ancestry by analyzing a large family tree showing the evolutionary history of living and extinct crocodylomorphs (modern crocodiles and alligators and their extinct relatives). The team was then able to predict the ancestral habitat for several divergence points on the evolutionary tree.

This suggests a complex evolutionary history not only of habitat, but of form. Those living at sea had paddles instead of limbs, and those on land often had hoof-like claws and long legs. These did not all evolve from ancestors that looked like modern crocodiles, as has long been assumed.

Conclusion

A new study offers a different version to the evolutionary past of modern-day crocodiles and alligators. The study says crocodiles and alligators came from a variety of surroundings beginning in the early Jurassic Period, and various species occupied a host of ecosystems over time, including land, estuarine, freshwater and marine.

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2. **SOURCE:** University of Iowa

Sangeetha B
III B.Sc I Sec

SMALL FISH PROVIDES INSIGHT INTO THE GENETIC BASIS OF EVOLUTION

INTODUCTION

Genetic analysis of sticklebacks shows that isolated populations in similar environments develop in comparable ways. The basis for this is already present in the genome of their genetic ancestors. Evolutionary biologists from the University of Basel and the University of Nottingham report these insights in the journal *Evolution Letters*.

Many examples can be found in nature of evolution producing the same characteristics repeatedly and independently. Similar adaptations to similar environmental conditions have been documented in numerous animal and plant species, even if primarily on the level of external characteristics. The extent to which similar populations have also made use of the same genetic variants during their evolution, however, is little known.

A new study has now provided new insights into the genetic basis of such parallel evolution. To this end, researchers from the University of Basel and the University of Nottingham examined the genome of three spine sticklebacks.

This is a popular fish among evolutionary biologists because it has adapted to a variety of habitats. In addition to this, the shared ancestor of freshwater populations -- sticklebacks that originally lived in the ocean -- still exists today, which enables an examination of the initial genetic base.

Isolated populations develop the same characteristics

On the Scottish island of North Uist, sticklebacks can be found in bodies of water with extremely varied pH values. While the lakes to the west contain alkaline water, the high moorland lakes in the east are acidic and low in nutrients.

Studies of five populations from both the western and eastern lakes showed that the fish adapted to their alkaline or acidic habitat independently of each other, but in comparable ways. All five populations in the acidic lakes, for example, displayed a greatly reduced skeleton and stunted growth -- probably as an adaptation to the lack of nutrients.

Variants located in the genome of ancestors

In addition to the shared external characteristics, the researchers were also able to establish that changes in the genetic pool proceeded in very similar ways: the populations within the same type of habitat showed the same genetic variants in dozens of regions of the genome. This makes it possible to predict where in the genome changes will take place under the influence of a particular habitat -- evolution becomes predictable to some extent.

Genetic analysis of the marine ancestor also showed that the genetic variants that are beneficial for adapting to acidic or alkaline water are all present in the ancestor. Similar life forms, therefore, didn't occur randomly, but independently of each other through the predictable sorting of advantageous genetic variants that were already present in the genome.

CONCLUSION:

Genetic analysis of sticklebacks shows that isolated populations in similar environments develop in comparable ways. The basis for this is already present in the genome of their genetic ancestors.

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2. **Predictable genome-wide sorting of standing genetic variation during parallel adaptation to basic versus acidic environments in stickleback fish**. *Evolution Letters*, 2019; DOI: 10.1002/evl3.99

SOURCE: University of Basel

Sangeetha B
III B.Sc I Sec

NEW KNOWLEDGE ON HOW NEURONS TALK TO MUSCLES

Date: October 2, 2018

Researchers at Karolinska Institutet in Sweden have discovered a new way in which nerve cells can control movement. In a study on zebrafish published in the journal *PNAS* they show that the contact between neurons and muscles is more dynamic than previously thought. The results can open up new avenues to treating spinal cord injury and certain neurological diseases.The ability to move deliberately is essential to the survival of all animal life, and is based on an interaction between the muscles and the brain. The site where motor neurons and muscle cells communicate with each other is called the neuromuscular junction. This is where the neurons transfer signal substances that can be taken up by the muscle cells to make them contract.

This point of contact -- the synapse -- has long been described as a relatively simple system in adult vertebrates, with the molecule acetylcholine as the most important neurotransmitter. Despite this, knowledge is lacking on how the communication is actually effected and how adult motor neurons can respond to damage or environmental change.

Researchers at Karolinska Institutet have now generated new knowledge about how the neuromuscular junction works. Their results show that it is a more dynamic system than previously believed.

"Our study shows that the function of the neuromuscular synapses can change under certain conditions and in certain diseases in order to fine-tune movements, which was a completely unexpected finding," says assistant professor Konstantinos Ampatzis at the Department of Neuroscience, Karolinska Institutet, who led the study.

The study was conducted on zebrafish, which is a common model system in neurobiological research. The researchers show that changes in the form of an increase in physical activity and spinal damage can cause certain adult motor neurons to switch from producing acetylcholine to producing another neurotransmitter -- glutamate. The researchers believe that this is to control movements better.

The results indicate that more detailed studies of the neuromuscular junction are needed, not least in humans. Such knowledge is important because impaired communication between neurons and muscles can cause serious diseases, such as the neuromuscular disease myasthenia gravis.

"Our study can open new doors to the treatment of diseases involving reduced neuromuscular transmission," says Dr Ampatzis. "More detailed knowledge on which neurons express specific neurotransmitters can enable the development of better treatments that restore function to the nervous system."

There is also growing evidence that the neuromuscular junction is involved in the early stages of such diseases as spinal muscular atrophy (SMA) and amyotrophic lateral sclerosis (ALS), which have previously been regarded as diseases of the motor neurons.

My views & Summary: -

Researchers have discovered a new way in which nerve cells can control movement. In a study on zebrafish they show that the contact between neurons and muscles is more dynamic than previously thought. The results can open up new avenues to treating spinal cord injury and certain neurological diseases.

Chaithra C T
II B.Sc B Sec

HEART IN A BOX
TRANSMEDICS DEVICE KEEPS DONOR ORGANS ALIVE OUTSIDE THE BODY

• Organ care systems keeps heart 'alive' from donor to recipient.
• Machine make hearts beat and lungs breathe using donor blood.
•Increases time organ can be outside body to at least eight hours.

The founder of TransMedics Waleed Hassanein in 1998, headquarters- Andover Massachusetts, United States, is a medical device company founded to address the unmet need for more and better organ for transplantation. The company has developed the organ care system (OCS).

The human heart consists of a pair of atria which receives deoxygenated blood and pumps it into a pair of ventricles which pump blood into the vessels. The right atrium receives the systematic blood from the superior and inferior venae cavae which are relatively low in oxygen and pumps it into the right ventricle which pumps it into the pulmonary circuit, lungs. Exchange of oxygen and carbon dioxide occurs in the lungs and blood high in oxygen returns to the left atrium which pumps blood into the left ventricle which in turn pumps blood into the aorta and the remainder of the system circuit.

A heart transplant is an operation in which a failing, diseased heart is replaced with a healthier, donor heart. Heart transplant is a treatment that's usually reserved for people who have tried medications or other surgeries, but their conditions haven't sufficiently improved.

So, TransMedics has developed the world's first commercial, portable, warm blood perfusion system that allows a new type of organ transplant called a living organ transplant.

Transplant surgeons are using a pioneering technology they keep a donor heart pumping outside the body.

Dubbed the 'heart in a box', the device keeps the organ 'alive' from the moment it is removed until it is placed in a recipient.

Conclusion:-

Now a days, people are suffering from many diseases, one of them is heart diseases. Alive people can't donate heart. So, after death of the people they can donate their heart. TransMedics device helped many people in the way to keep donor heart alive for many hours.

From this technique, the advantages are,

• This technology increases the time of organ can be maintained outside the body to at least eight hours, compared with a maximum of three to four hours on ice.
• After the death of the person ,this device keep the donor heart ' alive ' until it placed in the body of a recipient.
• Before introducing TransMedics, only limited hearts available for transplant, so surgeons are doing plastic surgery but living capacity is less. So, TransMedics help more people to leave for longer life.

Dheeraj S
II B.Sc B Sec

SEA ANEMONES

Sea anemones are a common sight on many coastlines, and despite their brightly coloured appearance it seems they may have more common with humans than people realise. What's more, researchers are wondering whether the creatures could hold the secret to eternal life

Usually the anemones didn't live long but in the right conditions it could have been a different story
As far as we know, these are immortal animals," says Dan Rokhsar, professor of genetics at the University of California, Berkeley. "They live a very long time - one was documented to have lived 100 years. They don't have old age. They live forever and proliferate, just getting bigger."
If you cut off their tentacles, they grow new ones. Even if you cut off their mouths they grow new "heads." As long as they are not poisoned or eaten, as is often the case, they seem to go on and on.
They appear to avoid ageing and the adverse effects that humans experience over time. "You should see tumours in these animals, but we have very few descriptions of that. They are constantly replenishing themselves without getting cancer," says Rokhsar.
Instead of ageing, anemones seem to stay young and fully functioning. "If I look at a sea anemone today and compare it to a week later the same structure will be there but many of the cells will have been replaced."
How it does this isn't clear. "We would love to be able to find a gene or pathway that allows it to avoid ageing," says Rokhsar. But he and his team are still searching for that Holy Grail.
Even if they do find what they are looking for, would it shed any light on the human ageing process?
Actually, anemones are more similar to humans than many people realise.
"Sea anemones are the simplest animals we know of that have a nervous system - it's not organised in the same way as ours, but they do have a network of neurones that allows them to respond to stimuli and be very active predators," says Rokhsar.
Their tentacles can render prey immobile, their mouths can be opened and closed voluntarily, and they have a gut to digest food - all pointing towards a relatively recent common ancestor with humans.
"Sea anemones share a lot with us. We found a lot of similarities we had not seen when comparing humans to fruit flies or nematodes," says Rokhsar. There are parallels in the way the genomes are organised and the way the genes area structured, revealing a link that "goes back at least 700 million years".
But there are philosophical questions too. "To what extent is immortality for a sea anemone and immortality for a human the same kind of thing?" asks Rokhsar.
A sea anemone simply lives in the moment. People, however have thoughts, memories and consciousness that they want to retain. Keeping these bright and present in our regenerating bodies may not be something the anemone can help with. "That," says Rokhsar, "is a much taller order."
The sea anemone is able to defy the natural aging process because its cells are continuously replenishing themselves. To cite just one example, the sea anemone can miraculously repair itself and grow a new tentacle when one gets broken off. As long as it doesn't fall prey to external threats in its environment, the sea anemone lives on and on! This intriguing ability to live forever has raised the interest of scientists who are studying how they do it - and in the process, hopefully stumble onto the secret to eternal life.
Surprisingly, sea anemones and humans have a lot in common. They both can exert voluntary control over their mouth; they both have an intestinal system for food digestion, and they both have a nervous system. Although less organized than that of humans, the nervous system in a sea anemone contains a complex network of neurons that allows them to respond to stimuli and be active predators.
Scientists have not yet identified the gene that explains how sea anemones appear to thwart the aging process, but once they do, these ground breaking developments could be applied to humans

Namratha.A
Pooja.B.R
Pooja.S.Hiremath
II B.Sc B Sec

A NEW REVERSIBLE DRUG-FREE ANTIPLATELET THERAPY COULD REDUCE THE RISK OF BLOOD CLOTS AND PREVENT METASTASIS

WASHINGTON (Feb, 13, 2019)

Human platelets were modified into "decoys" that binds some cells but will not function as normal platelet, including chemical signalling associated with the clotting process.

Platelets play a vital role in halting bleeding also life-threatening bleeding. It also play an important role in cancer metastasis by binding to tumour and protect from immune system.

To create the decoy platelets, the research team use a detergent treatment and centrifugation to strip natural human platelets of their inner structures and remove basic activation and aggregation abilities. These decoy platelets became about one third size of platelet retaining adhesion receptors on the surface. This allows them to bind to other cells in bloodstream, such as cancerous cells but not become active during blood clotting process.

The researchers led by Dr. Papa and Donald E the director of Wyss Institute, first examined, the team injected decoys into micro fluidic blood vessel mimicking device how the decoys reacted, Decoy did not show typical clotting behaviours, but the normal platelets show a reduced ability to aggregate and create a clot by binding to vessels walls.

In addition the researchers quickly reversed the effects of the decoys on normal platelets by introducing fresh platelets into the blood.

Ability to reverse the platelet inhibiting effects with a simple reintroduction of normal platelets is very encouraging as currently available anti platelet agents are often difficult to reverse in emergency settings such as severe bleeding.

Based on the key role platelets play in supporting cancer metastasis in the bloodstream the team sough to target circulating tumour cells with cellular approach. The decoy platelets were able to compete with normal platelets when binding to cancer cells and were effective in preventing cancer cell extrusion out of a vasculature emulating microfluidic chip model. Furthermore, in a model of metastasis there was a significant reduction in the burden of establishment metastasis tumours when cancer cells were introduced simultaneously with platelets and decoys.

Conclusion: It's an very fascinating discovery, those at high risk of blood clots - such as someone who's recently had a heart attack or a blood clot in their lung are often put on antiplatelet drugs. But if people on these medications need surgery or gets into a serious accident they're at high risk of bleeding. In patients with cancer previous work has found that platelets bind to cancer cells by building something of a clot wall around the cells cushion them as they journey through bloodstream and seed elsewhere in body.

Pooja D
Nayana M L
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II B.Sc B Sec

FASTING RAMPS UP HUMAN METABOLISM

Date: January 31, 2019

Source: Okinawa Institute of Science and Technology (OIST) Graduate University

Summary: Research uncovers previously unknown facts of fasting, including notably increased metabolic activity and possible anti-aging effects.

A study by the GO cell unit and Kyoto University researchers suggests that fasting, which puts the body in 'starvation mode', leads to fuel substitution, anti-oxidation, increased mitochondrial activation and altered signal transduction.

Fasting may help people lost weight, but new research suggests going without food may also boost human metabolic activity generate antioxidants and helps to reverse some effects of ageing.

The study, presents an analysis of whole human blood, plasma and RBC drawn from fasting individuals. The researchers monitored change in levels of metabolites. Substances formed during chemical processes provide organisms energy and allow them to grow. The results revealed 44metabolites, including 30 that were previously unrecognized, that increased universally among subjects between 1.5 to 60 folds within just 58hours of fasting.

In previous research, the GO cell unit identified various metabolites whose quantities decline with age, including 3 known as leucine, isoleucine, and ophthalmic acid. In fasting individuals, these metabolites increase in level, suggesting a thing that fasting increase longevity. These are important metabolites for maintenance of muscle and antioxidant activity. This result suggests rejuvenating effect of fasting, which was not known until now.

Metabolites give clues to mechanism and health effects:

Human body utilize carbohydrates for quick energy when they are available, when starved of carbohydrates, the body begins looting its alternate energy stores. The act of "energy substitution", gives metabolites known as butyrate, carnitines and branched chain amino acid which are well-known markers of energy substitution which gets accumulated during fasting.

But fasting appears to elicit effects far beyond energy substitution. In comprehensive analysis of human blood, the researchers noted many fasting markers. For example, they found increase in substances produced by citric cycle, a process by which organisms release energy stored in chemical bonds of carbohydrates, proteins, lipids. This suggests that during fasting, the tiny powerhouses running in every cell thrown into overdrive.

Fasting enhance the metabolism of purines and pyrimidine the chemical substances which play key roles in gene expression and protein synthesis. This suggests fasting may reprogram with protein cells. Thus altering their function change may promote homeostasis in cell or serve to edit their gene expression in response to environmental influences. When purines and pyrimidine metabolized it boost the production of antioxidants such as ergothioneine and carnosine which increase significantly over 58hours study period. These antioxidants protect cell from free radicals produced during metabolism. Products of metabolic pathway and harmful effects of oxidation are similarly seen to increase during fasting only in plasma.

These antioxidative effects stand in body's principle response to fasting, as starvation can foster dangerous oxidative internal environment. Fasting boost production of several age related metabolites, abundant in youths but depleted in old.

Recent studies shows that caloric restriction and fasting have prolong effect on lifespan in model animals, but details mechanism has remains mystery.

Conclusion: Understanding metabolic changes by fasting is expected to give us wisdom for maintaining health.

Journal reference:

Takayuki Teruya, Hiroshi Kondoh. Diverse metabolic reactions activated during 58hr fasting are revealed by non- targeted metabolic analysis of human blood. Scientific reports, 2019.

Ranjitha J
II B.Sc B Sec

FOWL TYPHOID AND PULLORUM DISEASE IN BIRDS AND HUMAN BEINGS

TITLE:

To eradicate fowl typhoid and pullorum disease in birds as well as human beings.

INTRODUCTION:

Fowl typhoid is a highly contagious disease of poultry caused by the S*almonella gallinarum* bacteria. The disease is spread through the droppings of infected birds. The bacteria may also be spread through contaminated food, water, clothing and equipment. Fowl typhoid is an economically significant disease with mortality rates reaching 100 percent.

Species Affected

The disease *affects* mainly mature or growing chickens, but has the ability *to affect* all chickens, ducks, grouse, guinea-*fowl* etc.

Geographic Distribution

Fowl typhoid and pullorum disease are common in some countries of Central and South America, Africa and Asia. These diseases have been eradicated from commercial poultry in many developed nations including the U.S., Canada, New Zealand, Australia, India, Japan and most countries in Europe

Can the disease affect people?

Mostly in rare case it will cause human also. Fowl typhoid is NOT the same as typhoid fever in humans. Fowl typhoid is not a public health threat.

What are signs of the disease in birds and humans ?

TRANSMISSION:

Horizontal and vertical transmissions are both important in the epidemiology of fowl typhoid and pullorum disease. Birds can become chronic carriers for both organisms, passing them to their offspring in eggs. Horizontal transmission occurs via the respiratory and oral routes. Birds can ingest bacteria after environmental contamination or during cannibalism. Wound infections are also possible.

How can the disease be prevented?

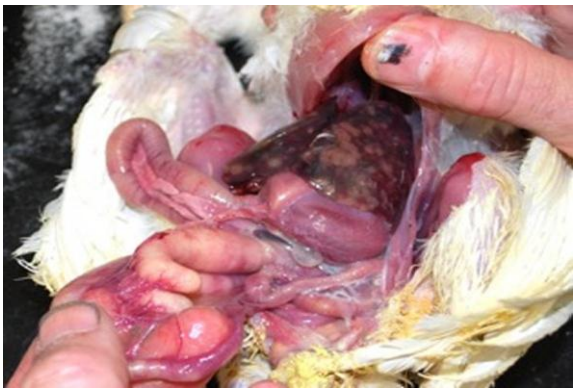
Vaccines for fowl typhoid are available. The disease may be prevented from getting into the flock by purchasing birds certified as typhoid-free and following USDA-APHIS Biosecurity for the Birds program .but in human it can be treated symptomatically.

FOWL DISEASE SYMPTOMS (BIRDS)	FOWL DISEASE SYMPTOMS (HUMAN)
Depression Loss of appetite Huddling Increased thirst Yellow or green diarrhoea	Fever, whole body rashes, Facial redness May affect central nervous system severely.

Control

The eradication of fowl typhoid and pullorum disease requires the establishment of infection free breeding flocks. Poultry should be purchased from certified infection free stock or tested before adding them to a flock. They should be hatched and reared in conditions where they cannot contact infected birds, potentially infected surface water, or other sources of organisms. Rodents and wild birds should be excluded, and insects, particularly flies, poultry mites and mealworms, should be controlled.

Diseasesd birds:



CONCLUSION:

One can easily say that the purchase of infected birds, not vaccinated birds and not maintaining proper hygienic condition in poultry, contaminated food, water which contributes the fowl & pullorum disease as well as poultry related diseases.

REFFERNCE:/SOURCES

1. Centre for food security and Public Health University of agriculture USA
2. www.science direct.com/science daily/ Texas animal health commission
3. https://articles.extension.org/pages/13076/fowl-typhoid./
4. http://www.cfsph.iastate.edu/DiseaseInfo/disease-images.php?name=fowl-typhoid&lang=en

Rashmi halbavi
II BSC B Sec

UNCOVERING THE EVOLUTION OF THE BRAIN

Scientists compare the development of brain cells between humans and non-human primates

Date: February 02, 2019
Source: Salk University

What makes us human, and where does this mysterious property of "humanness" come from? Humans are genetically similar to chimpanzees and bonobos, yet there exist obvious behavioral and cognitive differences. Now, researchers from the Salk Institute, in collaboration with researchers from the anthropology department at UC San Diego, have developed a strategy to more easily study the early development of human neurons compared with the neurons of nonhuman primates. The study, which appeared in e-Life on February 7, 2019, offers scientists a novel tool for fundamental brain research.

"This study provides insights into the developmental organization of the brain and lays the groundwork for further comparative analyses between humans and nonhuman primates," says one of the senior authors of the study, Salk President and Professor Rusty Gage, who holds the Vi and John Adler Chair for Research on Age-Related Neurodegenerative Disease.

Two important processes in brain development include neuron maturation and migration. Maturation involves neuron growth as the neurons increase their connections between each other for better communication. Migration is the physical movement of neurons into different parts of the developing brain. The authors sought to compare neuron maturation and migration between humans and nonhuman primates.

To accomplish this task, the Gage lab devised a new method utilizing stem cell technology to take skin cells from primates and coax them, via a virus and chemical cocktails, to develop into neural progenitor cells, a cell type that has the ability to become multiple types of cells in the brain, including neurons. These new primate cell lines can then be perpetually propagated, allowing researchers new avenues to study aspects of neuronal development of live neurons without tissue samples from endangered primates such as chimpanzees and bonobos.

"This is a novel strategy to study human evolution," says Carol Marchetto, a Salk senior staff scientist in the Laboratory of Genetics, co-first author and one of the study's senior authors. "We are happy to share these primate cell lines with the scientific community, so that researchers from around the world can examine primate brain development without the use of tissue samples. We anticipate this will lead to numerous new findings over the next few years about the brain's evolution."

The researchers first explored the differences in gene expression related to neuronal movement, comparing human, chimpanzee and bonobo cells. They also investigated the migration properties of the neurons inherent to each species. They found 52 genes related to migration, and, interestingly, chimpanzee and bonobo neurons had periods of rapid migration, while human neurons were slow to move.

In order to compare neuron movement and maturation outside of a dish, the scientists transplanted the neural progenitor cells from both humans and chimpanzees into the brains of rodents, enabling the neurons to thrive and providing additional developmental cues for the neurons to develop.

The researchers then analyzed the differences in migration distance, shape and size of the neurons for up to 19 weeks after transplantation. They observed the length, density and quantity of extensions of the neurons called dendrites, as well as the size of the cell bodies, which house the nucleus and DNA.

The chimpanzee neurons migrated a greater distance and covered a 76 percent greater area than the human neurons after two weeks. Human neurons were slower to develop but reached longer lengths than the chimpanzee neurons. This slower growth pattern may allow humans to reach more developmental milestones than nonhuman primates, which could account for differences in behavior and cognitive abilities.

In the future, the authors hope to construct an evolutionary tree of multiple primate species, utilizing induced pluripotent stem cell lines, to better understand of the evolution of the human brain. In addition, the authors plan to use this platform to study gene regulation differences between primate species that underlie the differences in neuronal maturation and can potentially impact brain organization in humans.

"We have limited knowledge about the evolution of the brain, especially when it comes to differences in cellular development between species," says Marchetto. "We're excited about the tremendous possibilities this work opens up for the field of neuroscience and brain evolution."

Pooja.K
Shwethashree.H
Varshini.J
II B.Sc B Sec

SCIENTISTS GENERATE FUNCTIONAL, TRANSPLANTABLE B CELLS FROM MICE

"It is still challenging to produce transplantable immune cells from mouse embryonic stem cells, so obtaining transplantable functional B-1 cells from mouse embryonic stem cells is a significant advance in the field," says senior study author Momoko Yoshimoto of the Center for Stem Cell & Regenerative Medicine at the McGovern Medical School at UT Health in Houston. "The take-home message is that a portion of immune cells may be replaced by cell therapies utilizing pluripotent stem cells in the future."

Hematopoietic stem cells in the adult bone marrow -- the soft, sponge-like tissue in the center of most bones -- provide various blood cells throughout life. Hematopoietic stem cell transplants are now routinely used to treat patients with cancers and other disorders of the blood and immune systems. But with current in vitro methods, it is challenging to produce hematopoietic stem cells that recapitulate the properties of cells in living organisms without gene manipulation.

In particular, bone marrow transplantation may fail to reconstitute some immune cells called B-1 cells, which produce immunoglobulin M (IgM) antibodies -- the first type of antibody the immune system makes to fight a new infection. In addition to patients who receive stem cell transplants, (IgM) deficiency also occurs in individuals with some cancers, autoimmune diseases, allergic diseases, and gastrointestinal diseases, increasing the risk for life-threatening infections.

In the new study, Yoshimoto and her colleagues demonstrated that functional, transplantable B-1 cells can be generated from mouse embryonic stem cells without gene modifications. The researchers overcame previous barriers preventing this feat by using high-quality cell lines to support B cell development. After being transplanted into recipient mice, stem cell-derived B progenitors matured into B-1 cells that were maintained for more than 6 months and secreted natural IgM antibodies.

"Producing functional B-1 progenitors in vitro from mouse embryonic stem cells is an important step to develop a cell therapy to provide natural IgM and innate B-1 cells that may not be provided by bone marrow transplantation," Yoshimoto says.

In future studies, the researchers will attempt to generate B cells from human induced pluripotent stem cells, which may be used for cell therapy to treat patients with immunological disorders. "This is just a first step in a long process to translate our findings to humans," Yoshimoto says

Functional B-1 cells derived from mouse embryonic stem cells are capable of long-term engraftment and secrete natural antibodies after transplantation in mice, researchers report. Scientists are interested in B-1 cells generated from pluripotent stem cells because they could be tested as a therapeutic for a broad range of immunological disorders.

Date: 7, February

Source: cell press

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II B.Sc B Sec

SMELLING THE FOREST NOT THE TREES: WHY ANIMALS ARE BETTER AT SNIFFING COMPLEX SMELLS?

Date: December 10, 2018
Source: University of Sussex

Animals are much better at smelling a complex "soup" of odorants rather than a single pure ingredient, a new study by the University of Sussex has revealed.

Complex mixed odorants are detected more quickly and more reliably by olfactory receptors and can be identified over a wider concentration range than pure odorants, according to research led by Professor Thomas Nowotny and his PhD student Ho Ka Chan.

The new findings, published today in PLoS Computational Biology, shed new light on the nature of the sense of smell and could help develop more sophisticated artificial systems that could eventually emulate the ability of sniffer dogs to detect drugs and explosives. There is also potential in the research to improve food safety with devices that could detect the quality and ripeness of produce.

Prof Nowotny, Director of Research and Knowledge Exchange in the University of Sussex's School of Engineering and Informatics, said: "Our study was looking at how olfactory receptors and brain structures cope with mixtures and single odorants. At first, we thought that mixtures would mean complications but it turned out there was no extra complications and in fact, it's usually easier to smell mixtures than single odorants and the sensing is also slightly faster. This wasn't what we expected but this is what came out from our mathematical investigation."

As well as building a mathematical model of odour transduction, the research team, which included academics from University of Konstanz in Germany, Universidad de Buenos Aires in Argentina and Arizona State University in the US, used physiological recordings of the olfactory system of fruit flies and honey bees to collect data in support of the model's predictions.

Prof Nowotny believes his findings could have serious ramifications for scientists around the world studying the growing field of scent which largely has focused on researching with single compounds.

He believes this could be a mistake and suggests researchers should take a more naturalistic approach to their research.

Prof Nowotny added: "If you were to go into a perfumery with pure compounds, it is known that humans are notoriously quite bad at distinguishing the separate compounds in a simple mix.

"This suggests that maybe our olfactory systems are not made to do this type of analytic smelling of pure compounds.

"Everything we take in from our environment is mixed smells, so it makes evolutionary sense that our olfactory systems would be better at those types of smells.

"Similarly, animals secrete odorant mixtures as communication signals (pheromones), so it is vital that they can quickly and accurately identify these chemical signals so they can decode the message they are being sent."

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II B.Sc B Sec

NEW DRUG TO PREVENT, TREAT ALCOHOLISM IN THE OFFING

The information below is taken from newspaper "DECCAN CHRONICLE" which was published on 12-02-2019 by researchers at [DHSU] Oregon health and science university.

Scientists at the Oregon National Primate Research Centre at OHSU discovered a gene that had lower expression in the brains of nonhuman primates that voluntarily consumed heavy amounts of alcohol compared with those that drank less.

Furthermore, the research team unravelled a link between alcohol and how it modulates the levels of activity of this particular gene. Researchers discovered that when they increased the levels of the gene encoded protein in mice; they reduced **alcohol consumption** by almost 50 percentages without affecting the total amount of fluid consumed or their overall well-being.

The study modified the levels of the protein encoded by a single gene—GPR39—which is a zinc-binding receptor previously associated with depression. The prevalence rates of co-occurring mood and alcohol use disorders are high, with individuals with alcohol use disorder being 3.7 times more likely to have major depression than those who do not abuse alcohol. Using a commercially available substance that mimics the activity of the GPR39 protein, the researchers found that targeting this gene dramatically reduced **alcohol** consumption in mice.

"The study highlights the importance of using cross-species approaches to identify and test relevant drugs for the treatment of **alcohol use disorder**," said senior author Rita Cervera-Juanes, Ph.D., a research assistant professor in the divisions of Neuroscience and Genetics at ONPRC.

To determine whether the same mechanism affects people, this team of researchers is now examining post-mortem tissue samples from the brains of people who suffered from alcoholism.

Currently, there are only a handful of treatments for alcoholism approved by the Food and Drug Administration. By testing the effect of the substance in reducing ethanol consumption in mice—in addition to its previously reported link in reducing depression-like symptoms—the findings may point the way toward developing a **drug** that both prevents and treats chronic alcoholism and mood disorders in people

Sonashree.R
II BSC B Sec

GENE STUDY PROVIDES HOPE FOR MEN WITH INFERTILITY

Deccan Herald; 25 Jan 2019

Scientists say they have understood the importance of a gene in regulating the production of fully functioning sperm, an advance that helps us to understand why some men might become infertile. The researchers at Newcastle University in the UK identified the role of gene, RBMXL2, which is very similar to a possible infertility gene found on the Y chromosome found only in men. This provided a model for the team to manipulate as the Y chromosome itself is very difficult to analyse, they said. Scientists found that deleting the RBMXL2 gene from chromosome II blocked sperm production. “Male infertility is a poorly understood topic, and this study helps us to understand why some men might become infertile,” said Professor David Elliott from the Newcastle University.

Making sperm and eggs, and eventually the next generation, depends upon a special kind of cell division known as meiosis. Meiosis is a hotspot for gene expression and sperm development, which involves copying long stretches of DNA into RNA. Without the important RBMXL2 gene, other genes are not expressed properly- they still make RNA, but this process does not replicate accurately, leading to mistakes which eventually block the production of sperm. Scientists used a mouse model for their study as these mammals, like humans, have an RBMXL2 gene, removing this single gene from mice prevented sperm from being produced. Research found that the block occurred while the cells were dividing in the testes to make sperm, under the process of meiosis. This block meant that none of the cells developed into sperm cells able to swim and fertilize eggs. A technique known as RNA sequencing was used to monitor the expression of millions of RNA in adolescent mice.

GEETHA K.R
JAHNAVI .S
II B.Sc H sec

SCAFFOLD CELLS COULD TRICK BODY INTO REPLACING CANCER – HIT TISSUE

Scientists have found a way to "trick" the body's own cells into repairing bone tissue lost or damaged due to ageing, accidents, cancer or other diseases. Researchers at the royal college of surgeons in Ireland (RCSI) have built what they call "scaffolds" containing the gene for bone production. In a series of laboratory experiments, they found these scaffolds capable of attracting and holding on to stem cells that are able to create new bone tissue. The same procedure could be used for developing heart, lung, brain or bone cells, they say. "We are trying to get the body to repair itself in instances where it normally might not to do so, "said O'Brien of the RCSI. This method of delivering the gene for bone production in the scaffold is safe, O'Brien said, because the gene is transported by a "nanoparticle" rather than a virus.

Other bone repair methods currently available carry potential risks, like increasing the cancer risk, while existing viral methods for gene therapy also carry," said O'Brien. Bone is the most transplanted tissue after blood, with 22cm bone transplants worldwide each year. Bone tissue is needed to repair fractures, to provide bone to secure dental implants, for hip replacement operations and for "spinal fusion" procedures. The current methods for replacing lost or damaged bone tissue involve a transplant from another part of the body, or a graft from a bone donor. Neither method is ideal, as transplanted or grafted bone might not take hold at the site where it is needed; donor bone carries a risk of infection. "This technique of using scaffold combined with therapeutic genes to target the body's own stem cells to repair damaged tissue could be applied in future to repair damaged heart or even brain tissue," said O'Brien.

GEETHA K.R
JAHNAVI .S
II B.Sc H sec

miRNA IN RNA SILENCING-AN ANTIVIRAL DEFENSE MECHANISM IN PLANTS

Category: biotech research
Date: 24-07-2018

In viruses- plant interactions one of the major mechanisms for plant antiviral immunity relies on RNA silencing. RNA silencing is a nucleotide sequence- specific process that includes mRNA degradation or translation inhibition at the post- transcription level (named PTGS in plants) or epigenetic modification at the transcriptional level, depend on RNA-directed DNA methylation (a process named RsDM in plants). RNA interference (RNAi) is a novel phenomenon that has the potential to become an extremely powerful tool for gene silencing in any organism). The process was discovered by Fire at 1998. RNA silencing refer to as a gene quelling in fungi and RNA interference (RNAi) in animals. In 1998, Andrew Fire of Carnegie institute of Washington and Craig Mello of the University of Massachusetts and their colleagues conducted an experiment on the nematode C elegant. They injected these worms with several different preparations of RNA hoping to stop production of a particular muscle protein. one of the preparations contained “sense” RNA that is an RNA having the sequence of the mRNA that encoded the protein being targeted; another preparation contained “antisense” RNA, that is an RNA having the complementary sequence of the mRNA in question and a third preparation consisted of a double- stranded RNA containing both the sense and antisense sequence bound to one another. Neither of the single- stranded RNA’s had much of an effect, but the double- stranded RNA’s had much of an effect, but the double- stranded RNA was very effective in stopping of the encoded protein.

Fire and Mello described the phenomenon as RNA interference (RNAi). They demonstrated that double-stranded RNA’s (dsRNAs) were taken up by cells where they include a response leading to the selective destruction of mRNAs having the same sequence as the added dsRNA.

Chaithra N
Kavya N
II Bsc H Sec

ONCOLYTIC VIRUS

Oncolytic viruses are a virus that preferentially infects and kills cancer cells. As the infected cancer cells and destroyed by oncolysis, they release new infection virus particles or virons to help destroy the remaining tumor. Oncolytic viruses are thought not only to cause direct destruction of the tumor cells, but also to stimulate host anti-tumor immune system. Oncolytic viruses are cancer therapeutics based on viruses as whose replication is restricted to malignant cells. Example of oncolytic viruses are adenovirus, vaccinia virus etc, are Government approved compassionate use of oncolytic adenovirus.

Mechanism of tumor selectivity

Use of viruses with inherent tumor selectively eg: NDV. Deletion of entire genes. Replacement of functional gene regions. Engineering of tumor-specific promoters. Insertion of genes such as those encoding suicide proteins, cytokines into tumor cells by means of genetic vector.

Advantages

High specificity, Self-regulating dosage, Lack of contraindications.

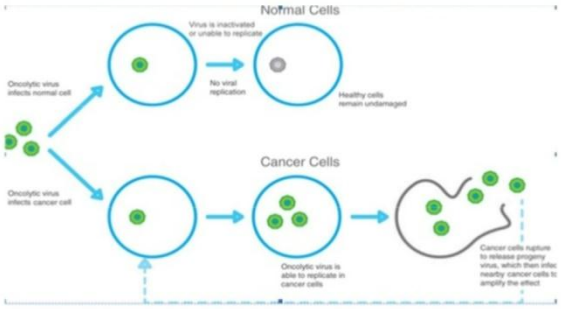


Figure 1: Generalised diagram of the cancer specificty of oncolytic viruses (Mode of action)

Chaithra N
Kavya N
II Bsc H Sec

THE MYSTERY BEHIND HAGFISH SLIME

Hagfish scientifically known as Myxine from the class Cyclostomata are Jawless vertebrates who are eel shaped slime producing marine fishes. The specialty about these Hag fishes is presence of a skull but absence of a Vertebral Column.
These Hag Fishes are closely related to Lampreys and their evolutionary link can be traced back.
Its skin is only attached to the body along the center ridge of the back and at the slime glands, and is filled with close to a third of the body's blood volume, giving the impression of a blood-filled sack. These slime glands in the hagfishes play a major role in attacking the predators.
In a research conducted by the students of University of Illinois College of Engineering, on the hag fish found in Illinois, USA.
They have found out in their decade long research how the slime in hagfishes clogs up the gills of some suction-feeding predators.

The Hag fishes produce slime in a very efficient way, the slime which is produced is very interesting and the reason of curiousness for many scientists as there is change in topology during the expansion of the slime.
The slime became thread like in appearance thus, showing a unique mechanism and opened doors for various approaches for Human development with it. During the study it was discovered that, the hag-fish threads, 100 times thinner than a human hair and initially wound up like a skein of yarn, can unravel in the blink of an eye due to fluid flow. In doing so, it can go from a size of about 0.1 millimeter to 10 centimeters in length, or a water incorporation in a magnitude of 10,000:1. From this observation, group of physicists and mathematicians got interested in the new finding about the hag fishes and a hypothesis was formed which states "fluid flow was actually making this happen rather than it being like a chemical explosion."

There were various models created to prove this hypothesis. They also took account into this model how hag fishes don’t only stay in a single type of environment and body changes.

After years of research they concluded that it took unraveling from about 0.1 millimeters to about 10 centimeters can happen in less than a few hundred milliseconds.

While the resulting slime gel is a solid, it is soft enough to take the form of its container, making it almost undetectable by the eye in a bucket of water. It is also strong enough and non-permeable enough to virtually stop the flow of water.

They are also looking into the material design perspective to this and how they can be used as clothing lines.

My Views:
Hag fishes are one of the oldest cyclostomata members and only living class. The slime which they produce could have given them evolutionary advantage over other beings thus helping them survive for so long. They also do not have a well-developed nervous and sensory system, with rudimentary eyes. Thus it should have been very difficult for them to survive but this slime, which clogs other predator’s gills, has proven to be the main reason for their survival through all the great extinctions.

To find an economic importance to them, after years is extremely great as it would help in breeding of myxins and help them not drive into extinction. Their tendencies of Slime Formation are very interesting and more can be studied for greater good of mankind.

Refference: Gaurav Chaudhary, Randy H. Ewoldt, Jean-Luc Thiffeault. Unravelling hagfish slime. Journal of The Royal Society Interface, 2019; 16 (150): 20180710 DOI: 10.1098/rsif.2018.0710

Hurshitha Vasudevan
II B.Sc I Sec

Consolation Prize

SILENT STROKE

Absent-mindedness may signal 'silent stroke' risk. The study is published on February 07 in Times of India.

People who frequently lose their train of thought or often become side tracked may be displaying early symptoms of cerebral small vessel disease, also known as silent stroke a study warns.

The study published in the journal Neurobiology of Aging, found that adults with damage to the brain's white matter, caused by silent strokes, reported because of poor attentiveness and being distracted more frequently on day-to-day tasks. Identified in formal laboratory assessments of attention and executive function.

The Executive function is a person's ability to plan, stay organized and maintain focus on overall goals. The results indicate that in many cases of people who were at a higher risk of silent stroke and had one, they saw a notable difference in their ability to stay focused, even before symptoms became detectable through a neurological test, by Ayan Dey from the University of Toronto in Canada.

This type of stroke and changes in the brain's blood flow are connected to the development of vascular dementia and a higher risk of Alzheimer's disease, heart disease and other dementias.

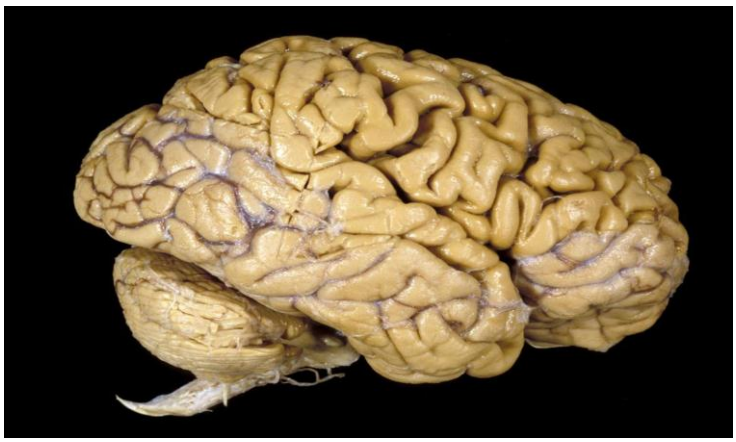
The strokes are "silent" since they do not cause lasting major changes seen with an overt stroke, such as affecting a person's ability to speak or paralysis. Damage to the brain's white matter can cause memory and cognitive issues over time.

Typically, this type of stroke is covered incidentally through MRI scans or once the brain damage has worsened said by Dey.

There are no effective treatments for Alzheimer's disease, but brain vascular changes can be prevented or reduced through smoking cessation, exercise, diet, blood pressure, diabetes and cholesterol under control.

Research participants had their brains scanned by MRI and scientists analysed brain tissue damage, specifically in relation to white matter, to determine injuries caused by cerebral small vessel disease.

With ageing population in India, such findings are useful for Proactive Health Care for executives. With increasing population, diabetic, heat, blood pressure, stress life style, such silent stroke cases will increase. Therefore, a person feels this may be the case; concerns should be brought to a doctor, especially if the person has a health condition or lifestyle that puts them at a higher risk of stroke or heart disease. Attentiveness and ability to stay focused can protect from brain's damage for some extent



Sumaya Banu
II B.Sc I sec

FOREST: THE LIFE SOURCE FOR SURVIVAL OF HUMANS

Referred Article: By K. V. Pawar and Ravi V. Rothkar, Published in 2015, Available online at www.sciencedirect.com.

Introduction:

A forest referred to as a wood or the woods, is an area with a high density of trees. Forest conservation is the practice of planting and maintaining forested areas for the benefit and sustainability of future generations. The conservation of forest also stands and aims at quick shift in the composition of trees species and age distribution. Forest may vary significantly in size and have different classifications according to how and of what the forest composed. Tree forests cover approximately 9.4 percent of the earth's surface (or 30 percent of total land area)., though they once covered much more (about 50 percent of total land area). They function as habitats for organisms, hydrologic flow modulators, and soil conservers, constituting one of the most important aspects of biosphere. Thus, there is need of conservation of forest. In the United States, forest conservation became popular in the late 19^{th} and early 20^{th} centuries. Forests are central to all human life because they are the reason for our survival and all other living organisms which provide diverse range of resources and multiple benefits too.

Conclusion:

When it comes to a forest or trees everyone thinks it of all kinds of resources we get from it, from the wood to the oxygen it gives out. Because of which there has been lots of destruction today. There are so many plants and animals that are in the line of extinction and have become extinct also. But what are we doing for it to protect. Nobody thinks it as life. We have lost many plants and animals from past 15 to 20 years. Forest cover is depleting rapidly due to many reasons such as an expansion of agriculture, timber plantation, other land uses like pulp and paper plantations, urbanization, construction of roads, industries, constitutes the biggest and severe threat to the forest causing serious environmental damage.

However, it shouldn't be always getting resources from environment and forests. Even we have to look them as a form of life and do some contribution to it, if there should be a balance in the environment. Fortunate or unfortunate there are only few people who take forests and trees as life and are working to conserve it. It is the fact that there is destruction, and many species of animals and plants are not there today as it was long before. So, is it necessary to keep on doing the same? If so, over a period of time humans will never exist on this land any more. Nature can survive on its own even if, we are not there it grows more and very well but it we who can't survive without nature. It is we humans who are the main reason behind most of the natural calamities, imbalance and destruction in nature.

It is not only humans living on this earth. We are just a small speck in it. If you ever visited a forest and had a look at it, you feel it as a heaven you never feel like coming back from that place. Is it not just beautiful and amazing that all creatures from small insects to a huge animals and trees are depended mutually on each other for their survival and well balanced without any destruction? But what are we doing. It is only we humans who are dependent on the forest's resources and causing imbalance and all kinds of disturbance in the nature. Don't you think we should change?, if not completely, at least to some extent.

HOW EACH AND EVERYONE CAN MAKE SOME CHANGES: -

As it is the major issue in many polluted places in Bangalore, Delhi, Varanasi, Kanpur etc.

(i) First thing as everyone knows is, to take a step towards planting as many as possible trees in barren lands, unused lands and government lands.

(ii) Off course we can't live without depending on forest, trees, and nature. Hence, the small change we can bring in this is, as we make use of trees from forest, we should also give importance for protecting it. For example, if we make use of some species of plant/tree for medicinal purpose or for wood purpose as these plants/trees gets reduced we should re-plant it the same species of plants/trees in the same place by storing few of those species in plant nurseries before getting it extinct and taking care of it till one year or till it is capable of growing on its own in the forest, then planting it again where there will be no chances of those species becoming extinct. If we make sure of taking

care of plants and trees this way we can save it as what it is today and may be can extent the trees and forests in the future.

(iii) other small changes that everyone can do is to reduce and avoid the usage of plastics and other toxic substances which are harmful for living organisms and can restrict the growth of forest or trees. If you are not able to plant trees and extend into forest, at least save how much it is now by not destroying it anymore. The unwanted cutting of trees for wood or other purposes should come down. Government should take strict actions against smuggling and other ill-legal cutting of trees and has to come up with many more afforestation programmes and policies to save and protect animals.

The last thing is to look at trees, plants and animals as a life not only as a resources like wood, timber, paper you get from it and protect them as you protect yourself.....

Triveni S
Bhargavi A
II B.Sc I Sec

TASTE, NOT APPEARANCE-DRIVES CORALS CONSUME PLASTIC

This article appeared on the website "http:/www.irishnews.com" dated on 26/10/2017 by AS Allen.

Corals like to eat plastic because it tastes good; scientists have found raising concerns about hazardous effect it might have on these marine animals. New research from Duke University has revealed that unlike other sea creatures who mistakenly eat plastic debris because it looks like prey, corals consume plastic because it "just plain tastes good" .The researchers conduct the experiment in two different ways as a part of their study. In the first one, the coral polyps were offered 8 different types of micro plastic along with sand. They ate all types of plastic but ignored the sand. In the second experiment, the scientists gave the polyps clean micro plastics and plastic covered in microbes. Microbes are believed to be a good source of nutrients for marine animals. The researchers found the corals preferred to eat the plastic without microbes.

The above article suggests that corals consume plastic not just by chance but out of preference .This research isn't the first to make associations between man-made pollutants and animals that use chemoreception to feed. Up to 950 million tons of plastic are predicted to b in the oceans by 2050."The propensity for plastic to mimic the taste, smell, appearance and texture of food items will have increasingly dire consequences for environmental and human health" is what the researchers write. But future studies that identify the precise compounds in plastic could therefore "significantly help reduce the threat these micro plastic pose .In this way the consequences of the over use of plastic may gradually reduce.

Varalakshmi N
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Swathi J
II B.sc I Sec

SPIDERMAN'S POWER
"SPIDER WEB INSPIRED IMPLANT MAY CONTROL TYPE 1 DIABETES"

PTI |JAN 3, 2018 ,12.24 PM IST

A team of researchers has developed a revolutionary new method for treating type 1diabetes. Inspired by a spider's web, the team created an easily implantable nanoporous thread that can hold hundreds of thousands of insulin-producing islet cells and be easily removed when they need to come out. Type 1 diabetes is characterized by the way the immune system destroys the body's insulin-producing cell clusters in the pancreas, called islets. For several years researchers have worked to find an effective way to transplant new, functioning insulin-producing islet cells into the body, but immune system rejection has been a major hurdle resulting in patients needed extreme immunosuppressive drugs.

A way to overcome the body rejecting the transplant is encapsulating the islet cells in a coating that protects them from the body's immune response. Of course the new problem raised by this method is that as these encapsulated cells are all disconnected from each other and nearly impossible to effectively remove from the body. A major issue when the cells either have a finite functional lifespan or have potentially cancerous side-effects.

This new method starts with a nanoporous polymer thread that is then covered with an alginate hydrogel which holds the insulin-producing islet cells. The hydrogel coating protects the islet cells from any immune system attack and the polymer thread allows the entire device to be easily implanted or removed through a simple laparoscopic surgical procedure. Dubbed TRAFFIC (Thread-Reinforced Alginate Fiber For Islets enCapsulation), the team successfully demonstrated the thread in mouse models showing a one-inch length effectively reducing the animals' blood glucose levels to normal within two days of implantation. Ten-inch samples were also tested for retrievability in dogs with easy laparoscopic removal demonstrated one month after implantation.

If further research shows this method to be effective in human experiments it could be applied to a variety of other hormone-deficient diseases and endocrine disorders. The novel, scalable, and easily retrievable method is potentially game-changing in how it offers a way to deliver new cell mass into a body while avoiding the problems of immune system rejection. For patients with the disease, immune systems destroy insulin-producing pancreatic cell clusters called islets, resulting in high blood sugar levels and symptoms including frequent urination, weight loss and increased hunger. To cope with symptoms and prevent serious complications – and potential death – patients take daily insulin injections or have stem cell-derived islet transplants.

Spiderman will surely be delighted to know that a spider web inspired scientists to develop an implant to help control type 1 diabetes. Thousands of islet cells are implanted into a patient. A thin hydrogel coating protects the islet cells that are attached to a polymer thread. The implant is an alternative to insulin therapy which involves the daily injection of insulin. However, it will require long-term immunosuppressive drug administration, Science Daily reported. Revolutionizing management of the disease although the implant will not cure type 1 diabetes, it will revolutionize the management of the chronic ailment, according to a research team from Cornell University led by Minglin Ma from the Department of Biological and Environmental Engineering.

Even better than a spider web, the scientists pointed out that the thread, which the team calls Thread-Reinforced Alginate Fiber for Islets encapsulation, is even better than a spider web because the hydrogel covers the thread uniformly. There are no gaps between capsules. He noted that with a spider's silk, there are still gaps between the water beads, while in their team's implant, gaps would be bad in terms of scar tissue and similar issues. By coating and protecting the cells in small

hydrogen capsules, it will avoid the response of the immune system. But the capsules cannot be removed from the body easily because they are not connected to one another. However, in using the spider web concept, the transplant can be removed which is a must because it has the potential to form tumors, that if the capsules die or fall off, it must be removed. With the design of the implant, it is not a problem that the team was inspired by athe way water beads on a spider's web form. When they first tried to connect the capsules with islet cells using a string, the team realized that it would be better to place the hydrogen layer uniformly around a string instead.

Conclusion:
More than a million of people are suffering from 1st stage of diabetes, everyday insulin infusions are truly an immeasurably significant issue so by this new discovery people get a life where there are free from taking painful insulin and surgical treatment throughout their life by pursuing good health condition.

The study was published in the journal Proceedings of the National Academy of Science.

Bindushree N
I B.Sc B Sec

II PRIZE

COME AND FALL IN LOVE WITH WILD LIFE
THE RARE ENDANGERED ANIMALS OF THE WORLD

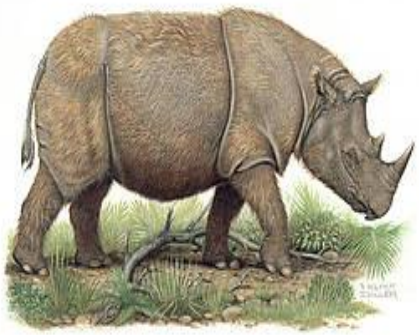
This article is published on 2nd January 2017 in "THE RICHEST" magazine (visit: http://www.therichest.com/.)

1. The south China Tiger :

In 1950's the south china tiger was over 4,000 in population but over next few decades they were considered pests, because of this thousands of tigers were hunted and killed until the Chinese government banned hunting in 1979. By 1996, there were considered to be 30-80 left in wild as if today south china tigers haven't been seen in the wild in over 25 years. But that doesn't mean they are extinct all together thankfully these are still south china tigers in zoos and in South Africa where there are to reintroduce captive bred tigers back to the wild.

2. *Sumatran Rhinos :*

The only Asian Rhino with two horns , and covered in long body hairs the Sumatran rhino is extremely endangered with only 220-275 rhinos left in wilds, they are also extremely rare, the Sumatran rhinos is the smallest of the rhino family and lives in isolated pockets of forest in Malaysia and Indonesia . Their population has been threatened due to stabilize the population became only 2 captive females have reproduced in past 15 years.



3. *Saola :*

This endangered species is so rare it wasn't even discovered until 1992 the saola is often called the "Asian unicorn", because it is rarely seen and is on the critically endangered mammal list little is actually known about the saola, because it so rare that is only been seen 4 times since its discovery, their population is threatened by hunting and the growing development of humans, that fragmentize their environment.

4. Amur Leopard :

There are only about 60 amur leopards left in the wild they are one of the rare and most endangered large cats, they can weigh up to 120 pounds and can leap over 19 feet in the air the amur leopards can only be found in amur river basin in eastern Russia, as they have gone extinct elsewhere this wild cats faces many threats to its survival such as climate changes poaching and human encroachment.

5. Addax :

Addax is also known as white antelope or screw horns antelope are nearly extinct the wild, the horns of adult male and female addax can reach lengths of 2.5 feet long. There are only 3 addax left in the wild. But there is hope for this endangered species private farms and zoos are doing their part in saving the species as they are home to over 2,000 addaxes around the world the addaxes have experienced population loss in the wild due to Chinese oil instillation in northern Africa whose guards hunt and poach wild addaxes.

6. Wyoming Toad :

This is so endangered, it is actually now extinct in the wild this little toad was actually rarely common in the US in the 1950's but began declining in numbers by the 1970's the Wyoming toad has very sensitive skin that makes it susceptible to death by many things such as its main killer fungus not only it is sensitive to disease the Wyoming toad's skin can't handle climate or environmental change which has been another reason for its extinction in the wild.

7. Mountain Gorilla :

They are better known by their nickname "silver backs" given to them because of the silver hairs that grows on the backs of the adult males. They were discovered in 1902 and since then have been subjected to uncontrolled hunting, wars, disease, captured for illegal pet tread as well as destruction of habitat all of these factors have led to only 880 mountain gorillas left in the wild today, the good news is the population has grown by over 250 in 30years thanks to conservationists and hoping to keep increasing.

8. Hainan Gibbon :

It wasn't that long ago that there were thousands of Hainon gibbons in the wild, but now researchers guess there are less than 25 though it's not uncommon for them to be hunted by natural predators, this isn't the reason for their decline, they were also poached for having medicinal properties used in Chinese medicine. They are now considered the world's most rare apes as well as the rarest mammal

9. Pygmy Three Toed Sloth :

It's crazy to believe one of the world's most beloved animals the pygmy three toed sloth is considered rare and endangered though it is adorable, that doesn't mean it knows what it's doing as far as survival goes, this breed of sloth is found on small island near Panama where only 79 are left in the wild, the island doesn't have any human in habitants but the species is still affected by poaching, as they aren't exactly considered the masters of escape. This are listed as number 16 in the world's 100 most unique and imperilled mammals.

As recent years have shown just what affects we had on the planet when it comes to destroy rain forest or the rising ocean, we seem to forget the impact it has on the animals that call places home, we may not be the direct cause but we are even responsible in destroying their home it's time to start serving mother earth travel to the world of forest where money has no value.

Pavan Kumar .B .S
I B.Sc B Sec

IS PREGNANCY ALSO A CAUSE FOR CARDIAC DISEASES?

This article was published under the science section of Times Of India dated 26th January 2019.

A new study in Beijing says that women who have given birth have a higher chance of developing heart disease and strokes than those who are children.

Previous studies have shown that women usually show changes in vascular properties, blood volume and heart rates during pregnancy.

In the new study, a team from the Hongkong University of Science and Technology in China, received 10 studies. It involved nearly three million women worldwide, with more than 1, 50,000 diagnosed with heart disease or strokes during the following 6 to 52 years.

In the findings published European society of cardiology journal, showed that giving birth has a 14 percent higher risk of heart disease and strokes.

In addition, there was a significant association between the number of pregnancies and the risk of cardiovascular disease.

Women had four percent increase in the incidence of Cardiovascular disease each time they gave birth, regard Len of weight, diabetes, high blood pressure, smoking and income.

The researchers said that each delivery increases the risk of coronary heart disease by five percent and strokes by three percent.

According to Wang Dongming, lead researcher from the varsity, pregnancy could cause inflammation within the body and accumulation of fat tissue around the abdomen, in the blood and arteries.

These changes may have a permanent impact on the cardiovascular system, leading to an increased risk of heart disease and stroke.

However, i gathered some information that women could do to prevent cardiovascular disease, they are,

- Quitting smoking
- Doing more exercises
- Always have a healthy diet
- Controlling weight to improve future health

Pavithran G
I B.Sc B Sec

SENSITIVITY TOWARDS ENDANGERED BIRDS, CAN BOOST CONSERVATION.

This Article was published under the science section of Times of India Newspaper dated 31st January 2019 which spoke about the conservation of endangered birds.

The great Indian birds' expedition undertaken by environment conservation group (EGCG), a society based in Coimbatore, Tamil Nadu, recently completed its tour of Gujarat and concluded that sensitivity among locals towards the migratory birds has contributed immensely towards their conservation.

The expedition which is supported by various state forest departments and organizations working under the Union Ministry of Environment began on Jan 12th from Coimbatore and will be covering different states of the country with important bird habitats over 100 days. Their aim is to watch and record all birds across different states focusing especially on the endangered, vulnerable and threatened spices. The team recently concluded its visit in Gujarat.

The team began its expedition in Gujarat from Jan 20 and visited several wetlands and areas with large bird population like Sasan Gir, Porbandar, Khigadia, Great Indian Bustard Sanctuary and Naliya in Kutch. R. Muhammed Salim, President of ECG, said that the number of species recorded in Gujarat has risen to 300 numbers so far. We could locate birds like Gray Hypocolliues an endemic species limited Kutch District in the country.

Birds recorded by the team during survey include Black Necked Stroke, Bartailed Godwit, Curlaur Spoonbills, Sandtiter, Raners and several waders.

The team had reached Gujarat after completing Karnataka and Maharashtra. The Gujarat leg of expedition was in partnership with Gujarat institute of desert ecology. The ECG have found that the people of Gujarat are very sensitive about birds and that they contribute a lot in conservation of endangered species.

My opinion is that awareness about endangered species should be brought about among common people such that they also become sensitive and play an effective role in conserving endangered species.

Pavithran G
I B.Sc B Sec

ANTIBIOTIC-RESISTANT NDM-1 GENE FOUND IN PRISTINE ARCTIC

(Published in the Times of India on 28th January 2019)

Scientists are surprised by the detection of the gene, first isolated in India, in one of the earth's most remote spots.

The recent detection of the antibiotic resistant (AR) gene NDM-1, first isolated in India, in the Arctic region is a further indication of the globalization of the anti-microbial resistant, said a study. The research was conducted in the high Arctic zone and scientists were surprised to find a rather robust presence of NDM- 1, according to Clare McCann, principal author of the study. “It was not a shock to find AR in the high Arctic. In essence, AR is a natural phenomenon. Most antibiotics are produced by soil microorganisms and over time they have evolved to become resistant to the compounds which they excrete to survive. However, finding NDM- 1 in 2013 was a surprise”

Five clusters:

Researchers noted in their paper, in the peer review journal environment international, that it was detected in the 5 out of the 8 clusters studied, NDM-1 was first reported in 2007 in a patient admitted to a hospital in New Delhi, but was reported to be present in Germany, the same year.

“The first finding of NDM-1 in the environment, rather than a clinic setting, was in surface waters of Delhi, in 2010. So finding NDM-1 in the high Arctic three years after the first report of its presence in the environment was very intriguing. The results show how far reaching and fast resistance can move around the globe”, Dr. McCann said.

“Our findings show that the NDM-1 gene is present in highest concentrations near fresh water sources where wildlife tend to congregate. Additionally, we discovered levels of mobile genetic elements (MGEs), the mechanism by which bacteria 'trade’ AR , to minor NDM-1, MGEs are noteworthy here because they are often associated with 'acquired' resistance and are found at higher levels in human, or animal waste-impacted environments” she said.

The findings point towards the involvement of migratory birds, who could carry the resistance in the gut as transfer it to the Arctic soil through faecal matter. However, it is also possible that it may have migrated with humans and spread via local wildlife, or it may be a combination of factors.

Priyanka. R
Nanditha. R
I B.Sc B Sec

5 THINGS TO KNOW ABOUT HIV- PREVENTION DRUG, PREP

Published on 6 Feb 2019 11.58 pm in m.dailyhunt.in

US President Donald Trump has announced a plan to end the HIV/AIDS epidemic in America with the help of the drug known as PrEP, which prevents the spread of the disease.
Around 40,000 Americans contract the disease each year. Globally, 36.9 people have HIV and 5000 more get it every day. One important part of preventing the transmission of HIV is the drug PrEP, which stands for pre- exposure prophylaxis. Derived from the antiretroviral drugs that reduce the amount of HIV in infected patients- this reducing their likelihood of transmitting the disease to others- PrEP is for people who have not yet contracted HIV. Here are five things to know about PrEP.
How it works. Many people living with HIV aren't aware that they have it.
By taking PrEP , at-risk men and women can prevent contraction of the disease. Similar to birth control pill,

PrEP is a pill that needs to be taken every day.
It's effective. Also like birth control pills, PrEP's effectiveness is dependent on the user's adherence to taking it. PrEP is nearly 100 percent effective for individuals who take it as directed. Women, especially, must take PrEP every day for it to be effective in preventing HIV. A recent study from Drexel university has found that if just a quarter of men who are having same-sec intercourse and at a high risk for HIV (i.e. not using condoms) used PrEP, 30 percent of new infections could be avoided.
It's under-used, despite being approved for use in 2012. A lack of awareness, healthcare funding, and understanding, along with high costs and social stigma all present barriers to adoption of the drug around the world.
It's safe. PrEP had been shown to be as safe as aspirin, with equally low rates of serious side effects to the painkiller.
It doesn't protect against other STIs. PrEP users are still at risk of getting other sexually transmitted infections like herpes, chlamydia, gonorrhoea, or syphilis, if they don't use condoms.

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Chiranth. G
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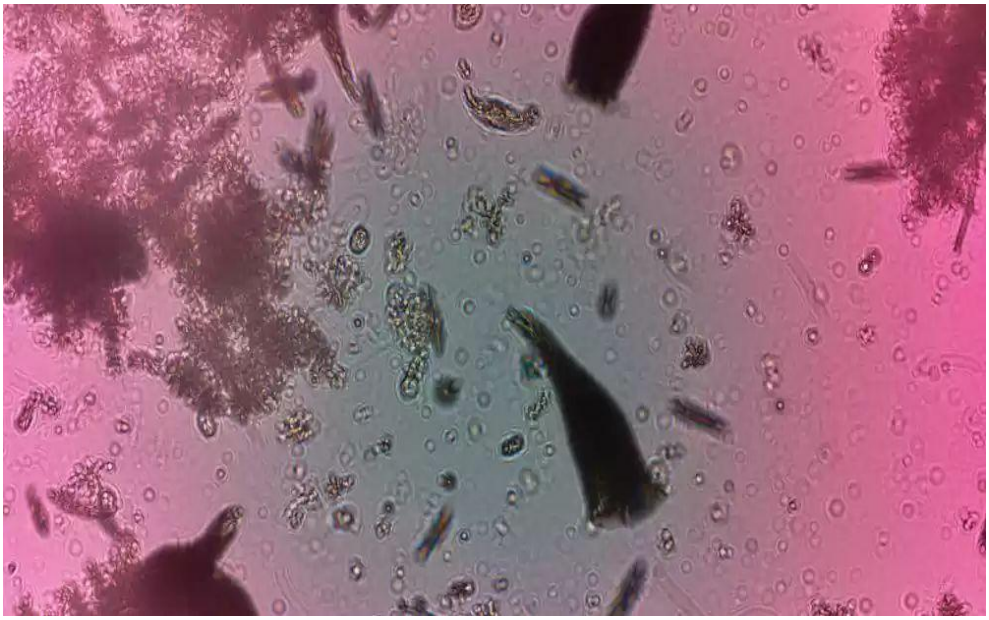
AI IDENTIFIES MICROSCOPIC MARINE ORGANISMS: STUDY

Published on 7 Feb 2019 12.53 pm in m.dailyhunt.com

New York: Researchers have developed an Artificial Intelligence (AI) programme that can automatically identify microscopic marine organisms, according to a new study.



The study showed that specifically, that AI programme has proven capable of identifying six species of foraminifers or forams – organisms that have been prevalent in Earth's oceans for more than 100 million years.

“At this point, the AI correctly identifies the forams about 80 percent of the time, which is better than most trained humans”, said Edgar Lobaton, Associate professor at the North Carolina State University.

“We also plan to expand the AI's purview so that it can identify at least 35 species of forams, rather than the current six,” said Lobaton.

The current system works by placing a foram under a microscope capable of taking photographs. An LED ring shines light onto the foram from 16 directions- one at a time- while taking an image of the foram with each change in light.

These 16 images are combined to provide as much geometric information as possible about the foram's shape.

The AI then uses this information to identify the foram’s species, said the study, published in the Journal Marine Micropaleontology.

This work demonstrates the successful first step toward building a robotic platform that will be able to identify, pick and sort forams automatically.

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BLOOD CELLS MAY HOLD THE KEY TO "FOUNTAIN OF YOUTH"

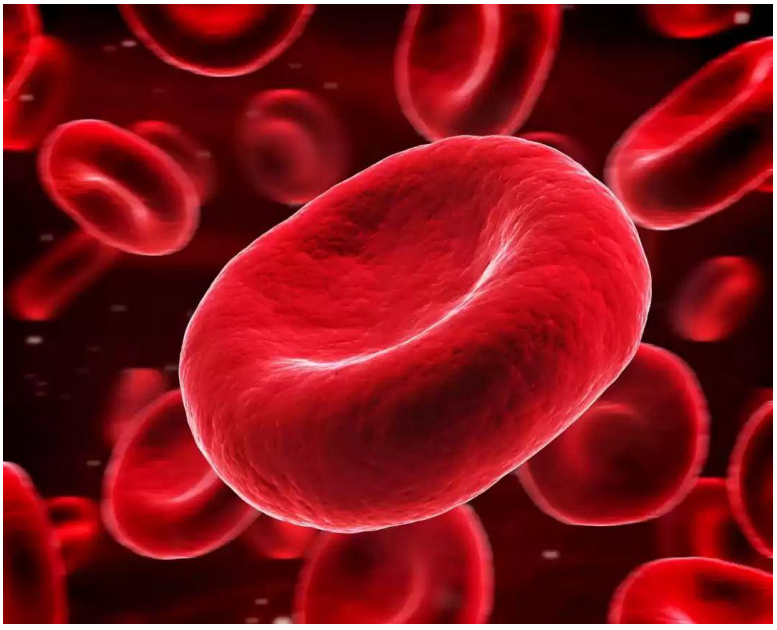
Published on 11 Feb 2019 3.54pm in m.dailyhunt.in

Washington: Human blood cells have an intrinsic clock that remains steady even after transplant, and could control Human ageing as well as underlie blood cancers.

The study, published in the journal Ageing Cell, measures cellular age in blood cells transplanted from healthy donors to leukaemia patients, focusing on donor-recipient pairs of different ages.

"This study is related to the fountain of youth", said Shigemi Matsuyama, an associate professor at Case Western Reserve University in the US. "We found young blood cells stay younger in older people. There was no accelerated aging of young blood cells in an older human body".

The team found that the other direction we also true – blood cells from adult donors transferred to a child stay older. The cells retained their intrinsic age nearly 2 decades after transplant. Their inherent



steadiness suggests blood cells could be the master clock of human aging, as they are not easily influenced by the environment.

The study showed that blood cells retain epigenetic patterns in DNA methylation – chemical groups attached to DNA – that can be used to calculate their age. Despite substantial age difference between donor and recipient (up to 49 years) , the DNA methylation age of transplanted blood reflected the age of the donor, even after many years of exposure to the recipient's body.

"DNA functions as time keeper of our age". The researchers provided the first experimental evidence that ageing clock of blood cells is cell-intrinsic and not set by interactions with other cell types in the body. They are now working to identity mechanisms that change the clock.

"In cancer cells, the clock is broken". DNA methylation patterns are unstable in cancerous blood cells and often show odd ageing – 200 or 5 years old in a 50 year old patient.

Although it may sound appealing, therapeutic cell infusions are not yet recommended to try to maintain one's youth. We don't know if the blood cells serve as master clock that could synchronize other cells. It's just not known yet. The research teams are working to understand why epigenetic age differences exist in cancer cells and how they could be overcome.

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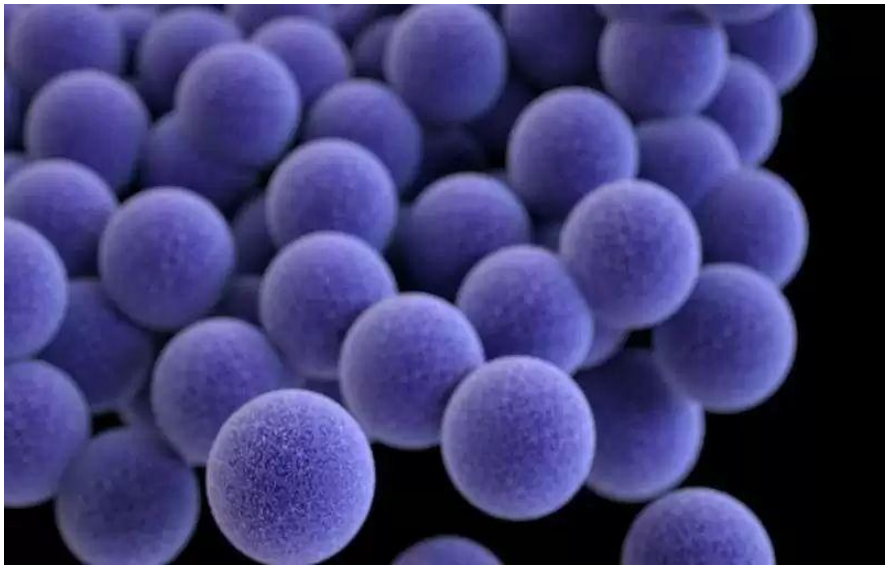
RESEARCHERS DISCOVER GENES THAT HELP BACTERIA PREVENT TREATMENT: STUDY

Published on 9 Feb 2019 12.54pm in m.dailyhunt.in

New York:
Researchers have discovered 2 genes that make some strains of harmful bacteria resistant to treatment by copper, which is a powerful and frequently used antibacterial agents, says a new study.
The discovery showed that staphylococcus aureus bacteria, which are highly resistant to antibiotics, can acquire additional genes that promote infections and antibacterial resistance and may open new paths for the development of antibacterial drugs.
The study conducted by the Rutgers University in the US, showed the two genes, named copB and copL, in some strains of S. aureus bacteria protect the germs from copper.



The genes may promote the survival of S. aureus in settings, such as hospitals, that could lead to infections or they may lead to S. aureus strains with higher copper resistance.
Recently, hospitals began using it against bacteria found on medical instruments and other surfaces. It has also been used for thousands of years to sterilise wound and drinking water.
But the two newly discovered genes encode proteins that help remove copper from S. aureus cells and prevent it from entering.
The findings, published in the Journal of Biological chemistry, revealed that some strains of S. aureus have newly acquired genes embedded in their genome in pieces of DNA called transposons.
Transposons aid in the spread of genes that can give rise to bacteria that are resistant to antibiotics and more likely to cause disease. The newly discovered genes are encoded within a transposon.

Nanditha. R
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I Bsc B Sec

AMPUTATION: FROGS SHOW THE WAY

(India Today website)

Salamanders and tadpoles can naturally regenerate lost parts of their bodies, especially their limbs. Adult frogs, on the other hand, cannot do so. But Russian and US scientists, experimenting with frogs, have proved that regeneration is possible by dipping the stumps of the amputated parts in salt solution or by applying an electric charge

The price to pay for carelessness can be a very high one. Lack of safeguards in factories, neglect on the roads and the deadly threshers on the farms take a heavy toll - hospitals with patients who self-consciously carry bandaged stumps that were once limbs provide gory evidence of this. For the countless thousands who can only face the future with a certain amount of dread, regeneration could be the biggest thing that happened in medical history.

The earliest experiments showed that younger animals and the lowest animals on the evolutionary scale are more capable of regeneration. Salamanders and tadpoles can naturally regenerate lost parts of their bodies, especially their limbs. Adult frogs, on the other hand, cannot do so. But Russian and US scientists, experimenting with frogs, have proved that regeneration is possible by dipping the stumps of the amputated parts in salt solution or by applying an electric charge.

Experiment: Now comes the news of the success of a team of Indian scientists whose initial experiments have paid off. The three scientists report that Vitamin A solution can aid regeneration of amputated forelimbs in the common skipper frog, Rana cyanophlyctis. As part of a research scheme sanctioned by the Council of Scientific and Industrial Research (CSIR), New Delhi, I. A. Niazi, O. P. Jangir and K. K. Sharma of the developmental biology laboratory, University of Rajasthan, Jaipur, used 30 such adult frogs for their study.

The researchers amputated the forelimbs of all the frogs through the wrist, and, after trimming off the bones inside, dipped the amputated stumps of 16 frogs for two minutes daily in an oily solution of Vitamin A (Arovit drops, made by Roche). This was done immediately after amputation and repeated for five days consecutively. The other 14 frogs were given no such treatment.

Regeneration: The two groups were kept separately in tanks with normal light and food. After 45 days, the forelimbs of all the frogs were examined. In some of the untreated frogs there were minor traces of regeneration - tiny spike shaped outgrowths were observed while others healed without any sign of growth. But positive regeneration was observed in all the 16 frogs treated with Vitamin A. In fact, signs of regeneration were observable just five days after amputation in these frogs.

According to Niazi and his colleagues, the regeneration observed in the vitamin-treated frogs "was not only faster but also distinctly better morphologically as well as histologically", as compared to the others. In one vitamin-treated frog, for instance, the regenerated limb was a hand-like structure with three fingers, two of which were partially fused.

Conclusion

Successful experiments like this, though a small step, raise the hope that in the future shattered limbs or injured spines could be treated to permit victims of accidents to lead normal lives.

R Sivashree
I B.Sc B Sec

III PRIZE

FOREST FIRE

Ground fires burn underneath the surface by smoldering combustion and are more often ignited by surface fires. ... Firestorms - Among the forest fires, the fire spreading most rapidly is the firestorm, which is an intense fire over a large area. As the fire burns, heat rises and air rushes in, causing the fire to grow. This is known as forest fire.

CAUSE FOR FOREST FIRE

Forest fires always start by one of two ways - naturally caused or human caused. Natural fires are generally started by lightning, with a very small percentage started by spontaneous combustion of dry fuel such as sawdust and leaves. On the other hand, human-caused fires can be due to any number of reasons.

FOREST FIRE DISASTER

A forest fire is a natural disaster consisting of a fire which destroys a forested area, and can be a great danger to people who live in forests as well as wildlife. Forest fires are generally started by lightning, but also by human negligence or arson, and can burn thousands of square kilometers.

PREVENTION OF FOREST FIRE

Be certain to completely extinguish cigarettes before disposing of them. Follow local ordinances when burning yard waste. Avoid backyard burning in windy conditions, and keep a shovel, water, and fire retardant nearby to keep fires in check. Remove all flammables from yard when burning.

CONCLUSION

To maintain ecological balance in the environment some of the disasters should be prevented. Mainly forest fire which is caused by both natural means and humans should be reduced due to which fertile land loses its fertility, animals would be burnt alive and some loses their habitat and some would enter into the cities in search of food and habitat. We humans being knowledgeable citizens of our country should take care of natural resources which is been the important part of country's economy.

Reshma R.H
I B.Sc B Sec

DISCOVERY OF NEW KURINJI SPECIES IN KARNATAKA

This article was published in Bangalore mirror dated on 19th January 2019, about the two different species of kurinji which has been found.

The species have derived their names from Mullayanagiri in Chikkamagaluru and Bisle Ghat in Hassan

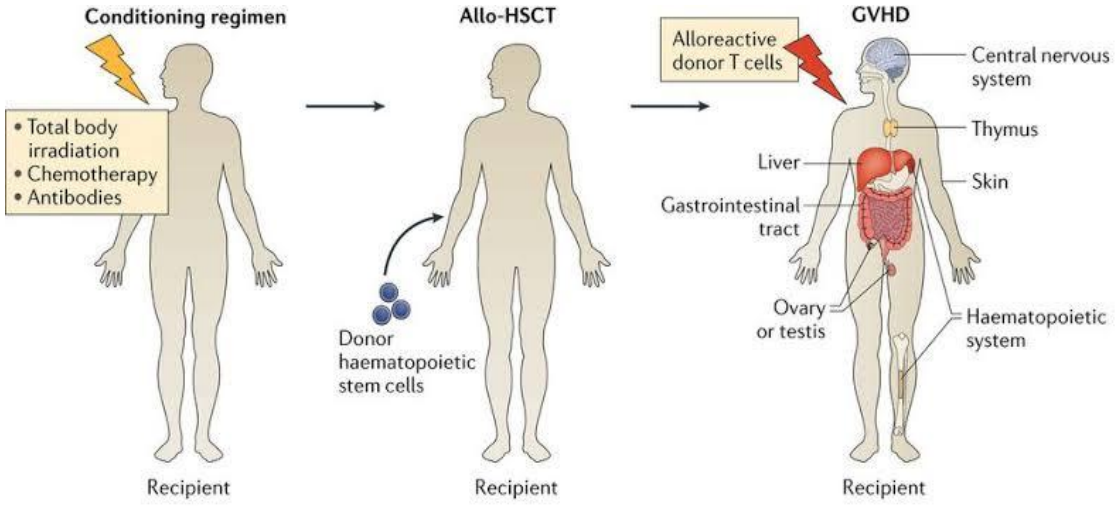
A team of researchers from Kerala and Tamil Nadu has discovered two new species of Kurinji (Scientifically known as Strobilanthes mullayanagiriensis and S. bislei) from the Western Ghats of Karnataka.

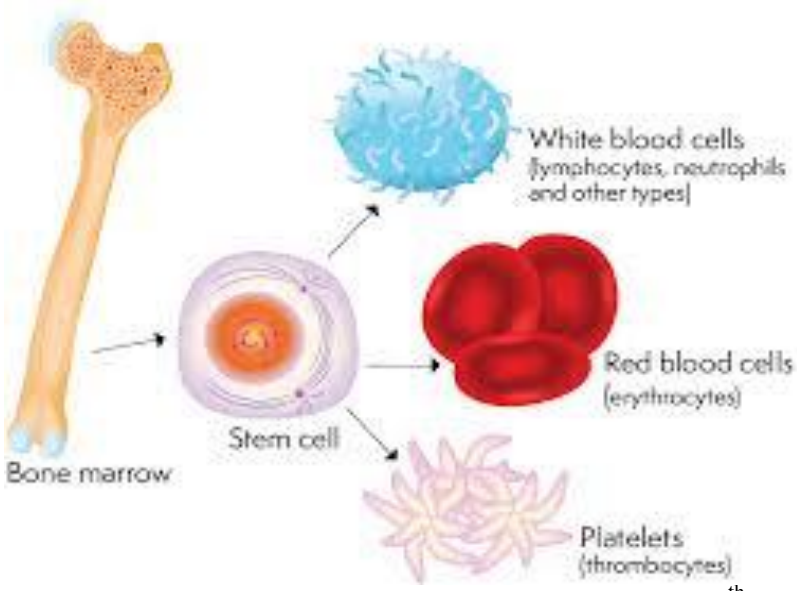
The Western Ghats, one of the hotspots in the country, is known for its biological diversity and edemism. It is home to a large number of threatened taxa, including several species of Strobilanthes. About 150 species of Strobilanthes have been reported from India and among them, 61 species are recorded for the Western Ghats. During explorations by the authors in Karnataka, these interesting species were collected from Chikkamangaluru and Hassan districts. Presently both plants were collected from their type locality only. Therefore, two more endemic species were found in the Western Ghats.

The authors, in research paper published in Plant Science Today, have described Strobilnathes Mullayanagiriensis gets its name from Mullayanagiri peak which is the highest peak in Bababudan Giri Hill ranges. It flowers during November-December and grows in the open rocky cliffs in the Bababudan Giri Hills. The other new species –Strobilnathes bislei- has been found at Bisle Ghat which houses rich biodiversity and is part of the central Western Ghats and grows on the exposed rocks in the Bisle Ghat forest reserves in Hassan District. The following observed during the months of October and November. The flowering periodicity of the species is uncertain; therefore further study on these plants is also relevant, as suggested.

Sampath Kumar K S
Sajjan L Gowda
I B.Sc B Sec

STEM TRANSPLANT SAVES LIFE





This article was published in the TIMES OF INDIA on December 9th, 2018.

VIJAYAWADA – Allogenic stem cell transplant was for the first time performed successfully in ANDHRA PRADESH on a 20 year old blood cancer patient.

Dr. Krishna Reddy, Dr. Mahadev Swamy and Dr. Madhav Danthala treated Pavan at Manipal hospital,where stem cells from a matching donor were transplanted into his bone marrow .

Less than a year ago, he was diagnosed with Philadelphia chromosome positive acute lymphoblastic leukemia – a rare variant of blood cancer. For a transplant, it is usually difficult to find a related or unrelated donor. Luckily, Pavan's sister was a perfect match and donated her stem cells. While 17 lakh rupees was crowdfunded , 3 lakh rupees was given from the CM relief fund .

Hitha S
I B.Sc H Sec

CRI-DU CHAT SYNDROME

Even before knowing what cri-du Chat syndrome is all about, let us know what a chromosomal disorder is. "Chromosomal disorder is an abnormal condition due to something unusual in an individual's chromosomes."

There are many examples to state-Down syndrome (caused by the presence of an extra copy of chromosome 21), Turner syndrome (presence of only one X- chromosome).

Cri-du Chat syndrome has some common names such as "Cat cry syndrome", "5p minus syndrome", "monosomy 5p", "5p deletion syndrome".

What is this 5p? It is basically a term used by geneticists to describe a portion of chromosome number 5 that is missing in these individuals. 5p deletion is a spectrum disorder.

It was 1st described by Jérôme Lejume in 1963 as a genetic condition that is caused by a deletion of the end of the short (p) arm of chromosome 5. The size of the deletion varies among affected individuals.

Most cases of cri du chat syndrome are not inherited. The deletion occurs most often as a random event during the formation of reproductive cells (eggs or sperm) or in early fetal development. Most affected individuals do not have a history of the disorder in their family. The parent carries a chromosomal rearrangement called a balanced translocation, in which no genetic material is gained or lost. Children who inherit an unbalanced translocation can have a chromosomal rearrangement with extra or missing genetic material. Individuals with cri du chat syndrome who inherits an unbalanced translocation are missing genetic material from the short arm of chromosome 5. This results in the intellectual disability and other health problems characteristic of the disorder.

How do we know that someone is suffering from this specific type of syndrome? Some of the symptoms are collected by the Human Phenotype Ontology (HPO) and they are as follows:

The syndrome gets its name from characteristic cry of affected infants, which is similar to that of a meowing kitten due to problems with larynx and nervous system. About one third of children lose the cry by the age of 2.

1. Low birth weight and poor growth
2. Behavioural problems such as hyperactivity, aggression, outbursts.
3. Unusual facial features which may change over time.
4. Excessive drooling, small head and jaw.
5. Widely-spaced eyes (hypertelorism);
6. Skin tags in front of eyes.

Just as the proverb says "Where there is a way there is a will" there is a solution for this condition. The Genetic Testing Registry (GTR) provides information about the genetic tests for this condition. While there is no specific treatment available for cri du chat syndrome, early intervention is recommended in the areas of physical therapy (achieving physical and motor milestones such as sitting and standing up), communication (speech therapy, sign language instruction), behavioral modification (for hyperactivity, short attention span, aggression), and learning (special education).
Many organizations also have experts who serve as medical advisors or provide lists of doctors/clinics which help the families to face this condition. "5p society", "Chromosome Disorder Outreach" performs tremendous activities not only in reaching out to the families instead creating

awareness regarding this condition.
The Hull Live news shares very interesting and rare information about a boy who was diagnosed by Cri-du Chat syndrome was said that he would die within a year. So what's interesting in this? Not just interesting in fact the amazing part is that, that boy fought this condition and also celebrated his 10th birthday. Little Harry Bates was just 12 weeks old when specialists realised something was wrong because the youngster was in and out of hospital with hernias and kidney problems.

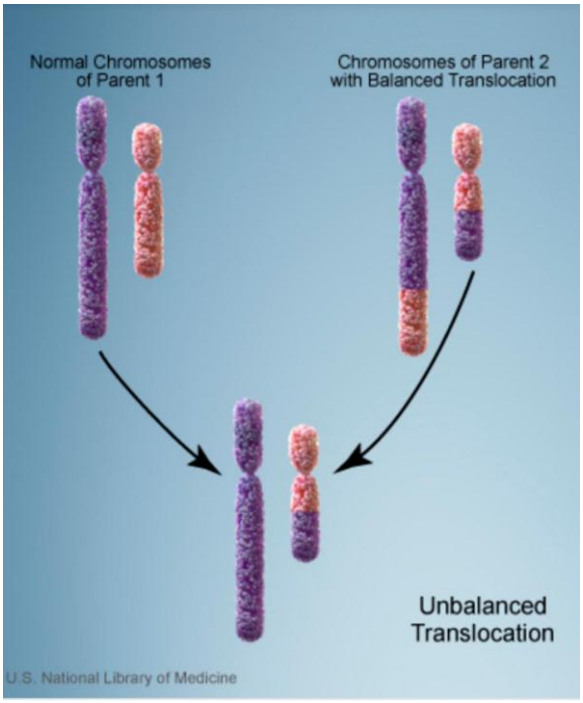
His mother Liz Todd noticed he was shrieking like a cat from his crib just days after he was born at Hull Royal Infirmary on February 11, 2008.
He was eventually diagnosed with Cri-du Chat syndrome. Doctors at the hospital had tragically said the youngster wouldn't survive and told his mum Liz and father Rich Bates that they could take him home to pass away in peace.

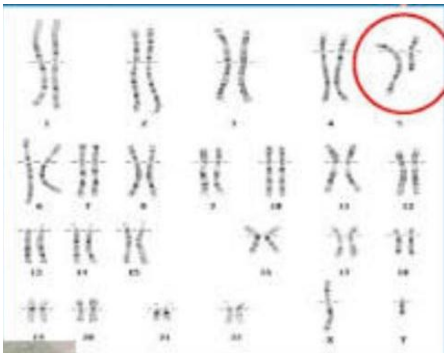
"The doctors told us Harry wouldn't last a year, but now he is loving life." Harry needs round-the-clock care 24 hours a day, which Liz has been doing since he was born, and now Rich has taken a home-based role from his module management job. But the results of his parents determination and hard work, as well as Harry's desire to thrive, has seen him walk metres on his own with only splints around his 'twisted' ankles for support.

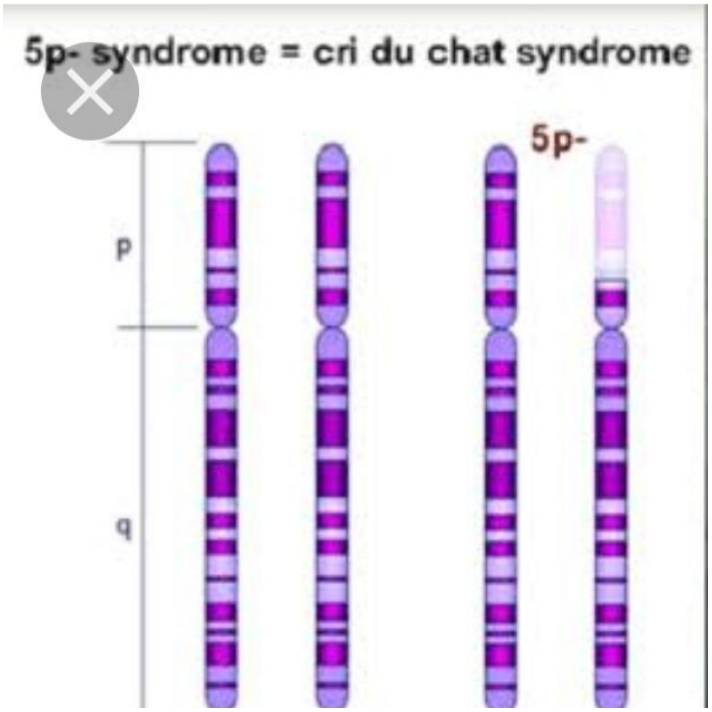
This is it... The only way to overcome any situation is dedication and hard work. Just like Harry's parents stood by him it’s the responsibility of all of us to give them the moral support and not treat them as any other individual.

Image of Harry Bates and his family.

Translocations Image of a boy suffering from Cri-du Chat syndrome







Aishwarya Lakshmi Talakad
I B.Sc I Sec

DEVIL'S IVY
THIS HOUSE PLANT CAN CLEAN INDOOR AIR

Cleaning supplies, paints, glues and other items can release harmful chemicals into indoor air. Removing them from that air can be tricky and expensive. But Stuart Strand thinks house plants may be able to help.

Strand's team decided to work with a house plant called pothos ivy. They boosted its pollution breakdown ability by adding a pollution busting gene. In tests, this altered plant removed from the air.

Strand's team started by giving plants the gene to make an enzyme called 2E1. It's a liver enzyme shared by all mammals, including people. They used the rabbit version of this gene because they had worked with it before. This enzyme targets small, carbon rich molecules called VOCs (Volatile Organic Compounds). VOCs can cause breathing troubles and other problems they can also damage DNA, increasing the risk of cancer in human bodies.

One Tough plant

The Researchers choose to work with pothos ivy – also known "Devil's ivy" – because it's already a popular house plant. They took baby plants that were few centimeters tall and put them in bottles. The bottles held just some water, a few nutrients and air.

After sealing the bottles, the researchers injected one of two common indoor VOCs into each bottles. Some bottles received benzene. Benzene often enters home through attached garages. Other bottles got Chloroform. This chemical forms in Chlorine-treated water, like tap water. It can escape into the air during hot showers.

Strand's team also set up bottles with regular pothos ivy and bottles with no plant at all. They let all the bottles sit in the lab for more than a week. Each day, the scientists sampled the air inside the bottles. They ran these samples through a machine called a gas Chromatograph. It can identify the chemicals in air.

All the chloroform bottles started out with same amount of the gas in bottles with same amount of the gas. In bottles with the same gene-altered ivy, Chloroform levels fell 82 percent within three days. Chloroform levels in bottles with regular plants barely budged. Results with benzene were similar. Its level in bottles with normal pothos dropped slightly over eight days. It did the same in

plant free bottles. But in bottles with ivy able to make the 2E1 enzyme, benzene plunged by about 75 percent.

Conclusion

The idea which Strand's working with is hardly new. When plants take in air through their leaves they can cause proteins called enzymes to disarm toxic chemicals. But most enzymes only work on a few types of chemicals. And plants may not have enzymes that tackle each of the pollutants in their environment. So plant's usefulness for cleaning up pollution is limited without some help from scientists. Strand hopes such plants will help to tackle the wide spread problem of home air pollution. Indoor levels of those chemicals tend to be small. But if people breathe them in every day for year and year they might lead to disease, such as cancer small children and teens may get extra large doses if they spend more time at home than their parents.

The results of the experiment confirm that adding 2E1 helped pothos ivy breakdown common VOCs. But cleaning all the air inside tiny bottle is easier than detoxifying an entire house.

Nirmala S
I B.Sc I Sec

I PRIZE

WARMING IS MAKING AIR QUALITY BAD

Times of India
Dated-8th February, 2019

Rising Temperatures increase the concentration of aerosols in the atmosphere that cause air pollution, according to a study which highlights another effect of climate change. While climate change is warming the ocean, it is warming the land faster, which is bad news for air quality all over the world, according to researchers from the University of California, Riverside in the US.

The study, published in "Nature climate change" shows the contrast in warming between the continents and sea, called the land-sea warming contrast, drives up the aerosol centration in the atmosphere. Increase in the aridity leads to decreased low cloud cover and less rain, which is the main way that the aerosol are removed from atmosphere.

To determine this researcher's ran simulations of climate changes under 2 scenarios. The first assumed a business as usual warming model, in which warming proceeds at a constant, upward rate. The second model probed a scenario in which the land warmed less than expected.

New Delhi: The special report on global warming by a UN body has set the tone for the upcoming climate conference in Poland where countries will now have to make efforts to align their pledges with the 1.5 degree Celsius goal-more stringent target than the existing agreement to limit average temperature rise within 2 degree Celsius by 2100.

Raksitha V
I B.Sc I Sec

CALLING ALL Surfers!!!
SHARK-BITE RESISTANT WETSUIT IS ON THE WORK.

This article that appeared in the 'Deccan Herald' newspaper, dated Jan 30 2019, provided precise information about the ongoing new testing to develop shark-bite resistant materials by an Australian University.

Researchers of an Australian University have started testing a new fabric for wetsuits in a bid to prevent devastating and fatal injuries from shark attacks.

The research is being done at Adelaide's Flinders University who has been awarded A$90,000 (R875,000) New South Wales Government grant to develop this protective suit.

According to Charlie Huveneers , head of the Southern Shark Ecology Group(SSEG) research lab at Flinders University, the suit could prevent large wounds suffered by surfers and swimmers in attacks.

Despite tens of millions of trips to the beach taken in Australia every year, shark attacks are rare but they do happen every time and these incidents sets off public debate about beach safety. These bites can have big consequences, some physical and some mental. They even attract media attention.

According to the data compiled and recorded by Sydney's Taronga Zoo, there were 27 shark attacks in Australian waters last year, 18 attacks in 2017 and 26 in 2016 with one fatal incident in popular tourist destination Whitsunday Islands, near the Great Barrier Reef.

The material that is on testing is new Neoprene. This is similar to Kevlar, which is also a heat-resistant and will feature robust synthetic fiber typically used for bullet and stab-resistant body armours.

The new neoprene will be tested for compliance with standard materials used by surfers and divers. The researchers, recognizing that the strength of a shark bite can break a person's bone, suggests that if their wetsuit design is successful, then a person's life can be saved by stopping the bleeding until he is provided with qualified medical care.

Scientists and research staff have already begun testing the new wetsuit off the coast of Spencer Gulf, near New Adelaide, with sharks in their natural environment.

Even though the chances of being attacked by a shark are infinitesimally small, surfers, divers and swimmers will always be more exposed to the predator's assault. Therefore, it is important to keep developing new means of reducing shark bite risks and ensure the efficacy of such new products.

Sanghavi R
I B.Sc I Sec

'LITTLE BRAIN' DOING PRETTY BIG THINGS..!!!

This article which was appeared in "DECCAN HERALD" newspaper, dated January 26 2019, elucidates about a newly identified circuit connecting the cerebellum to the brain's reward centers in mice could help scientists understanding autism and addiction.

A new study in rodents has shown that the brain's cerebellum – known to play key role in motor coordination –also helps control the brain's reward circuitry. This unexpected finding, published in 'Science', may explain why the region consistently pops up in the studies of autism.

The cerebellum plays well-recognized role in the coordination and regulation of motor activity. However, research has also suggested that this brain area contributes to a host of non-motor functions. For example, abnormalities in the cerebellum have been linked to autism, schizophrenia, and substance use disorders, and brain activation in the cerebellum has been linked to motivation, social and emotional behaviors, and reward learning, each of which can be disrupted in psychiatric disorders.

The findings based on mice: Muting neurons that connect the cerebellum to a reward center in the brain makes mice less sociable, researchers found. The results also show that the cerebellum activates this reward centre, called the ventral tegmental area (VTA).

According to Kamran Khodakhah, chair of neuroscience at Albert Einstein College of Medicine, New York, any process that interrupts this pathway could be a reason for the brain not being able to provide the reward required for socializing.

The study upends conventional notions that cerebellum merely controls brain.
According to Sam Wang, professor of neuroscience at Princeton University, who was not involved in the study, this kind of work has the potential to chance textbooks about what the cerebellum is doing in the brain.

Flashing lights:

Researchers have known since 1970s that the cerebellum connects to the VTA, but the reason for these links were unknown. Khodakhah and his colleagues set out to explore this using a technique called optogenetics.

They made mice that produce light-sensitive proteins only in cerebellar neurons and placed in mice in a square chamber. Whenever a mouse visits a certain corner of the chamber, a probe flashes light into the VTA. The researchers were able to selectively switch on and off the subset of neuronal projections, or axons that extend from the cerebellum to the VTA.

The mice spend most of their time in this corner, suggesting that activating the axons stimulates a reward circuit in the VTA, the researchers found. (Turning off the axons has no effect on the mice's choice of corners.

The light flashes do not affect the mice's activity levels or motor coordination, which could have skewed the results.

In another test, the researchers gave the mice a choice of either a darkened or brightly lit part of a chamber. Mice typically take cover in darkness. But if researchers activate cerebellar fibers when the mice learn to prefer the bright region, the mice learn to prefer the bright region. These findings also suggest that the mice find it pleasurable when these neurons are activated.

Social reward:
The cerebellar axons are more active when mice explore a chamber containing another mouse- a social reward – then one containing an object. However, when the researchers turn off the projections to the VTA, the mice stop seeking the company of the other mice.

According to Peter Tsai, assistant professor of neurology at the University of Texas Southwestern in Dallas, who was not involved in the work, this is a potential mechanism by which the cerebellum actually is contributing to autism.

However, turning on the axons has no effect on the social interaction. The finding suggests that the cerebellum is required for social reward but does not work in isolation.
The next step is to study the cerebellum's connections to the VTA in people and in the younger mice.
Wang's team has found that disrupting the cerebellum early in life alters the mice's social behavior, but doing so in adulthood has no effect. Khodkhah's team is also looking at the link between cerebellar neurons and the VTA during social interactions in mouse models of autism.
Egidio D'Angelo, a neurophysiologist, who was not part this work, penned a commentary saying, 'These work is done in mice - now we have to see whether this happens in humans'.

In further studies, the researchers plan to test whether the cerebellum-VTA pathway can be manipulated, using drugs or optogenetics , to treat addiction and prevent relapse after treatment.

Sanghavi R
I B.Sc I Sec

A Medical Milestone…. !!!
FIRST BABY BORN VIA UTERUS TRANSPLANTED FROM ADECEASED DONOR.

This article which appeared in 'Deccan Herald' newspaper, dated December 6, 2018, gives information about the birth of the first baby through the uterus transplantation received from a dead donor.

For the first time, a baby has been born to a woman who received a uterus transplant from a deceased donor, according to Hospital DAS Clinicas at the University of Sao Paulo School of Medicine in Brazil.

The uterus or womb, which is shaped like a topsy-turvy pear and sits within the pelvis, is a female reproductive organ that houses and nourishes the fetus until birth. At least a dozen children in Sweden, the United States and Serbia have been born to women with transplanted uteri donated by a living relative, noted the authors of the study , which was published Tuesday in the medical journal 'The Lancet'.

The baby is first to be born in US after uterus transplant. The hospital says, "The results provide proof-of-concept for a new treatment option for absolute uterine factor infertility." Wrote co-authors Dr. Dani Ejzenberg, an ob/gyn at the University of Sao Paulo and Hospital das Clinicas in Brazil, and Dr .Wellington Andraus, a transplant surgeon at the Sau Paulo University School of Medicine in the study. Less than 5% of women worldwide have some type of "absolute uterine factor infertility." In which an abnormality of the womb interferes with interferes with fetal development.

The Brazilian team followed protocols established by Dr. Mats Brannstrom and his team at the University of Gothenburg in Sweden, where the first successful uterus transplant, that one from a living donor, was performed in 2013. That recipient mother gave birth in 2014.

From transplant to birth:

The transplant recipient, who had been born without a uterus, was 32 years old at the time of the surgery in September 2016. (The patient's identity remains anonymous, which is typical for published case studies). Her diagnosis: Mayer-Rokitansky-Kuster-Hauser syndrome, a genetic condition that affects one in 4500 women and causes a patient's vagina and uterus to be either absent or underdeveloped, although her external genitals appear normal and her ovaries still function and contain eggs.

The donor was a 45-year-old woman who died from a stroke.
Months before receiving a uterus transplant, the patient underwent in-vitro fertilization. This resulted in eight good-quality early-stage embryos, which were cryopreserved in the hopes of being used after a uterus transplant.

Brannstrom, though, feels hopeful and believes that future transplants will not only create new life, they will 'greatly increase the quality of life for parents and grandparents.

Sanghavi R
I B.Sc I Sec

WHALES, SUICIDE AND SONAR: A BLEAK TALE

Source: Science and environment section of Deccan Herald.
https://www.deccanherald.com/science-environment/some-whales-sonar-may-provoke-715635.html

Millions of years of evolution have turned whales into perfectly calibrated diving machines that plunge kilometres below the surface for hours at a stretch, foraging for food in the inky depths.
The heart rate slows, blood flow is restricted, and oxygen is conserved.
However the beach stranding of the rare beaked whales tell a different story. The more recent of the incidents had 140 whales die on the shores of New Zealand on separate incidents.
So how could the ocean's most accomplished deep sea divers, despite adaptations to a life in the deep waters, strand themselves on land, usually on a beach with nitrogen bubbles poisoning their veins?
The culprit: Beaked whales get really stressed in the presence of SONAR and swim vigorously away from the sound source, changing their diving pattern .This leads them to ascend quickly which causes decompression sickness in the whales, the same disorder that afflicts scuba divers.
Under the high pressure experienced at depth , nitrogen can dissolve into the bloodstream (as solubility of gasses increases with pressure) .When the whales ascend quickly, the dissolved nitrogen comes out of solution , forming gas bubbles in the blood and body tissues , damaging vital organs . High proportion of bubbles can lead to numbness, paralysis and loss of brain function, thus *literally driving* the whales to suicide.
SONAR is used by the military to find submarines and other obstacles submerged in the ocean. It is vital to the Navy, but it also has negative effects that are detrimental to the oceans. To avoid more beaching of these rare marine animals, strong methods are recommended.

- Tests could be conducted to determine the parts of the ocean which are abundant in whales or other marine lives and avoiding excessive use of SONAR

- Alternatives of SONAR like Passive sonar, Magnetic sensors and Thermal imaging could help reduce unnecessary whale deaths.

Whales face a number of other threats like industrial hunting, entanglement in commercial fishing gear, climate change, ingestion of marine debris, oil and gas development, disturbance by recreational watercraft and noise pollution. Let us try not to add to the list and help conserve these marine mammals from the brink of extinction.

Sindhu M

I B.Sc I Sec

THE KASHMIR STAG

The Kashmir Stag also known as HANGUL is the state animal of Jammu and Kashmir. Hangul comes from Kashmiri word 'Haang' which means a dark, rusty brown colour. The animal is endemic to Kashmir. Hangul prefers grazing in the early morning or late afternoon. Sighting the Hangul is a matter of wild luck. It is a shy animal. The animal senses human presence very quickly much before a human eye can spot it and escapes quickly.

It is found in dense forests in high valleys and mountains of Kashmir. In Kashmir, it is found in Dachigam national park where it receives protection but elsewhere it is at high risk. Earlier it was believed to be subspecies of red deer, but mitochondrial DNA genetics have revealed that the Hangul is subspecies of the elk native to India. Over the years Hangul has faced the threat of extinction because of human interference with the natural habitat of the animal.

The various factors like habitat destruction, overgrazing by domestic livestock and poaching have dramatically reduced its number. Earlier during the 20th century, the number was in thousands but because of human exploitation, the animal is at the verge of extinction. If necessary steps are not taken we would soon be deprived of this beautiful creature. It is very difficult to count the exact number because of the fact that the animal is very shy. If the animal feels a human presence, it immediately escapes. According to census 2015, the estimated number of protected members was only 186. According to 2017 census, the number has further reduced, which is a matter of serious concern.

Although Dachigam National Park had been specified for the protection of the Kashmir Stag. Still, inside the national park, illegal activities like the introduction of sheep farm have increased stress on the natural habitat of the stag. It not only has given rise to competition for food and space

but has also given birth to a respiratory disease, proven hazardous and fatal for the Hangul. The state government so far has been incompetent in addressing such issues. Militancy in Kashmir also has had an adverse effect on the population of the animal, so has been the construction of army camps and barracks, built on high altitudes, resulting in the downward movement of tribal people towards the national park, hence disturbing the natural habitat of the animal. The other critical reasons resulting in the reduction are; grazing, fuel wood and timber extraction and grass cutting for domestic animals. The grass cutting by the locals for their domestic animals greatly reduces the amount of food required by the animal. There has also been a natural cause decreasing its number that is predation. Brown beer and leopard are also posing a serious threat to the animal.

Although the number of animal is low, still the International Union for Conservation of Nature (IUCN) has not included this in critically endangered species. The state and central government are working in collaboration with one another for the preservation and protection of this prestigious animal. Every now and then steps are being taken to protect this animal from extinction.

Here are some of the steps that should be taken to protect the animal, wildlife protection act should be followed, grazing should be highly regulated, anti-poaching squads should be formed and making their presence in the poaching sensitive areas.

Zahoor Ahmad Sheikh
I B.Sc I Sec