MES College of Arts, Commerce & Science

Malleswaram, Bengaluru – 03

Department of Zoology

SPIRITUS

Inspired thoughts....

NEWS 'N' VIEWS

2017 - 2018

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 fourth edition of our e-newsletter "SPIRITUS", we bring to our readers, **41** articles from the month of August 2017 to March 2018.
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 Fourth 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 23rd March, 2018. 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 2017 - 18.

The winners were –

- Anithashree. S II B.Sc 'H' ---------- I Prize
- Rashmi. R III B.Sc 'H' ---------- II Prize
- Yoganand. C I B.Sc 'i' ---------- II Prize
- Panchami. P II B.Sc 'B' ---------- III Prize
- Tejaswini. M.D & Ankita Varshney II B.Sc 'B' -------- III Prize
- Ajay II B.Sc 'A' ---------- Consolation Prize

This is Fourth edition of "SPIRITUS" has **41** articles, written by students of life sciences of 1st, 2nd & 3rd year B.Sc.

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INFERTILITY

The inability to conceive children is experienced as a stressful situation by individuals and couples all around the world. The consequence of infertility is manifold and can include societal repressions and personnel suffering.

Infertility is a condition of the reproductive system that prevents the conception of children.

It is common assumption that infertility is primarily related to woman. In reality, only one-third of infertility cases are related to the woman alone. Statistically, one-third of infertility problems are related to men and the remaining one-third is a combination of fertility factors involving both partners or unknown causes. Unknown causes account for approximately 20% of infertility cases.It affects 10-15% of couples throughout the United States.

Conception and pregnancy are complicated process that depend upon a number of factors including,

1. The production of healthy sperms by the men.
2. Healthy eggs produced by the woman.
3. Unblocked fallopian tubes that allow the sperm to reach the egg.
4. The sperm's ability to fertilize the egg when they meet.
5. The ability of the fertilized egg (embryo) to become implanted in the woman's uterus.
6. Sufficient embryo quality.

Finally, for the pregnancy to progress to full term the embryo must be healthy and the woman's hormonal environment adequate for its development. If just one of these factors is impaired infertility can be the result.

Lifestyle factors for infertility.

Lifestyle factors have had a dramatic impact on general health and the capacity to reproduce. Lifestyle issues such as smoking and obesity can affect general health and wellbeing. For example, smoking increases an individual's risk of cardiovascular disease and adverse consequence associated with obesity, diabetes and some cancers. There is an increasing body of evidence that lifestyle factors can impact on reproductive performance. Studies have demonstrated that smoking in woman significantly decreases the chance of conception.

These factors include female age, smoking, weight, diet, exercise, psychological stress, caffeine consumption, alcohol consumption and exposure to environmental pollutants.

Treatment

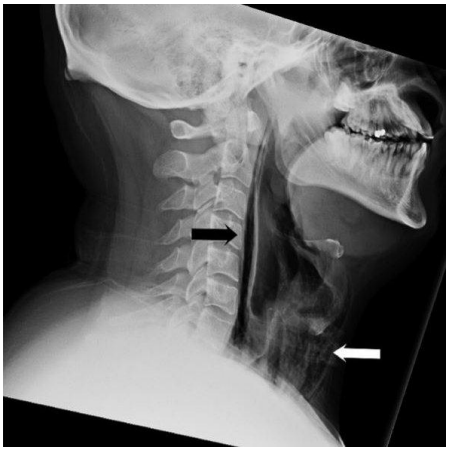
Infertility is not such a condition which can't be cured. These days advanced technology help couples to gain their fertility and give birth to young ones. The infertile couples can undertake treatments like IUI treatment, IVF process, ICSI treatment, embryo freezing, Blastocyst transfer and etc. Such treatments help the couples to become fertile.If you haven't already thought about adoption, this might be a time to think about it. Some couples decide at this point to spend their resources on adoption instead of IVF. Where others couples see IVF as the best option.

Pooja. B
I B. Sc ‘B’ sec

WHY YOU MUSTN'T STIFLE A SNEEZE

Doctors warn you should never stifle your sneeze. If you have ever tried to stifle a sneeze by pinching your nose and closing your mouth, doctors are offering a cautionary tale for why you should stop.

The patients doctor detail the incident in the latest issue of BMJ case reports. "the patient attempted to suppress a sneeze by clamping his mouth shut and blocking both nostrils, but the resulting force perforated his pharynx, the part of the throat just above the larynx and oesophagus".



[***A radiograph shows streaks of air behind the pharynx (black arrow) and air in the layer below the skin in front of the trachea (white arrow)***]

A man in UK reported that the back of his throat during the maneuver, he was left un-able to swallow and had difficulty speaking for days.

The doctors described their initial confusion when the previously healthy man turned up in the emergency room at University hospitals of Leicester, complaining of swallowing difficulties and "popping sensation" in his neck and said the swelling began "after he tried to halt a sneeze by pinching the nose and holding his mouth closed", that 34-year-old patient had intense pain in his throat and spent a week in the hospital, and underwent examinations.

They discovered air bubbles in his neck and his chest and determined that the stifled sneeze had torn a hole in the lower part of his throat. This patient had no history of trauma and said he hadn't eaten anything sharp. Later he was admitted to the hospital and started treatment with antibiotics. He was also placed on a feeding tube after 7 days, an examination showed the swelling subsided, then the feeding tube was removed and the patient was put on a soft diet with no problems.

At a 2 month follow up, the man did not present any further complications.

Dr. ZIYANG JIANG, a head of neck surgeon at university of Texas Health Science center at Houston who was not involved in the man's treatment, told the associated press that injuries from repressed sneezes are "exceedingly rare" but can happen.

This incident explains us that it is possible to harm ourselves from trying to stifle a sneeze. Halting sneezing such as blocking nostrils and mouth is a dangerous maneuver [action/activity], and should be avoided.

Generally, when we sneeze, at a scientific view it is said that the air is pushed out at about 150 miles [80 km's] per hour; if we retain that much amount of pressure, it could do a lot of damage to us and we would end up like that patient from UK with air trapped in his body.

The whole point of sneezing is to get rid of germs and bacteria. Instead the safest way to keep ourselves healthy is to sneeze out loud, and maintain our manners by using a hand kerchief or a tissue, and avoid shyness or be afraid to sneeze in public, because it's a natural process.

Shravani. R
I B. Sc 'B' sec

THESE SEA CREATURES HAVE A SECRET SUPERPOWER: INVISIBILITY CLOAKS

Scientists have found that some crustaceans have just the trick for hiding from predator
Being a snack-sized animal in the open ocean is tough. Some have it easier than others. Creatures on the bottom can blend in with stones and sand. Stands of kelp and coral provide hiding places in other ocean habitats.

But in midwater, there is no place to hide. There, creatures can get eaten pretty quickly by something unless they can find a way to disappear. Laura Bagge, a graduate student at Duke University, thinks she knows how to make that happen—at least in a group of tiny, shrimp-like crustaceans called hyperiids.

Bagge, along with biologist Sönke Johnsen and Smithsonian zoologist Karen Osborn, recently published a paper in the journal Current Biology, describing how hyperiids amphipods use nanotechnology to cloak themselves with invisibility.

The discovery was made by Bagge, the paper's lead author, who worked with Osborn at the Smithsonian's National Museum of Natural History in Washington, D.C. "She was interested in the transparency of these animals. Transparency has been looked at in other animals and they do it in known ways so far but nobody had looked at this in these.

Bagge examined the surfaces of the animal's exoskeleton to study their structure. "She found these bumps and thought they were interesting," says Osborn.

The bumps turned out to be microscopic spheres. In some cases she found a nano-sized shag carpet and on others, a layer of tightly packed nano-spheres. They were sized just right to dampen light in a manner similar to the sound-proof foam insulation that decreases noise in a recording studio. Hyperiids seem to have two possible ways to make their surfaces not reflect light—nano protuberances on their cuticle (a shag carpet essentially) or a microfilm layer of tiny spheres. The closer that they looked, the more those little spheres seemed to be bacteria.

“Every indication is that they are bacteria but. . . they are extremely small for bacteria,” says Osborn. “There is a possibility that these are some strange excretions, but it’s a pretty microscopic chance.” She adds that Bagge is now working on exploring that possibility with microbiologists.

Animals living in the midwater habitat of the ocean adapt different camouflage methods to deal with light coming from different directions. Light from the sun becomes dimmer and changes color as it penetrates deeper water. To deal with this, fish and other sea creatures hide from predators stalking them from above by adapting dark colors on the top parts of their bodies as a disguise to blend in with the dark depths below.

At the same time, to hide themselves from predators lurking beneath them, they may be shaded underneath their bodies with lighter colors, or even glow, in order to blend in with the light from above. Mirroring on the sides of some fishes is another way to hide.

The hyperiids start out with a big advantage: They are transparent. But that only gets them so far. A pane of glass is also transparent, but when you shine a light at it from certain angles, it will flash and become visible.

Bioluminescence is an important part of the strategies of many creatures that are both predators and prey in the ocean. By flashing lights from various directions, a predator can see the flash back from its transparent prey. To avoid detection, a free-swimming hyperiids with no place to hide needs a way of dampening the light and keeping it from flashing back.

This is what the bacteria seem to be doing for their hosts. These cells are small as bacteria go, ranging from under 100 nanometers to around 300 nanometers (100 nanometers is less than the diameter of a single strand of hair). The ideal size for dampening flashes is 110 nanometers in diameter, but anything up to around 300 nanometers can help reduce visibility.

"Hyperiids are really tough little buggers,” says Osborn. They were relatively easy to work with, she says, because they stay alive in a laboratory setting. “They are happy in a bucket, happy if you leave them alone.”

The scientists plan to sequence at least parts of the genomes of the bacteria in order to learn more about them. Do all species of hyperiid host the same species of bacteria? Do the bacteria also live in the water without a host? Sequencing DNA is an important step towards answering these and other questions.

Bagge initially concentrated on only two species of hyperiids, but Osborn encouraged her to branch out and see if these nanotechnologies were common among more of the 350 known species in the sub-order. Osborn was able to find her more samples, both living and long dead.

“It was really interesting to compare the fresh specimens to the things we have in the collections at the National Museum of Natural History that are over 100 years old,” says Osborn. “We found the microfilm consistently on the specimens we looked at . . . It gives us the diversity that you can’t get from anywhere else. Smithsonian’s historical collections come into play for a lot of studies.”

Chaitra. C. T
I B. Sc ‘B’ sec

DESERT TORTOISE: RESOURCEFUL REPTILES

Over view: Five eggs the size of Ping-pong balls crack open as the tiny Desert Tortoise inside breaks through the shells.

The two-inch-long babies immediately crawl, off in search of flowers and grass to eat. These animals may be newly hatched but they already have survival skills that will allow them thrive in their harsh, sizzling -hot habitats.

Burrow Builders:

Desert Tortoise live in the desert of the southwestern United states and Northwestern Mexico. During the summer ground temperature in parts of their range can hit 140°F. To beat the heat, desert tortoise uses their strong forearms and tough nails to dig underground burrows where they can hide from the sun. Some of these tortoise tunnels are up to 32feet in length. And the burrows can get pretty crowded. As many as 25 desert tortoise might bunk together in one shelter.

The animals also dig grooves into on the grounds surface to catch rainwater. After a storm, they will return to these holes to slurp up the water that's collected inside. Once it's had a good drink. A desert tortoise can go up to a year without requiring fresh water again. The Reptile stores the water it has consumed in its bladder and can later absorb the liquid when it needs to hydrate.

Tortoise Tussle:

Despite sometimes hanging out in burrows, they together are pretty solitary and sometimes when males come across each other, they will fight to establish dominance. The dueling duo may use horns on their chests to try and knock each other over. The contest ends when one animal flips the other on its back.

The losing tortoise can turn right side up by wiggling its body back and forth until it flips over. But after that the tortoise knows who's the boss.

Sounds like a Tortoise's shell isn't the only thing about it that's taught!

Shridhar. M. N and
Sumukh Babu. V
I B. Sc ‘B’ sec

STICK INSECT: TRICKSTER LOOKS LIKE A TWIG!!!

A tree stands in a forest under a cloudy sky. Suddenly it appears as if a twig is crawling down the trunk. The object isn't actually a twig that's a spring legs- It's a Stick Insect. The Stick like trickster uses its appearance to protect itself from enemies so it doesn't end up in, well a sticky situation.

FOOLING MECHANISM:

Stick insect also known as Walking Sticks live in tropical and temperature forests all over the world. These are alike of grasshoppers, crickets and mantises but their creepy crawlies are usually brown, green or black. They are also world's longest insect. The largest one was ever found stretched 22 inches with the legs extended.

This bug spends much of its time in trees, marching on leaves. When predators such as birds approach, the insects try to remain completely still in order to blend with the branches. If a predictor isn't fooled and grabs the bug by the leg, it's no big issue at all. The insect can detach the leg and scuttle away.It will late regenerate or grow back the last limb

About 3000 species of stick insects exist and some are master mimies even before they hatch. The females from that species lay eggs that look like plant seeds and this presents carnivore's insects from eating the eggs and hence cralwer really known for their undercover business and marketing.

Shridhar. M. N and
Sumukh Babu. V
I B. Sc 'B' sec

NERVOUS SYSTEM PUTS THE BRAKES ON INFLAMMATION

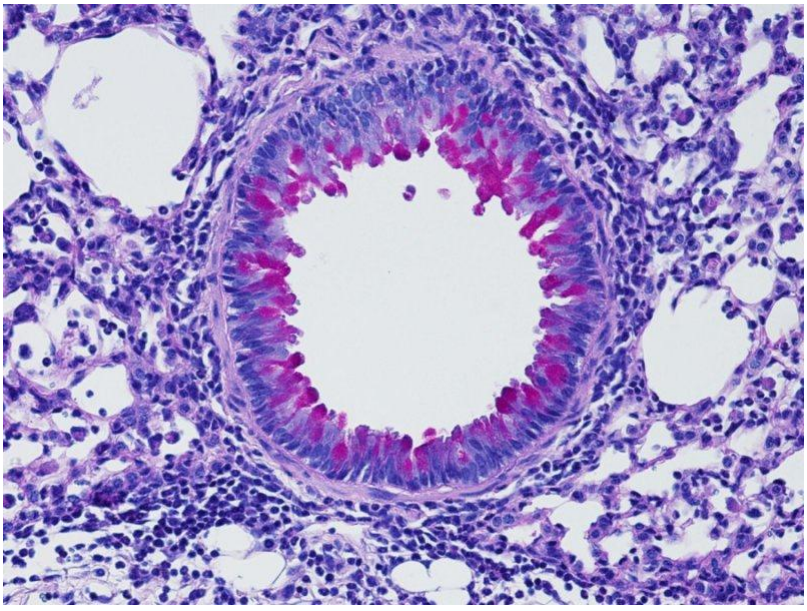
Date: March 2,2018
Source: Weill Cornell Medicine

Cells in the nervous system can "put the brakes" on the immune response to infections in the gut and lungs to prevent excessive inflammation, according to research by Weill Cornell Medicine scientists. This insight may one day lead to new ways to treat diseases caused by unchecked inflammation such as asthma and inflammatory bowel disease.

The study, published March 1 in science provides some clues about what might be going wrong in these diseases, which have become more common in industrialized countries and in helminth infections, which are still a major public health problem in less industrialized countries. It also may explain how some existing countries. It also may explain how some existing countries treatment for diseases like asthma work and point to new treatment strategies.

"There is a crosstalk between the nervous system and the immune system, and that plays an important role in regulating acute and chronic inflammation", said Dr. David Artist." Those two organ systems are closely interacting and play an important role in human health and disease."

For their study Dr. Artis and his colleagues examined communication between the nervous system and immune system during the kind of inflammatory response that is trigged by allergens or infections with parasites called helminths. Exposure to these agents causes a class of immune cells called group 2 innate lymphoid cells (ILC2) to release inflammatory molecules called cytokines that can promote increased mucus production and muscle contractions all of which help to expel the parasite or allergen from the body.



ILC2s have receptors on their surface called beta2 adrenergic receptors (beta2AR) that interact with a chemical called norepinephrine that nerve cells release. These receptors give nerve cells the ability to interact with each other and influence the immune response. To determine the role of beta2AR in communication between two systems, Dr. Artis and his colleagues employed mice that lack the receptor and then infected them with helminthes.

If these results are confirmed in humans it could have very important implications for patients with asthma, allergies and other type of inflammatory diseases.

The most commonly used drugs to treat asthma also stimulate beta2AR, which may explain why they are so effective at controlling allergy symptoms. “We must have given tens of millions of doses of these drugs to shut down the acute symptoms of asthma”, Dr. Artis said “nobody could agree on how these drugs work, but it may be that they are working in part through targeting the innate immune system.”

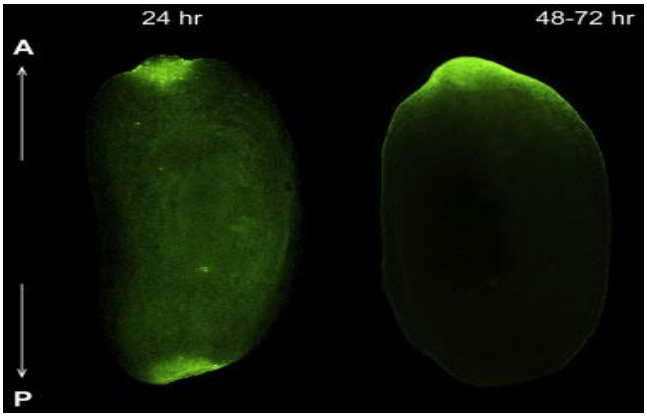
In this, the scientists discovering a new way to treat diseases. “If we understand more mechanistically how this class of drugs works” he added. “It might give us new avenues to develop additional therapies built around the biology.”

Dheeraj. S
I B. Sc ‘B’ sec

RECENT IDENTIFICATION OF AN ERK SIGNAL GRADIENT GOVERNING PLANARIAN REGENERATION

Abstract:

Planarians have strong regenerative abilities derived from their adult pluripotent stem cell (neoblast) system. However, the molecular mechanisms involved in planarian regeneration have long remained a mystery. In particular, no anterior-specifying factor(s) could be found, although Wnt family proteins had been successfully identified as posterior-specifying factors during planarian regeneration That is, planarian regeneration was supposed to be explained by a single decreasing gradient of the β-catenin signal from tail to head. However, recently we succeeded in demonstrating that in fact the extracellular-signal regulated kinases (ERK) form a decreasing gradient from head to tail to direct the reorganization of planarian body regionality after amputation.



The beginning of our quest to find such an anterior-specifying factor started from our comprehensive screening of *Dugesia japonica*for anterior-blastema-specific genes. However, we could not identify any such genes. Instead, our screening revealed genes that showed extensive activation in both the anterior and posterior blastema within 12–24 h after amputation (Tasaki et al., 2011a). One of them was the *mkp* (MAP kinase phosphatase) gene. It is known that its expression is activated by active MAP kinase to form a feedback loop, suggesting that MAP kinase may be activated during a very early stage of regeneration, just before the formation of either an anterior and or a posterior blastema. We next succeeded in demonstrating that signaling by ERK, one of the MAP kinases, is required not only for blastema formation but also for the transition of neoblasts from the stem cell state to the differentiating state (Tasaki et al., 2011a,b).

Next we focused on possible additional function(s) of MAP kinase, since the ERK signal was suppressed in the posterior blastema, but enhanced in the anterior blastema, from 48 h to 72 h after amputation. We therefore investigated how the ERK signal is suppressed at the posterior end, and found that the β-catenin signal has the ability to suppress the ERK signal at the posterior end. β-catenin-RNAi planarians maintained the ERK activity in their posterior blastema, resulting in ectopic head formation from the posterior blastema (Gurley et al., 2008; Petersen and Reddien, 2008; Hayashi et al., 2011). Interestingly, β-catenin-RNAi planarians also showed up-regulation of the ERK signal in the anterior blastema, suggesting that β-catenin

has the ability to suppress the ERK signal in general (Umesono et al., 2013). That is, the β-catenin signal may contribute to forming the decreasing ERK signal gradient from head to tail by forming a decreasing gradient in the opposite direction. This point is the most important finding of our research. Based on these findings, we proposed a default model as follows: the neoblasts can enter into the differentiating state after activation of the ERK signal and then start to differentiate into brain neurons as a default fate, but the β-catenin signal modulates their fate by suppressing the ERK signal (Umesono et al., 2013). This is one reason why no anterior gradient molecule(s) could be identified for a long time, although many researchers tried to do so.

The next question we addressed was how β-catenin is activated only in the posterior part of the body. Incidentally, we had already obtained the answer to this question (Yazawa et al., 2009). That is, we detected constitutive and ubiquitous expression throughout the body of the Hedgehog (Hh) receptor gene, *patched* (*ptc*), which is known to suppress *wnt* gene expression. Thus, *wnt* expression is normally suppressed in all regions of the planarian body through a *ptc*-mediated signal. When Hh binds to *ptc*, this suppression is reversed and the expression of *wnt* is activated. Interestingly, we found that the *hh* gene is transcribed in the central nervous system in planarians. Thus, if Hh-containing vesicles are normally transported from the (−) to the (+) ends of tubulin along the microtubules in the axons, Hh might be released at the posterior end of the axons when the body is transected, and then Hh would bind to *ptc* to activate *wnt* expression at the posterior end of the fragments after amputation. We speculate that this is the mechanism of the asymmetric activation of *wnt* genes in the posterior blastema.

As a next step, we are interested in the extent to which a similar system is used in other animals. When we inhibit planarian ERK signaling by inhibitor treatment or RNAi, the neoblasts cannot differentiate into any type of cells, even though they maintain their proliferative ability. Consequently, inhibitor-treated planarians cannot form a blastema, and thus lose regenerative ability (Tasaki et al., 2011a). Interestingly, this property can also be observed in mouse embryonic stem (ES) cells. That is, mouse ES cells treated with ERK inhibitors cannot differentiate into any type of cell and can be maintained in a pluripotent state when simultaneously treated with a GSK3 inhibitor (the so-called “2i condition”) (Ying et al., 2008). Now it has become popular to culture ES cells under the “2i condition” in order to prepare a homogeneous population of pluripotent-state cells. Therefore, it is possible to speculate that ERK signaling might have an important, conserved role in exiting from the pluripotent state of cells in various animals (Nakanoh et al., 2013). ERK inhibitor-treated hydra also show regeneration arrest (Manuel et al., 2006).

However, the reason for this regeneration defect is not so clear. Hydra has three distinct stem cell lineages, but we do not know whether all three lineages are affected by ERK inhibition. Further research on the function of ERK signaling in hydra regeneration will be necessary in order to clarify the generality of the role of ERK signaling in multicellular organisms.

Shridhar. M
I B. Sc ‘B’ sec

RESEARCH TEAM FINDS MOLLUSCS CHANGES AS IT AGES

Researchers from Britain's national oceanography center, South Ampton, working in the Antartic have discovered that a species of molluscs *Lissarca miliaris*, changes from male to female as it grows older. As the team describes in their paper published in the journal polar biology, the males harbour eggs when they are young then grow female sex organs as they grow older to allow for brooding.

Previous studies of the reproductive process of the mollusc had focused almost exclusively on the adult female and because of that had missed the hermaphrodite traits this team had discovered.

In studying young males, the team found out that they held within them, multiple eggs, more than they could very possibly brood as they are still quite small at that age. In looking at other specimens they found out that as the males grow older they grow female organs that allow for proper development of eggs and brooding.

The team suspects that the molluscs reproduce as the males, then switch over to being female when they are large enough to brood the huge numbers (upto 70) of young that have been produced. they also found that the male organs appear to hang around for some time after the female organs developed.

Mollusc part of a group of bivalves, hold their young inside their shells while brooding, a technique the researchers say in common in cold antartic climate, and other mollusc have been known to exhibit hermaphrodite features as well. Keeping the young inside requires less energy and souces to keep offspring alive while growing. The eggs are described as quiet yolky and the young develop quiet slowly.

The team theorizes that having the males produce eggs allows for the long time span, up to 18 months, it takes for the offspring to mature. Under such an arrangement, mating can occur when the mollusks are still very young, and then have room to develop as the male sex organs give way to female and the amount of room inside the shell grows. They also note that their findings show just how little is known about invertebrates living in the Antarctic and how much there still is to discover.

Srinivas P. M
I B. Sc ‘B’ sec

NEW INSIGHTS INTO HOW A VIRUS- BLOCKING BACTERIUM OPERATES IN MOSQUITOES

Wolbachia is associated with reduced replication of dengue, west Nile viruses and breakdown of their RNA.

Date: March 1, 2018

Source: PLOS

Summary: New research reveals details of the mechanism by which the bacterium wolbachia blocks viruses in mosquito cells, suggestion that it reduces viral replication inside cells and that rapid degradation of viral RNA is involved.

Professor Scott O'Neill, program director of the world mosquito program, led by Australia's Monash University, and colleagues report their findings in PLOS Pathogens.

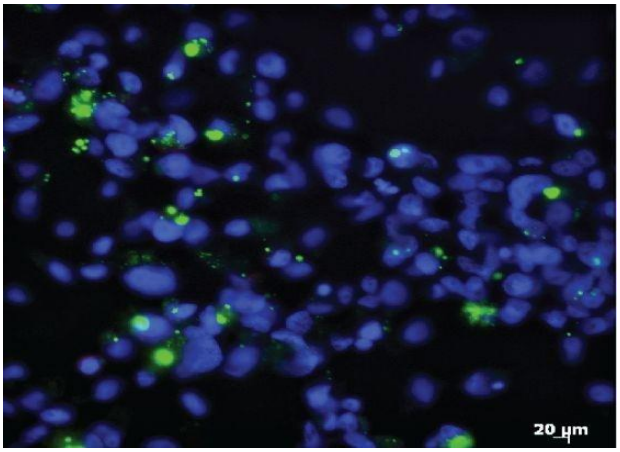
Wolbachia is known to lower mosquito's ability to transmit viral diseases, such as dengue, chikungunya and Zika, to humans, and scientists are testing whether deliberately infecting mosquito populations with Wolbachia can stop the spread of these diseases. However, the precise mechanism by which wolbachia blocks viruses in mosquitoes in unclear. Most investigations into virus blocking by wolbachia have focused on mosquito's response to the bacterium; instead, O'Neill and colleagues studied the effects of wolbachia on dengue and west Nile viruses themselves. They performed a series of each stage of viral infection in wolbachia-infected mosquito cells.

The researchers found no evidence that wolbachia inhibits the earlier stages of virus infection, which includes binding to the outside of a cell, followed by entry into the cell. Instead, the results suggest that the bacterium inhibits replication once dengue or west Nile virus is inside a mosquito cell.

The researchers found no evidence that wolbachia inhibits the earlier stages of virus infection, which include binding to the outside of a cell, followed by entry into the cell. Instead, the results suggest that the bacterium inhibits replication once dengue or west Nile virus is inside a mosquito cell. Reduced replication was associated with rapid degradation of viral RNA, and evidence suggested that a mosquito cellular protein called XRN1 may play a key role in this process.

Further evidence showed that the virus- blocking ability of wolbachia also depends on the initial dose of the virus and how fast it replicates; slowly replicating viruses like dengue are blocked more effectively than faster ones, such as west Nile. Dengue infection is increasing worldwide, with an estimated 400 million people infected every year.

While further research is needed to tease out more of the molecular details behind virus blocking by wolbachia, these new findings could help inform efforts to use the bacterium to prevent spread of disease.



“We now have a better understanding of the mechanism by which wolbachia inhibits replication of the dengue virus and leads to the degradation of viral RNA in the mosquito cell”, O’ Neill explains “This is an important step forward in deepening our understanding of the mechanistic basis of our approach to tackling the increasing global arbovirus burden”.

Chaithra. N
Kavya. N
Deekshitha. V
I B. Sc ‘H’ sec

THE MOLECULE BEHIND EVOLUTION

Evolution is the basic answer to all the questions we ask. The reason of why humans are different from other species or how life has arisen in this world. Great wanderers like Charles Darwin who initially believed in the existence of almighty later realizing the genetic difference between each and every individual came to a conclusion, that there is an external factor which is the reason for this and when he went on his voyage to the Galapagos Islands, he could see the variations among species. This he termed as genetic drift; where once the same species individuals have been separated due to natural conditions and now their progeny are so genetically apart that they cannot reproduce with each other.

Example: Marsupials of Australia. They all share a common ancestor, but now due to various biotic and abiotic stress/ factors have become apart.
So, this makes us wonder, if a single species due to various reasons can give rise to various other interspecies which cannot reproduce with each other, then there might be a common ancestor for all of us. So we come back to the origin of life, thus we come to understand the chemical evolution. Thus we come back to coacervates: macromolecules synthesized abiotically in primitive oceans. Later protobionts found by oparin and proteinoids by fox talk about a polymer amino acid molecule which can be said as the first form of life.

The first cell which arose from the primitive ocean is a protocell, which had the properties of self-replication and nucleoproteins. Thus which can be called the actual first cell. The virus can be explained by this, how wheb few nucleoproteins are absent they become inactive. Thus started the biggest debate of the century, which is, what is the main molecule which gives rise to life. From Rna world to now confirming it as DNA, with this new self-replicating protein changes the whole equation. Making this the predecessor of the molecule which might be the reason of origin of life.

Amyloids: Which were first considered as a threat protein as its observed in a dangerous disease like Parkinson and Alzheimer, Now the discovery by ETH Zurich talks how it plays the role of building blocks of life.
In my opinion, this is one of the out breaking and view changing research, as if we break down any form of life, proteins can he observed thus making it a necessity for terming an organism living or not. Even the lowest of lowest form have some form of protein in them, this can also work for virus and viroids, as they also contain proteins.
Unlike the Rna World Hypothesis, this can be very likely, as Rna id highly reactive whereas proteins are not and are stable in themselves. Thus this amyloids which can be seen with all criteria needed for replication plays a major role in life replication and sustainability.
Whats the use of knowledge about how evolution has occurred or how life began, well it will help us find the cure and reasons for our survival and find the origin of life-threatening diseases.

Hurshitha
Vasudevan
I B. Sc ‘I’ sec

COMPASSION HELPED NEANDERTHALS SURVIVE

NEUROSCIENCE NEWS MARCH 14, 2018

Summary: Compassion and helping care for their injured may have been key to Neanderthal survival, researchers report.

Source: University of York.

ABSTRACT

Calculated or caring? Neanderthal healthcare in social context

Explanations for patterns of healed trauma in Neanderthals have been a matter of debate for several decades. Despite widespread evidence for recovery from injuries or survival despite impairments, apparent evidence for healthcare is given limited attention. Moreover, interpretations of Neanderthals' approach to injury and suffering sometimes assume a calculated or indifferent attitude to others. Here the authors review evidence for Neanderthal healthcare, drawing on a bioarcheology of care approach and relating healthcare to other realms of Neanderthal social life. The authors argue that Neanderthal medical treatment and healthcare was widespread and part of a social context of strong pro-social bonds which was not distinctively different from healthcare seen in later contexts. They suggest that the time has come to accept Neanderthal healthcare as a compassionate and knowledgeable response to injury and illness, and to turn to other questions, such as cultural variation or the wider significance of healthcare in an evolutionary context.

ARTICLE

They have an unwarranted image as brutish and uncaring, but new research has revealed just how knowledgeable and effective Neanderthal healthcare was.

The study, by the University of York, reveals that Neanderthal healthcare was uncalculated and highly effective – challenging our notions that they were brutish compared to modern humans.

The researchers argue that the care provided was widespread and should be seen as a "compassionate and knowledgeable response to injury and illness." It is well known that Neanderthals sometimes provided care for the injured, but new analysis by the team at York suggest they were genuinely caring of their peers, regardless of the level of illness or injury, rather than helping others out of self-interest.

Lead author, Dr. Penny Spikins, senior lecturer in the Archaeology of Human Origin at the University of York, said: "Our findings suggest Neanderthals didn't think in terms of whether others might repay their efforts, they just responded to their feelings about seeing their loved ones suffering." Most of the individual's archaeologists know about had a severe injury of some kind, with detailed pathologies highlighting a range of debilitating conditions and injuries. In some cases the injuries occurred long before death and would have required monitoring, massage, fever management and hygiene care, the study suggests.

Analysis of a male aged around 25-40 at time of death revealed a catalogue of poor heath, including a degenerative disease of the spine and shoulders. His condition would have sapped his strength over the final 12 months of life and severely restricted his ability to contribute to the group.

Neanderthals were genuinely caring of their peers. Yet, the authors of the study argue he remained part of the group as his articulated remains were subsequently carefully buried.

Dr Spikins added: “We argue that the social significance of the broader pattern of healthcare has been overlooked and interpretations of a limited or calculated response to healthcare have been influenced by preconceptions of Neanderthals as being ‘different’ and even brutish. However, a detailed consideration of the evidence in its social and cultural context reveals a different picture.

“The very similarity of Neanderthal healthcare to that of later periods has important implications. We argue that organised, knowledgeable and caring healthcare is not unique to our species but rather has a long evolutionary history.”

ABOUT THIS NEUROSCIENCE RESEARCH ARTICLE

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Publisher: Organized by NeuroscienceNews.com.

Original Research: Open access research in World Archaeology.

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ARTICLE REVIEW

Title: The article presents the reader with a simple and evocative title, "Compassion helped Neanderthals survive", which claims to answer a highly debated question, did the Neanderthal, our closest non-human relative, process emotions like we do? Did that help in their survival?

Abstract: The abstract of the scientific paper claims to add credibility to a less popular theory, which states that Neanderthals were capable of offering healthcare, and by extension, compassion, within their societies. The prevailing thought was that Neanderthals largely sported an indifferent or uncaring attitude towards their injured or diseased members of society. However, through extensive research and the application of bioarcheology, the authors seem to have obtained evidence to the contrary. The abstract is well worded and engages the reader’s curiosity.

Main Article: Lead author, Dr. Penny Spikins, senior lecturer at the University of York, and her team of researchers performed a detailed analysis on a Neanderthal male aged around 25-40 at time of death with a degenerative disease of the spine and shoulders, and poor health in

general. He was found buried carefully and articulately, showing that he remained part of the group and earned a respectful burial even though his debilitating disease would have prevented him from contributing to the group.

Thus, the team has concluded that the Neanderthal was taken care of and supported by his social group all the way up until the time of his death, showing an early form of healthcare. While it was previously assumed that Neanderthals would not offer help or support when there was nothing to be gained, this research presents the possibility that they may have acted out of sheer compassion to a member of their society.

To the average reader, the article poses some interesting questions and considerations. Neanderthals are often misattributed to be more related to Apes than Humans. The public belief is that these early human-like creatures were devoid of intelligence and complex feelings, and were brutish and instinctual like other animals. This article however, asserts that this viewpoint should be changed, that humans were not the only species that evolved to be compassionate and intelligent, and that our distant yet surprisingly close relatives, the Neanderthals, may very well have exhibited this trait as well.

Conclusions - The article offers a very informative insight into a hotly debated topic of archaeology, learning more about the sociology, biology, and psychology of Neanderthals could have broad effects on our understanding of humankind and human history as well. While the article is lacking in some scientific detail, like elaboration on the research methods used, it achieves its goal effectively on informing the reader about one of the many surprising new advancements in zoo archaeology, in this case Dr. Spikins's research, which seeks to broaden our knowledge and perception about ourselves and our extinct, but biologically and sociologically close relatives.

Vignesh. S
I B. Sc 'I' sec

WHY MARINE ANIMALS CAN'T STOP EATING PLASTIC

By Josh Gabbatiss

Plastic doesn't just look like food, it smells, feels and even sounds like food.

In a recent interview about Blue Planet II, David Attenborough describes a sequence in which an albatross arrives at its nest to feed its young.

"And what comes out of the mouth?" he says. "Not fish, and not squid – which is what they mostly eat. Plastic."

It is, as Attenborough says, heartbreaking. It's also strange. Albatrosses forage over thousands of kilometers in search of their preferred prey, which they pluck from the water with ease. How can such capable birds be so easily fooled, and come back from their long voyages with nothing but a mouthful of plastic?

It's small comfort to discover that albatrosses are not alone. At least 180 species of marine animals have been documented consuming plastic, from tiny plankton to gigantic whales. Plastic has been found inside the guts of a third of UK-caught fish, including species that we regularly consume as food. It has also been found in other mealtime favorites like mussels and lobsters. In short, animals of all shapes and sizes are eating plastic, and with 12.7 million tons of the stuff entering the oceans every year, there's plenty to go around.

Even in the most remote areas of the open ocean, plastic flotsam can be found, with far-reaching consequences for marine life (Credit: BBC 2017)

"Animals have very different sensory, perceptive abilities to us. In some cases they're better and in some cases they're worse, but in all cases they're different," says Matthew Savoca at the NOAA Southwest Fisheries Science Center in Monterey, California.

One explanation is that animals simply mistake plastic for familiar food items – plastic pellets, for example, are thought to resemble tasty fish eggs. But as humans we are biased by our own senses.

To appreciate animals' love of plastic, scientists must try to view the world as they do.

Humans are visual creatures, but when foraging many marine animals, including albatrosses, rely primarily on their sense of smell. Savoca and his colleagues have conducted experiments suggesting that some species of seabirds and fish are attracted to plastic by its odor. Specifically, they implicated dimethyl sulfide (DMS), a compound known to attract foraging birds, as the chemical cue emanating from plastic. Essentially, algae grows on floating plastic, and when that algae is eaten by krill – a major marine food source – it releases DMS, attracting birds and fish that then munch on the plastic instead of the krill they came for.

Even for vision, we can't jump to conclusions when considering the appeal of plastic. Like humans, marine turtles rely primarily on their vision to search for food. However, they are also thought to possess the capacity to see UV light, making their vision quite different from our own.

Qamar Schuyler at The University of Queensland, Australia, has got into turtles' heads by modelling their visual capabilities and then measuring the visual characteristics of plastics as turtles see them. She has also examined the stomach contents of deceased turtles to get a sense of their preferred plastics. Her conclusion is that while young turtles are relatively indiscriminate, older turtles preferentially target soft, translucent plastic. Schuyler thinks her results confirm a long-held idea that turtles mistake plastic bags for delicious jellyfish.

Color is also thought to factor into plastic consumption, although preference varies between species. Young turtles prefer white plastic, while Schuyler and her colleagues found that seabirds called shearwaters opt for red plastic.

Every year, around 8 million metric tons of plastic waste enters the ocean (Credit: BBC 2017)

Besides sight and smell, there are other senses animals use to find food. Many marine animals hunt by echolocation, notably toothed whales and dolphins. Echolocation is known to be incredibly sensitive, and yet dozens of sperm whales and other toothed whales have been found dead with stomachs full of plastic bags, car parts and other human detritus. Savoca says it's likely their echolocation misidentifies these objects as food.

Because plastic has something for everyone. It doesn't just look like food, it smells, feels and even sounds like food. Our rubbish comes in such a range of shapes, sizes and colors that it appeals to a similarly diverse array of animals, and this is the problem.

My View about the article

It's been a well-known issue and an existing threat "the Pollution" created by humans and gifted back to mother earth. I am very familiar with all sorts of pollution created by us on land and ocean by different means. But when I heard of Plastics eaten by many marine species as food it was really heart breaking and strange news. I would strongly urge and demand the government, NGO's and other policy makers to make strong policies to ban the usage of plastics all across the world. With this also people should turn against the disposable plastics and have empathy towards these animals. Ultimately this should help to cut off the supply of junk food pouring into the oceans.

Yoganand. C
I B. Sc 'I' sec

EARTH IS ON BRINK OF SIXTH MASS EXTINTION

This article was published on June 2, 2017 in 'The Times of India, Bengaluru.

According to the history and statistical studies scientist estimate that earth has undergone 5 mass extinction

The mass extinction periods

1. Ordovician- Silurian extinction: The third largest extinction in earth's history during the Ordovician, most life was in the sea so it was in the sea, so it was sea creatures such as trilobites, brachiopods and graptolites that were drastically reduced in number
2. Late- Devonian mass extinction: Three quarters of all species on earth died life in the shallow seas were the worst affected
3. Permian mass extinction: It has been nicknamed The great dying since a staggering 96% of species died out. All life on earth today is descended from the 4% of species that survived
4. Triassic- Jurassic mass extinction: Climate change, flood basalt, eruptions and an asteroid impact have all been blamed for this loss of life
5. Cretaneous- tertiary mass extinction: It is also known as the K/T extinction it is famed for the death of dinosaurs including the ammonites many flowering plants and the last of the pterosaurs.

Now humans are bringing about the sixth mass extinction of life on earth mass extinction of life on earth according to scientists writing in a special edition of the leading journal nature the growing human population which has increased by 130% in the last 50 years and is set to rise tomore than 10 billion by 2060 and our increasing demand for resources as we become wealthier is ramming up the pressure on the natural worlds

Tens of thousands of species including 25% of all mammals and 13%of birds are now threatened with extinction because of over hunting poaching, loss of habitat, the arrival of invasive species and other human caused problems

In one of a series of papers in nature a team of international scientists wrote. “Human influenced extinctions began when modern humans moved out of Africa” it said successive waves of extinctions in Australia (50,000 years ago), north America and south America (10,000 to 11,000 years ago) and Europe (3000 to 12,000 years ago) were driven largely by a combination of hunting by humans and natural climate change by 3000 years ago, earth had lost half of all terrestrial mammalian megafauna species and 15% of all bird species

The researchers said that since 1500AD human destruction of wild life had accelerated. It said “urgent” action was needed to entrust “sufficient habitats will remain to preserve the viability of species in the long term and to guarantee that such habitats are well managed”

Sahana. J. K
II B. Sc ‘B’ sec

PROGERIA: A YOUNG OLD MAN

The title is actually an oxymoron.

Can u think of a 12-year-old kid with a body of a 60-70-year-old?

Sounds impossible, but the fact is that it can happen in reality. Progeria is a rare autosomal dominant genetic disorder in which symptoms resembling ageing are manifested at a very early age. Progeria is one of several progeroid syndrome. It is also called Hutchinson-Gilford progeria syndrome (HGPS).

Symptoms of this syndrome appear during the first few months of life. Limited growth, hair loss, distinctive appearance are all characteristics of progeria. Later, the condition worsens due to wrinkled skin, atherosclerosis, kidney failure, loss of eyesight and so on. Due to these complexities those born with progeria typically live to their mid-teens to early twenties.

Speaking about the cause of progeria most children with progeria have a mutation on gene LMNA that codes for lamin A, a protein that holds nucleus of a cell progerin. In 2003, the cause of progeria was discovered to be point mutation in position 1824 of LMNA gene in which cytosine is replaced by thymine. The defective protein is thought to make nucleus unstable. This instability makes the cells more likely to die younger, leading to the symptoms of progeria. There is no usual family history, but if there is already one child in the family with progeria, 2-3% chance are there that the other sibling may acquire it to.

Statistics reveals that around the world, 134 children are thought to have progeria across 46 countries. It is believed to affect one in every 4 million new borns of both sexes and all ethnicities.

There is no cure for progeria, but occupational and physical therapy can help the child keep moving if their joints are stiff. Heart health is important for them so doctors prescribe statins, nitro-glycerine etc.,

Sun screen is important for protecting the skin. Apart from these eating healthily and getting regular exercise are must.

The cause of progeria is recently being understood but active research is going on about this matter. One possible treatment is “farnesyltransferase inhibitors (FIT’s)”. in 2014, a study indicated the an FTI known as ‘lonafarnib’ may increase the lifespan by an average of 1.6 years. Studies about progeria may also give an insight into ageing process.

To end with a positive note, we expect that very soon treatments to combat this disorder is discovered so as to stop a child from dying as a 80 year old even though he is just 12 year old.

T. Akhila Rao
II B. Sc ‘B’ sec

GENETICALLY MODIFIED COWS PRODUCE 'HUMAN' MILK

Research at:

- The state key laboratories for Agro Biotechnology at the China Agricultural University.
- Beijing GenProtein Biotechnology Company

Head of the Research: Prof. Ning Li

	Human Milk (g/l)	Bovine Milk (g/l)
Casein	2.5	27.3
Whey protein	6.4	5.8
α-Lactalbumin	2.6	1.1
Lactoferrin	1.7	trace
ß-Lactoglobulin	–	3.6
Lysozyme	0.5	trace
Serum albumin	0.5	0.4
Immunoglobulin A	1.0	0.03
Immunoglobulin G	0.03	0.6
Immunoglobulin M	0.02	0.03

Scientists have created genetically modified cattle that produce "Human" Milk in a bid to make cows' milk more nutritious.

They have successfully introduced human genes into 300 Dairy cows to produce milk with the same properties as human breast milk.

Human milk contains high quantities of key nutrients that can help to boost the immune system of babies and reduce the risk of infections. Prof. Ning Li who leads the research and Director of State Key Laboratories for Agro Biotechnology at the China Agricultural University insists that the GM milk will be safe to drink as milk from ordinary cows. He also says the milk tastes stronger than the milk.

The researchers used cloning technology to introduced human genes into DNA of Holstein Dairy Cows. Before the genetically modified embryos implanted into surrogated cows.

In the scientific pear – review journal public library of science, one of the researchers said, they were able to create cows that produced milk containing a human protein called "Lysozyme" which is an antibacterial protein naturally found in large quantities in human breast milk. It protects the infants from bacterial infections during their early days of life.

They also created cows that produce the protein 'lactoferrin (present in human milk), which helps to boost the number of immune cells in babies. The third human protein Alpha-lactalbumin which helps in several physiological functions in the neonatal period and it is discovered to have anti-infective activity and enhances apoptosis. It is also revealed that the milk fat content is boosted by around 20% and the levels of milk solids have also changed making it closer to human milk composition having the same immune boosting properties.

The transgenic animals are physically identical to ordinary cows. They have managed to produce 3 generations of GM Cows for commercial productions, whose human – like milk with high nutritional content.

They hope the GM Dairy products from herds could be sold in super markets and thus could financially support a major biotechnology company.

Critics of Technology and animal welfare group are reacting angrily to the research and questioning the safety of milk from GM animals and its effect on cattle's health. Because in the two experiments conducted by the researches has resulted in 42 transgenic calves being born, of which only 26 survived and later within short duration 10 more calves were dead. Due to gastrointestinal disease and further 6 calves die within six months of birth. Thus the royal society for the protection of animals are extremely concerned of how the GM cows are produced because of the offspring suffering health and welfare problems. Ethically also there are issues about mass producing animals in this way.

Prof. Keith Campbell who works with transgenic animals says "GM animals and plants are not going to be harmful unless you deliberately put in a gene that is poisonous and GM food if done correctly can provide huge benefits for consumers in terms of producing better products.

ARGENTINE TEAM:

A cloned cow named Rosita ISA, born on April 6th and delivered by caesarean section was roughly twice (100 LBS) the normal weight of a Jersey cow is the first bovine born in the world that incorporates two human genes (protein lactoferrin and lisozyne) that contains proteins present in the human milk

Arun D. N
Chitra. K
II B.Sc 'B" sec

HOW A YEAR IN SPACE ALTERED HIS D.N.A.

Mark & Scott Kelly

On March 2016, NASA astronauts Scott Kelly returned to earth after historic 340 days on the international space station a changed man – his time in orbit had permanently altered a part of his DNA.

Scott Kelly is the first American to spend 12 consecutive months in orbit, he spent a total of 520 days in space during his NASA carrier and retried from space agency in 2016.During his time on the ISS, Scott took part in the study with his twin brother Mark on earth. The brothers provided blood saliva and urine samples, underwent ultrasounds and bones scans and more, all in the name of science. The researchers confirmed the studies preliminary findings which revealed the that part of Scotts genetic makeup actually changed during his year on the orbiting space lab.

In particular scientists highlighted the presence of the so called “space gene” in Kelly and said that 93% of his gene returned to normal after landing. However, the remaining 7 % point to possible long term changes in genes related to immune system, DNA repair, bone formation network, hypoxia (oxygen deficiency in tissues resulting in organ damage) and hypercapnia (excessive carbon dioxide in the blood stream which is harmful for the respiratory system). During a recent interview they explained his microbiome, the bacteria that live inside him also have altered dramatically during his year in space.

Scientists also identified significant change in telomeres (the caps at each strand of DNA that protect a chromosomes). The telomeres in general get shorter as a person ages but Kelly’s has got longer and they reported that most of his telomeres shortened after two days of his return to earth. He also experiences a temporary weight gain in space. There was a pronounced decreased in speed and accuracy for Scott, possibly due to re-exposure and adjustment to earth gravity.

These findings are extremely useful for NASA’s human research programme which aims to keep astronauts healthy in space.

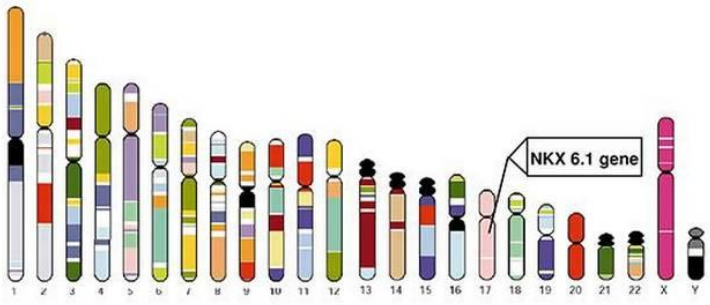
Aiswaria. P
II B. Sc ‘B’ sec

GENE FOR RARE FORM OF DIABETES FOUND

This article was published in **The Hindu** on the 28th February 2018.

A team of researchers in Chennai have isolated a gene that causes a rare form of diabetes called **Maturity Onset Diabetes of the Young(MODY**). This is the new addition to the earlier known 14 gene variations that cause MODY and could advance the emerging field of precision.
Diabetes involves disruption of blood sugar in check by the hormone insulin. In Type 2 diabetes, many genes and environmental factors play a major role in the disruption in the blood sugar level. In MODY, if one gene is defective, it hampers the body's insulin usage and may lead to Type 2 diabetes.
Non obese children are many times diagnosed with Type 1 diabetes as they have elevated blood pressure and treated with insulin leading to poor control of blood sugar.

Position of the novel MODY gene(NKX6.1) in the entire set of human chromosomes



Some forms of MODY can be treated with **Sulphonyl urea**, and inexpensive drug. “It works well on patients, especially a game changer in the age group of 14-21 and improves the quality of life” says V Mohan, President, Madras Diabetes Research Foundation.

Table 1: Common forms of MODY

Classification	Gene mutation	Comments
MODY 1	HNF 4 alpha	Responsive to sulphonylureas. May later need insulin
MODY 2	Glucokinase	Often asymtomatic. Low risk of complications. May not require treatment
MODY 3	HNF 1 alpha	Most common form of MODY in the UK. Responsive to sulphonylureas
MODY 5	HNF 1 beta	Associated with renal cysts, uterine abnormalities, gout. Tends to develop later than other forms of MODY

Type 1 diabetes usually mistaken for MODY is not gene-dependent, hence cannot be inherited. Running the MODY gene test, first for the common forms, and if they are negative, testing for the rare ones are the next ones to be taken. In a paper published in BMC Medical Genetics journal, researchers outlined that variants of NKX6-1 gene found in MODY patients were 'functionally impaired'. Study was

carried out by MDRF in collaboration with the scientists from Genentech, California and Med Genome, India. Of the 14 MODY genes already identified largely from European studies, MODY 1-3 are the most common. Radha Venkatesan, heading Molecular genetics wing at MDRF states that after testing for MODY 1-3, they were the causative factor in only 11% of the cases. They found four other variants in RFX6, WFS1, AKT2, NKX6-1 which may contribute to MODY. Further assessment showed that NKX6-1 was impaired.

Study carried out was based on a comprehensive genomic analysis of 289 individuals from India that included 152 MODY cases and 137 patients without diabetes. Latter showed no genetic variants with MODY.

The costs: Currently cost of testing is pretty high. While cost of testing each gene is about Rs 3000, the costs for the entire MODY genetic panel is around Rs 18000.

My views:

Though the cost of testing is very high, I feel in the years to come this gene can be used extensively for treating the Maturity Onset Diabetes for the Young.

In the recent years, a lot of people seem to suffer from obesity further leading to diabetes and other health ailments. This is due to the change in the food habits, i.e., in earlier days' people used to consume a lot of greens and fruits, but now in recent times people are going in search for junk as a better option than healthy food. Little do they realize that they are digging their own grave by consuming this kind of food which have a lot of cholesterol, artificial agents, fatty acids, etc. Second factor is the lifestyle. In the present tech world, everyone is so busy to even get out of their house and exercise and keep themselves fit. Adding to that, there are machines to do each and every task thus counting down the amount of work to be done and this leads to a human being becoming lazier day by day.

The present day children should wake up before it is too late and choose healthier options, change their lifestyle so that they keep away from these ailments and also before they become a prey to the pharmaceutical world or the medicine world.

Panchami. P
II B. Sc 'B' sec

ARTIFICIAL KIDNEY- Different Approach

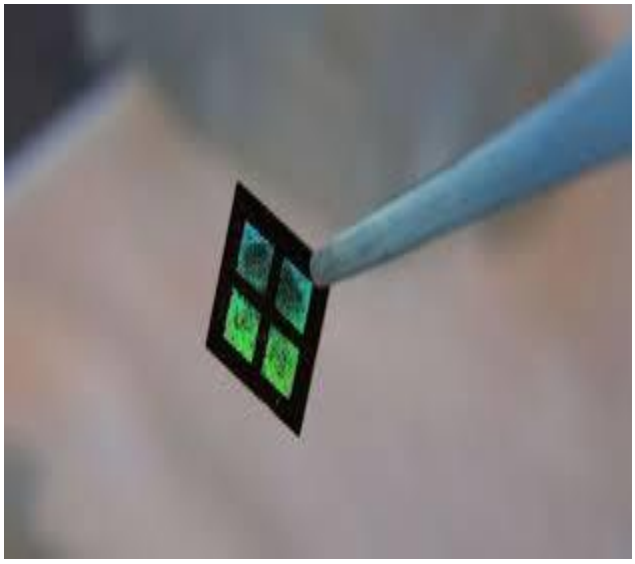
Have you heard of the word DIALYSIS off course one or the other way one must have heard about it. So let's take the scientific approach towards this - it is a process of purifying the blood of a person whose kidneys are not working properly.

CELLULOSE LAYER USED IN DIALYSIS INSTEAD PF PHOSPHOLIPID BILYAER USED BY KIDENYS.

A KIDNEY DIALYSER - USED IN HEMODIALYSIS

ARTIFICIAL KIDNEYS are often seen as synonym of Dialysis but it does have something which we might not know. This article deals with bio-engineered kidneys that are grown from renal cells or renal tissue.

Dialysis can be a tough process for a person who is suffering. We are moving towards a new hope of ray that is ARTIFICIAL KIDNEY being developed by nephrologist named William H. Fissel IV M.D. from the Vanderbilt University Medical Center. The goal of this project is to develop a bio-hybrid device that can imitate the function of healthy kidney which is being done by Dialyzer commonly for kidney patients. The most unique approach towards that use of nanotechnology and the microchip which is precious and can act as a normal filter.



PROCESS OF ARTIFICIAL KIDNEY HOW IT WOULD WORK IN FUTURE

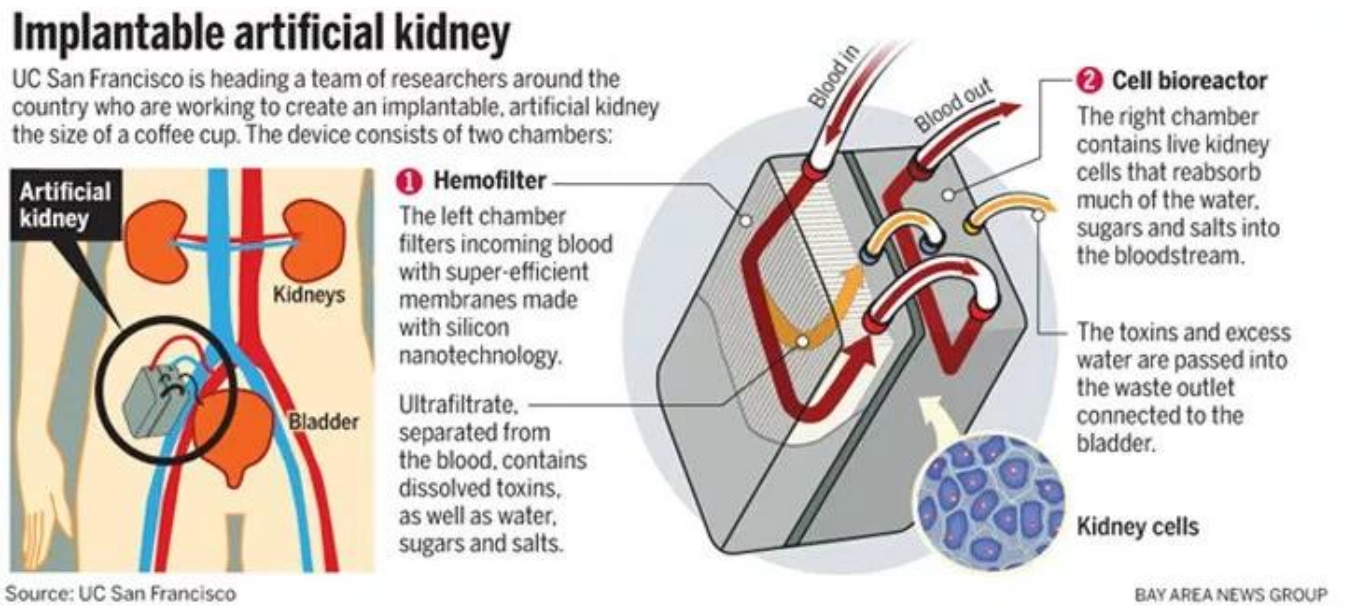
THE MICROCHIP HAVING LIVING CELLS IMITATING NATURAL FUNCTIONS OF KIDNEY

It's about size of a coffee mug. Generally, it will have two main units

1. Filtering unit- uses silicon membrane with nanopores to form the blood.
2. Bioreactor unit- this unit has living kidney cells inside it.

Each nanopore of the artificial kidney will perform a specific function. Living cells residing on microchip will behave or We should say they will imitate the natural functions of natural kidney.

The bio-hybrid system of the device will not be in direct contact with immune system of the body so won't be any chance of rejection of introduction of this kidney by the patient's body. This will be designed in such a way that it will fit inside the body of the patient leading to successful operation with patient's natural blood flow. The progress in this field continues to grow enormously and the Fissel and his team continue to make progress and they were expecting the implantable artificial kidney would enter in human trials in 2017 but as it seems now it will take a little more time to come and give the results in expected way.



CONCLUSION-

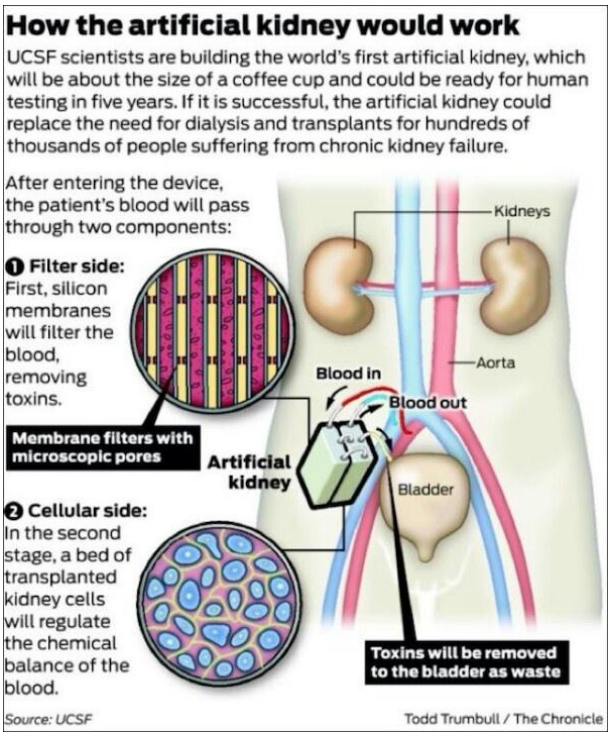
- There are number of researches going on in this field till now and artificial kidney is not the only one which is being looked forward but there are plenty to name them

1.Implantable artificial kidney
2.Wearable artificial kidney

3.Implantable Renal Assist Device

- If things work out in favor of the research, then as experts say "THE IDEA IS TO FREE PATIENTS FROM DIALYSIS FOREVER"
- Despite of all the positive effects it is showing there are drawbacks for this also, it remains a holy grail of renal tissue engineering as this research is still limited to only laboratory and has not reached out to medical centers as far as testing is concerned that has been done but still the patients remains deprived of this for not being approved by the authorities but because of few loopholes also which has to be kept in mind while working on this.

However, progress in cryopreservation (process of cooling and storing cells, tissue or organs at very low temperature to maintain their viability) is seen thus making a pathway for manufacturing, storing and distributing bio artificial organs which includes artificial kidneys as well. We can expect quantum advances in renal tissue engineering.



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

NEW ARCHEOLOGICAL DISCOVERIES

Fantastic new burial in Greece

The tomb of a warrior who was killed by the slice of a sword has already been discovered in Greece. Four other people were buried with the warrior five people were buried with gold and silver rings, ivory-handled swords, a gold decorated dagger and many other artifacts.

13 Dead sea scrolls cave

In 2017, a new dead sea scrolls cave was found near the site of QUMRAN. The cave had been plundered in the 1950s or 1960s, but archeologists found a blank scroll when they excavated it. This survey is being carried out as a part of a larger project by the Israel Antiquities Authority. The IIA is racing to identify and excavated any caves in the Judane desert that may contain archaeological remains.

Valley of the kings

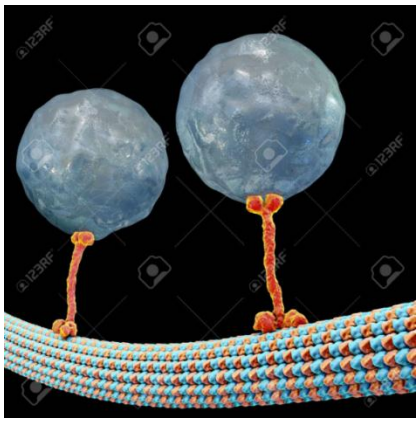
Archeologists had identified an area near the tomb of the Pharaoh ay that has four foundation deposits and a radar reading that could indicate the presence of a tomb. Another group of archaeologists has carried out surveys of western part of the valley of the kings. Another team from university of Basel in Switzerland.

is currently analyzing and publishing the finds from KV-40,a tomb in the valley of kings where dozens of mummies were discovered.

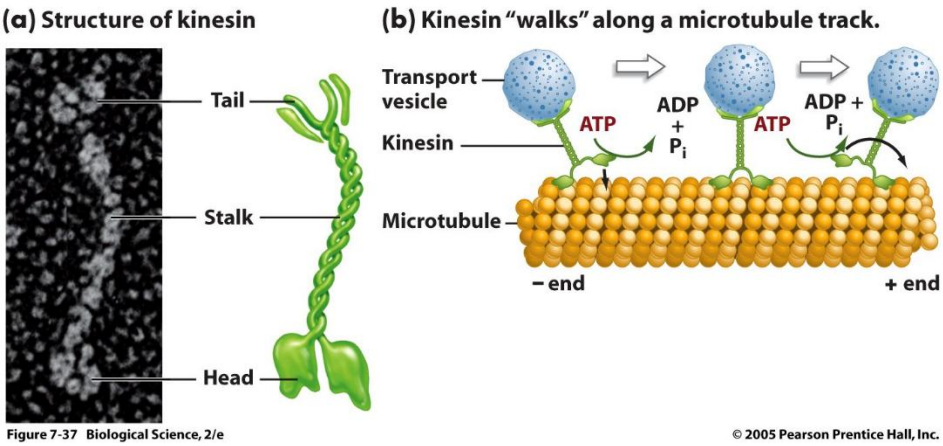
Shilpa. E. Naik
II B. Sc ‘B’ sec

HOW FATS ARE REGULATED

Source of information: Deccan herald, spectrum, March 13, 2018.



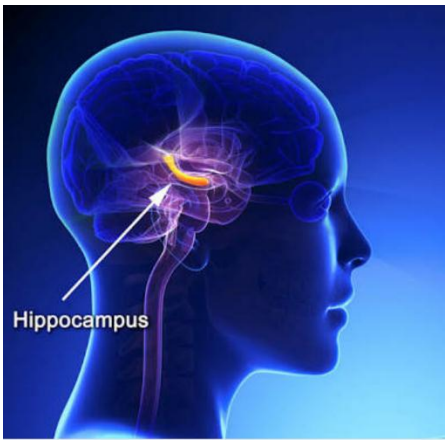
A bar of chocolate is irresistible for most of us. In fact, we all live for junk cravings. But, laden with so much sugar, scientists believe it could kill you, if not for a process called homoeostasis in our body. Homoeostasis involves numerous cellular and molecular mechanisms that get our vital like temperature, blood pressure, cholesterol, etc., into normal range. While some components of homoeostasis, like insulin mechanism, are understood to an extent, but many are still a mystery. Researchers from Tata Institute of Fundamental Research(TIFR), Mumbai; Indian Institute of Science, Bangalore; and Indian Institute of Science, Education and Research (IISER); Pune have attempted to understand the process behind lipid homoeostasis in our body. They have discovered the role of KINESIN in regulating the fat secreted from the liver. Kinesin, a protein responsible for transport in involved carrying various cargo, including lipid droplets, to different regions in a cell. Researchers have shown that kinesin protein molecules attach themselves to the lipid droplets and take them to the smooth endoplasmic reticulum in the cell where lipoproteins are produced.



S. V. Mythri
II B. Sc 'H' sec

NO NEW MEMORIES MADE IN ADULT HOOD

The hippocampus is a small organ located within the brain's medial temporal lobe and forms an important part of the limbic system, the region that regulates emotions. The hippocampus is associated mainly with memory, in particular long-term memory. The organ also plays an important role in spatial navigation.



*New neurons continue to be generated in the subgranular zone of the dentate gyrus of the adult mammalian hippocampus. This process has been linked to learning and memory, stress and exercise, and is thought to be altered in neurological.

*Every day, the human hippocampus, a brain region involved in learning and memory, creates hundreds of new nerve cells — or so scientists thought. Now, results from a study could upend this long-standing idea. A team of researchers has found that the birth of neurons in this region seems to stop once we become adults.

*The findings present a challenge to a large body of research which has proposed that boosting the birth of new neurons could help to treat brain diseases such as Alzheimer's disease and depression. But the authors said it also opens the door to exciting new questions about how the human brain learns and adapts without a supply of new neurons, as in seen in mice and other animals.

*Arturo buylla, who is a professor of neurological surgery working at the University of California, San Francisco (UCSF) and the head of the laboratory behind the study, "*that if neurogenesis occurs in the adult hippocampus in humans, it is an extremely rare phenomenon, raising questions about its contribution to brain repair or normal brain function.*"

*For this study, researchers collected brain tissue from patients who had surgery for epilepsy or those who had died at various ages, from babies to adults who were 77 years old. They looked for signs of young neurons, which means it was new, and found that neurogenesis declines one year after birth. New neurons were found in children at 7 and 13 years old, but they found no trace of them could be found in adults.

"*In young children, we were able to see that substantial numbers of new neurons continue to be made and integrated into the dentate gyrus, but neurogenesis fades away completely by early adolescence,*" says Mercedes Paredes, a senior researcher on the project. "*The fact that we could compare newborn brains, where new neurons were clearly present, to the adult, where we saw no evidence for young neurons, gave us added confidence that what we were seeing was correct.*"

*The researchers then turned to studying the stem cells that give birth to new neurons. They found that neural progenitors are plentiful during early prenatal brain development, but become extremely rare by early childhood. They noted that these cells fail to cluster early on into a concentrated 'niche' in a region of the human DG known as the subgranular zone.

*Shaun Sorrells, a senior researcher on the new study acknowledges that it is virtually impossible to definitively say the adult hippocampus produces no new neurons, but this evidence certainly suggests that if adult neurogenesis exists, it may be a very rare and/or minimal process that doesn't adequately explain plasticity in an adult human brain.

*However, the absence of neurogenesis in the human brain may not be a bad thing, the researchers point out, but instead point the way to understanding what makes the human brain distinct from other animals and set researchers on a better path to developing treatments for human brain diseases.

Young neurons (green) are shown in the human hippocampus at the ages of (from left) birth, 13 years old and 35 years old. Images by Arturo Alvarez-Buylla *Young neurons (green/yellow) in the dentate gyrus at birth, alongside more mature neurons (red). Image by Arturo Alvarez-Buylla lab*

Note: I visited IISC open day recently, there I saw demo experiments done on this topic.
Which gave me a special interest towards this topic. By doing this article it gave me an exposure to many facts about brain and about hippocampus.

Anitha Shree. S
II B. Sc 'H' sec

INSIDE OUT FOR REAL!

What if I told you inside out movie characters really do exist in our brain, and they are responsible for our Mood swings and stuffs. To get know more than this article will be useful.

At the root of all our thoughts, emotions and behaviors is the communication between neurons within our brains. Brainwaves are produced by synchronized electrical pulses from masses of neurons communicating with each other.

Brainwaves are detected using sensors placed on the scalp. They are divided into bandwidths to describe their functions (below), but are best thought of as a continuous spectrum of consciousness; from slow, loud and functional - to fast, subtle, and complex.

It is a handy analogy to think of brainwaves as musical notes - the low frequency waves are like a deeply penetrating drum beat, while the higher frequency brainwaves are more like a subtle high pitched flute. Like a symphony, the higher and lower frequencies link and cohere with each other through harmonics.

Our brainwaves change according to what we're doing and feeling. When slower brainwaves are dominant we can feel tired, slow, sluggish, or dreamy. The higher frequencies are dominant when we feel wired, or hyper-alert.

Brain waves are broadly classified into 4 types:

ALPHA WAVES (8 TO 12 HZ)

Alpha brainwaves are dominant during quietly flowing thoughts, and in some meditative states. Alpha is 'the power of now', being here, in the present. Alpha is the resting state for the brain. Alpha waves aid overall mental coordination, calmness, alertness, mind/body integration and learning.

BETA WAVES (12 TO 38 HZ)

Beta brainwaves dominate our normal waking state of consciousness when attention is directed towards cognitive tasks and the outside world. Beta is a 'fast' activity, present when we are alert, attentive, engaged in problem solving, judgment, decision making, or focused mental activity.

DELTA WAVES (.5 TO 3 HZ)

Delta brainwaves are slow, loud brainwaves (low frequency and deeply penetrating, like a drum beat). They are generated in deepest meditation and dreamless sleep. Delta waves suspend external awareness and are the source of empathy. Healing and regeneration are stimulated in this state, and that is why deep restorative sleep is so essential to the healing process.

GAMMA WAVES (38 TO 42 HZ)

Gamma brainwaves are the fastest of brain waves (high frequency, like a flute), and relate to simultaneous processing of information from different brain areas. Gamma brainwaves pass information rapidly and quietly. The subtlest of the brainwave frequencies, the mind has to be quiet to access gamma.

Gamma was dismissed as 'spare brain noise' until researchers discovered it was highly active when in states of universal love, altruism, and the 'higher virtues'.

WHAT BRAINWAVES MEAN TO YOU?

Our brainwave profile and our daily experience of the world are inseparable. When our brainwaves are out of balance, there will be corresponding problems in our emotional or neuro-physical health. Research has identified brainwave patterns associated with all sorts of emotional and neurological conditions.

Over-arousal in certain brain areas is linked with anxiety disorders, sleep problems, nightmares, hyper-vigilance, impulsive behavior, anger/aggression, agitated depression, chronic nerve pain and spasticity. Under-arousal in certain brain areas leads to some types of depression, attention deficit, chronic pain and insomnia. A combination of under-arousal and over-arousal is seen in cases of anxiety,

ALTERING YOUR BRAINWAVES

By rule of thumb, any process that changes your perception changes your brainwaves. Chemical interventions such as medications or recreational drugs are the most common methods to alter brain function; however, brainwave training is our method of choice. Over the long term, traditional eastern methods (such as meditation and yoga) train your brainwaves into balance. Of the newer methods, brainwave entrainment is an easy, low-cost method to temporarily alter your brainwave state. If you are trying to solve a particular difficulty or fine-tune your brainwave function, state-of-the-art brain training methods .like neuro feedback and pEMF deliver targeted, quick, and lasting results.

Anitha Shree. S
II B. Sc 'H' sec

TERMITES ARE JUST COCKR OACHES WITH A FANCY SOCIAL LIFE

Termites are the new cockroach. The Entomological Society of America is updating its master list of insect names to reflect decades of genetic and other evidence that termites belong in the cockroach order, called Blattodea. As of February 15, “it’s official that termites no longer have their own order,” says Mike Merchant of Texas A&M University in College Station, chair of the organization’s common names committee. Now all termites on the list are being re-categorized. Among specialists, discussions of termites as a form of roaches go back at least to 1934, when researchers reported that several groups of microbes that digest wood in termite guts live in some wood-eating cockroaches too.

Once biologists figured out how to use DNA to work out genealogical relationships, evidence began to grow that termites had evolved as a branch on the many-limbed family tree of cockroaches. In 2007, Eggleton and two museum colleagues used genetic evidence from an unusually broad sampling of species to publish a new tree of these insects (SN: 5/19/07, p. 318). Titled “Death of an order,” the study placed termites on the tree near a Cryptocercus cockroach. Cryptocercus roaches live in almost termite like style in the Appalachian Mountains, not too far from chemical ecologist and cockroach fan Coby Schal at North Carolina State University in Raleigh.

Monogamous pairs of Cryptocercus roaches eat tunnels in wood and raise young there. The offspring feed on anal secretions from their parents, which provide both nutrition and starter doses of the wood-digesting gut microbes that will eventually let the youngsters eat their way into homes of their own. Termites are “nothing but social cockroaches” Schal says.

Various roaches have some form of social life, but termites go to extremes. They’re eusocial, with just a few individuals in colonies doing all of the reproducing. In extreme examples, Macrotermes colonies in Australia can grow to 3 million individuals with only one queen and one king.

Rohan Chandak. R
II B. Sc ‘I’ sec

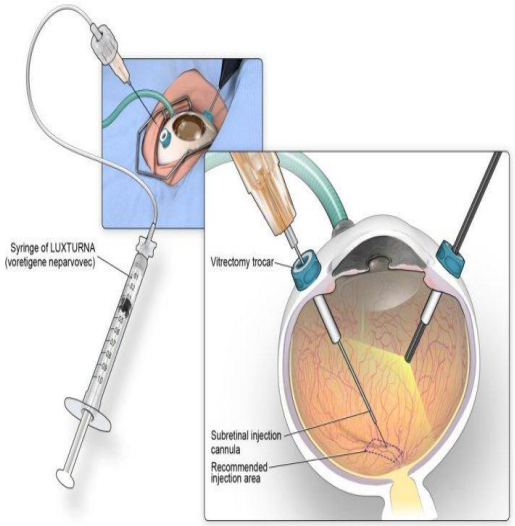
FIRST GENE THERAPY THAT RESTORES VISION

Present on the first chromosome in humans, is a gene called Retinal Pigment Epithelium-65 (*RPE65*). This gene is responsible for manufacture of a protein, an enzyme called retinol isomerohydrolase that nourishes the retinal cells. Every individual inherits two copies of this gene, one from each parent. If both these copies have mutations, then the manufacture process of the protein gets affected and those individuals suffer from Retinitis Pigmentosa (RP), a group of inherited conditions of the retina that all lead to a gradual progressive decline in vision.

RPE65 gene mutations result in reduced or absent levels of the *RPE65* protein which leads to a block in the visual cycle that converts light into electrical signals and causes vision loss. At first, patients may lose their peripheral vision and develop "tunnel vision," and they may also have trouble seeing in dim light. But eventually, they may lose their central vision as well and become totally blind.

More than 10 million people in the United States and millions more around the world have retinal degenerative diseases. Until late 2017, there was no cure for these diseases. But thanks to a biotechnology company named Spark Therapeutics' LUXTURNA ^{TM}, hope is not lost for these patients.

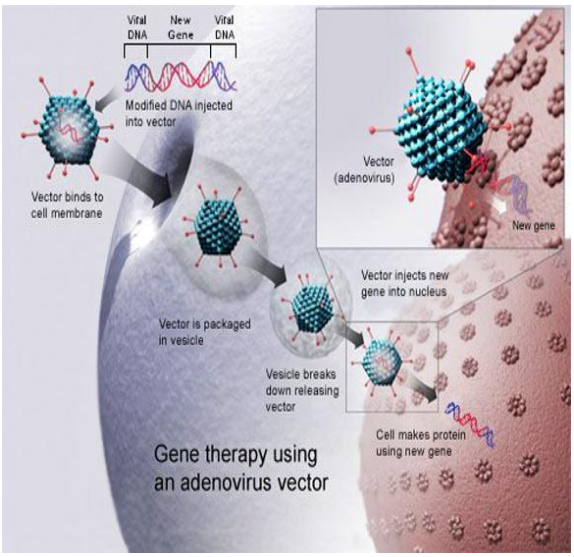
On October 12th 2017, Spark Therapeutics' vision-restoring *RPE65* gene therapy received marketing approval from the U.S. Food and Drug Administration (FDA), becoming the first gene therapy to gain regulatory approval for the eye or any inherited condition.



The gene therapy LUXTURNA™ generically known as voretigene neparvovec-ryzl, restored vision in a clinical trial for people between the ages of 4 and 44 with Leber Congenital Amaurosis (LCA) caused by mutations in the gene *RPE65*. Study participants with severe vision loss reported putting away their navigational canes, seeing stars, being able to read, and recognizing faces of loved ones. Vision restoration has persisted for at least three years. The treatment is also designed to work for people with retinitis pigmentosa (RP) caused by *RPE65* mutations.

The LUXTURNA™ gene therapy involves injection of healthy copies of RPE65 underneath the retina. The *RPE65* copies are contained in a human-engineered virus — known as an adeno-associated virus or AAV — which is designed to readily penetrate retinal cells to deliver the therapeutic genetic cargo. LUXTURNA™ provides a functional copy of the *RPE65* gene to act in place of a mutated *RPE65* gene. The functioning gene has the potential to make the visual cycle work properly again. Mutations in both copies of the *RPE65* gene, the only mutations for which LUXTURNA™ is indicated, must be confirmed with a genetic test ordered by a healthcare professional. In order to receive treatment, it must also be confirmed that the patient has enough remaining cells in his retina.

Misty Lovelace of Alexandria, Kentucky, had never clearly seen her mother's face. She'd never seen stars. But all that changed when the 18-year-old got an experimental gene therapy treatment that not only stopped her from going blind, but gave her back much of the vision she'd lost to an incurable genetic disease. "I never knew they were real dots that twinkled. However, I will say that rainbows are overrated by far." Lovelace told a panel of federal drug advisers Thursday. Lovelace and others came to the Food and Drug Administration headquarters on Thursday to ask that it be approved so more kids can see what they've seen. After hearing their testimony, and hours of detail about the treatment and its effects, they voted yes —unanimously. Eye doctors, parents and patients were unanimous in their support of approving the treatment, which would be aimed at the one in a million children with a specific genetic defect that causes Leber Congenital Amaurosis.



"Almost all will proceed to blindness. Other than voretigene, there are no avail treatments that can slow or stop the insidious loss of vision in these patients," Dr. Albert Maguire of Children's Hospital of Philadelphia, where the treatment was developed, told the FDA panel hearing. "By the time they are in their 40s, its lights out," Dr. Jean Bennett of Children's Hospital and the University of Pennsylvania, who helped develop the treatment, told NBC News.

It's a fairly obvious approach to try to correct that faulty gene, but gene therapy has turned out to be far more difficult than experts thought it would be. The corrected genes often don't stay where they are supposed to, and getting them to the right place is difficult.

Patients often have severe side-effects such as cancer, and can even die. But the eye is a good place to try it, as it's a self-contained organ and doctors and patients alike can literally see the results. Other teams are trying gene therapy in the eye, as well as approaches such as infusing stem cells to regenerate dying tissue. With LUXTURNA^{TM} , the approach is fairly straightforward, experts told the FDA panel. An eye surgeon makes a small incision in the eye and the treatment is infused onto the retina. The hope is that it will take a single treatment to stop the degeneration. But several of the 31 patients tested in the trials of the therapy said they saw unexpected and dramatic improvement in their vision very quickly.

"What I saw in the clinic was remarkable. Most patients became sure of themselves, pushed aside their guides and navigated their environments independently and with confidence. In all honesty, if either myself or my child had this condition, I would not hesitate for a moment to get this treatment", Maguire said. Christian Guardino said he struggled to get along in school, squinting at people who greeted him in the hallway. "I couldn't see if somebody was smiling at me or frowning," Guardino, now 17, told the hearing. "That never went over very well''. But the treatment transformed his life. "Gene therapy has made my world literally so much brighter. I have been able to see things I never saw before, like stars, snow falling, fireworks and most important, the moon," the Patchogue, Long Island, high school student said. "I am now able to go to the movies and now my social life is so much better. I can now see people's facial expressions. I can see all you people right now."

It's not unheard of for FDA advisory committees to get emotional testimony from patients, often flown in at the expense of the company seeking approval. But the hearing for LUXTURNA^{TM} was unusual in that even ophthalmologists who had nothing to do with the trial pleaded for its approval. It won't help everyone with vision loss, just the few thousand who have the particular defect targeted by the drug.

"Children should be treated as early as possible. Ideally, all patients should be treated before they reach complete retinal degeneration. That could eventually mean at birth or even before birth, while in the mother's womb. Once a patient has lost too many cells in the retina, even the gene therapy treatment likely will not help. Voretigene is essential to keep our patients from going blind. I believe we have a chance here today to make history'', said Dr. Bart Leroy, an expert in genetic ophthalmology at Children's in Philadelphia. "LUXTURNA^{TM} will be life changing for people with Retinitis Pigmentosa and Leber Congenital Amaurosis caused by *RPE65* mutations. For them, the treatment may well mean the difference between relying on assistive technologies or other people and living a life of independence." says Benjamin Yerxa, PhD, Foundation chief executive officer.

Syona Baptista Thomas
II B. Sc 'I' sec

MELTING GLACIERS LIBERATE ANCIENT MICROBES

Melting permafrost in the artic is unlocking diseases and wrapping the landscape. The consequences of climate change can be weird and apocalyptic. Ancient Microbes might one day get added to the list of ominous consequences of melting ice.

Scientists working in the Arctic circle over the past few decades have unearthed several massive viruses that some say could be re-awakened if the permafrost that imprisons them dissolves.

In 2015, researchers in Siberia uncovered one called *Mollivirus sibericum*, a 30,000-year-old behemoth of a virus that succeeded in infecting a defenseless amoeba in a lab experiment. About a decade earlier, scientists discovered the first mimivirus, a 1,200-gene specimen measuring twice the width of traditional viruses, buried beneath layers of melting frost in the Russian tundra. Some researchers have suggested that these enormous viruses could thaw out, escape, and make lots of people sick. It sounds like something out of a 1990s horror film. But you shouldn't get too concerned - at least not yet.

The likelihood that these microbes will break free and sicken humans is slim, according to New York Times science columnist Carl Zimmer, whose recent book, " A Planet of Viruses ," digs into what we know about viruses and the diseases they cause.

The book says that “These particular viruses infect amoeba There are no human pathogens that have burst out of the Siberian permafrost until now. Permafrost is a very good preserver of microbes and viruses, because it is cold, there is no oxygen, and it is dark. Pathogenic microbes that can infect humans and animals might be preserved in old permafrost layers, as humans and animals have been buried in permafrost for centuries, it is possible that other infectious agents could be released.

Since the risk from permafrost pathogens is unknowable, people might well focus on more established threats from climate change such as rise in outbreaks of diseases like malaria and cholera which thrive warmer temperatures. The alternate mindset is that we should not ignore such risks just because we cannot quantify them.

Conclusion:

HOW LIKELY THAT THE MICROBES EFFECT HUMANS IS NOT KNOWN, IT IS JUST A POSSIBILITY. It could be bacteria, or a virus If the pathogens hasn't been in contact with humans for a long time, then our immune system would not be prepared. So yes, that could be dangerous.

Raksha More
II B. Sc 'I' sec

ON PHYSICAL ATTRACTION

During teenage usually people fall in love. Some might argue saying it's not love but just physical attraction. The physical attraction two people of opposite gender is something usual and obvious. This physical attraction between people of opposite gender is also seen at a young age. If you are a teenager and if you are attracted to a person of opposite sex, it's not something to worry about. It's just natural at that age.

This phenomenon of physical attraction is not just seen in human beings. It's also seen in other animals as well. We do see the male birds singing to impress the female ones. We do see the male deer's fighting one another for a female deer. So, the phenomenon of physical attraction seems to be universal.

But, the big question remains. Why? Why is an organism physically attracted to another of opposite gender? Answering such questions might become too philosophical. But, all we know that it's the mechanism by which nature operates to maintain the population. Without physical attraction there would be no sexual intercourse. And without sexual intercourse there wouldn't have been the sustainment of species population. It's quite shocking to know that, during mating lions have sex 20 to 40 times a day. One Australian marsupial has sex until it dies.

So physical attraction is something natural or it's a law of nature to which we living beings are bound.

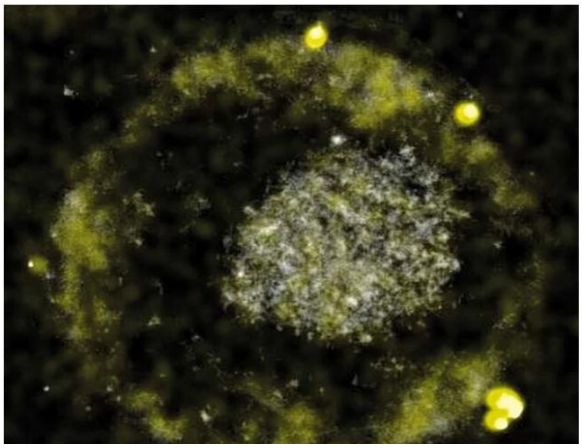
Ajay. S
II B. Sc PCM 'A' sec

THESE BACTERIA EAT TOXIC METAL, 'POOP' GOLD NUGGETS

Turning Straw into gold is old hat: A bizarre species of bacteria practices a form of alchemy every time it breathes.

The soil-living, rod shaped bacterium *Cupriavidus metallidurans* is famous, biologically spreading, for being able to survive massive doses of toxic metals.

New research reveals that special enzymes within the bacteria are responsible for changing toxic versions of gold into inert solid gold.



C. metallidruns, soil bacteria that survives toxic metal exposure by excreting gold nuggets

Heavy Metal Problems:

C. metallidurans survives in the soils that are full of heavy metals, which are typically toxic to biological organisms.

The bacteria are surrounded by two membranes, with the space called periplasm in between. They need trace amounts of copper to conduct the metabolic processes that the copper is toxic in large doses. So the bacteria have a special enzyme called cupA that can pump excess copper from the interior of the cell into the periplasm, it can't do any harm

When the bacteria encounter gold ions, which are gold molecules that have lost one or more of their electrons and thus are unstable, these ions are easily imported past both cellular membranes into the interior of the cell, where they can cause damage of their own.

The ions also inhibit the cupA pump that get rid of excess copper and can cause compound damage from copper ions that make their way into the cells.

Another enzyme called CopA, This enzyme steals electrons from the copper and gold ions, transforming them into stable metals that cant easily pass through the interior membrane of the cell.

Once the metallic gold nano particles formed in the periplasm, they are immobilized and less toxic.

The bacteria essentially transform solid gold into a highly soluble gold compound and then back again. If humans could mimic the process, it would be possible to take with a very low percentage of gold, transform the precious metal into water soluble itself and dissolve it from the rock –viola- transform it back into the shiny solid gold used in everything from jewelry to electronics.

The only way to do that is to use mercury, which is very toxic

Ashok Kumar B
III B.Sc 'B' sec

ARTICLE ON VAN CATS

Van cat is a distinctive landrace of domestic cat, found in the lake of eastern Turkey. It is relatively large, has a chalky white coat, sometimes with ruddy coloration on the head and hindquarters, and has blue or amber eyes or is odded eyed (having one eye of each colour).The variety has been referred to as “the swimming cat’’, and observed to swim in lake van.

Characteristics: The cats are notable for their lean, long-legged appearance. They are all white or sometimes mostly white with amber markings around the tail and ears. Locals to the van area identify only the all white type as the van cat, according to a 1991 BC documentary, cats, written and presented by Roger Tabor.

- Their most notable genetic characteristic is their almond-shaped eyes that often are mismatched colours. The most valued and valuable members of the type generally have one amber-green eye and one blue eye. It is a natural breed, not a manmade breed, originating in Turkey.
- It is unique in its history, its colour and pattern, its ability to survive, virtually unchanged for thousands of years.

Causes for eye mismatch: The scientific name for odd eyes is heterochromia iridis. In van cats with white or white spotted gene, the melanin is often prevented from reaching one eye ,so that one will remain blue while the other eye receive melanin and changes to green, yellow, amber or the other colour.

Conclusion:

The Turkish van cats is likely an old breed with mismatched eye .It is due to heterochromia ,but the vision is not affected .It is a natural breed .It is been protected by its native land .They are said to be water lovers .It is a lively cat. Never to be frightened about this cat due to their eyes .They are very much intelligent and it is been rared by different countries and it is kept has a pet and it human friendly and many efforts are made to safe guard this unique cat by the government of many countries .It is a unique type among the existing cat.

Meghana. C. T
III B. Sc ‘B’ sec

WHY OUR OCEANS ARE STARTING TO SUFFOCATE?

When it comes to animal life on Earth, oxygen is a baseline necessity. For humans and animals, the simple diatomic molecule is essential to the success of cellular respiration, which breaks down complex carbohydrates to produce the energy required for survival.

According to the recent research, all across the globe, oxygen content in our oceans is dropping rapidly

At the heart of the oxygen crisis has an unfortunate double effect which tied to rising ocean temperatures, which themselves are linked to greenhouse gas emissions on the part of humans, the solubility of oxygen is inversely correlated with water temperature,

So when ocean water gets hotter, the oxygen in the air does not dissolve as readily, as higher water temperature elevates the metabolic rates of sea creatures, so their bodies crave more and more oxygen as less and less is available.

Low oxygen caused the death of these corals and others in Bocas del Toro, Panama.
The dead crabs pictured also succumbed to the loss of dissolved oxygen.

The manner of invidious effects in anoxic, or abnormally oxygen-poor, marine environments. In many cases, algae and other simple organisms that don't need as much oxygen to survive proliferate at the expense of complex organisms.

And gamete production among those complex organisms—needed for successful reproduction—can also be adversely impacted by low oxygen levels, such that once a population begins to drop off.

The consequences of climate change go way beyond just the potential for declining oxygen in the oceans

ABOUT GO2NE – Global Ocean Oxygen Network

- The group formed in 2016 under the Intergovernmental Oceanographic Commission, part of the **United Nations Educational, Scientific and Cultural Organization (UNESCO**).
- Members of the **GO_2NE working group (Global Ocean Oxygen Network)** from around the world work together to better understand the problem of low oxygen and find solutions.

Jeevitha. S
III B. Sc 'B' sec

BACTERIA THAT DRIVES COLON CANCERS IDENTIFIED

The article with the above title was published in Times of India on 3rd January 2018.

Scientists have identified a combination of bacteria that appears to increase the risk of colon cancer, a finding that could lead to new ways to more effectively screen for and ultimately prevent colon cancer. Through a series of experiments, the researchers were able to pinpoint ways in which the two species of bacteria -- *Bacteroides fragilis* and *Escherichia coli* -- promote inflammation and break down the mucus layer of the colon. "It is the combination of these effects, requiring coexistence of these two bacteria, that creates the 'perfect storm' to drive colon cancer development," said Cynthia Sears, Professor, at the Johns Hopkins Bloomberg School of Public Health. Both types of bacterium are found to commonly colonize young children worldwide, potentially contributing to the rise in colon cancer rates among younger people.

The findings, published in the journal Cell Host & Microbe and Science, describe a process in which these bacteria invade the protective mucus layer of the colon and collude to create a microenvironment -- complete with nutrients and everything the bacteria needs to survive -- that induces chronic inflammation and subsequent DNA damage that supports tumour formation.

Unlike most bacteria, which do not make it past the colon's protective mucus layer, these communities of bacteria that invade the mucus, form a sticky biofilm right next to the colon epithelial cells that line the colon, where colon cancer usually originates

Varidhi Chelageri
III B. Sc 'B' sec

MOLECULAR AND FUNCTIONAL CHARACTERIZATION OF PHEROMONE BINDING PROTEIN 1 FROM THE ORIENTAL FRUIT MOTH, *Grapholita molesta* (BUSCK)

Pheromone binding protein (PBP) is thought primarily to bind and transport the sex pheromone in moths. The accumulated studies suggest that three PBPs were identified in moth species. In *Grapholita molesta*, the functions of GmolPBP2 and GmolPBP3 have been previously studied. However, the function of GmolPBP1 is still unclear. Furthermore, the *Cydia pomonella* sex pheromone Codlemone can act as a sex pheromone synergist of *G. molesta*. In *C. pomonella*, CpomPBP1 specifically bind the Codlemone.

CpomPBP1 displays high identity with GmolPBP1 (70%), indicating that the two PBPs may share a similar 3D structure thus can bind the similar or same ligands. In this study, we explored the molecular and functional characterization of GmolPBP1. GmolPBP1, bearing the typical characteristics of Lepidopteran odorant binding proteins, was closest phylogenetically to CpomPBP1. Binding studies demonstrated that GmolPBP1 exhibited strong binding affinities with (*Z*)-8-dodecenyl alcohol, 1-dodecanol and Codlemone.

Molecular docking showed that GmolPBP1 has different ligand recognition mechanism for the three ligands. Our results suggest that GmolPBP1 functions as recognizer of (*Z*)-8-dodecenyl alcohol and 1-dodecanol of the female sex pheromone blend, and may be the potential transporter of Codlemone, which contributes to the synergism of the pheromone response of *G. molesta* by Codlemone.

Ujwala. A
III B. Sc ‘B’ sec

RAISING BABY LIONS IS HARDER THAN IT LOOKS!

Parental care is a behavioural and evolutionary strategy adopted by some animals, making a parental investment into the evolutionary fitness of their offspring. This strategy means that more effort is spent on a relatively small number of offspring to give each of them a high chance of surviving to reproduce; an opposite strategy is to produce a very large number of small offspring, often as eggs, which are left to fend for themselves.

Parental care is seen in many insects, notably the social insects such as ants, bees and wasps; in certain fishes, such as the mouth brooders; widely in birds; and especially widely in mammals, which share two major adaptations for care of the young, namely gestation (development of the embryo inside the mother's body) and production of milk.

In Mammals

All the higher mammals (excluding the monotremes, namely the echidna and the platypus) share two major adaptations for care of the young, namely gestation (development of the embryo inside the mother's body, followed by live birth) and production of milk. These imply a group-wide choice of a degree of parental care. Many mammals go much further, building a nest, digging a burrow, or feeding and guarding the young, often for a prolonged period.

While baby lions grow up to be some of the most powerful predators in their ecosystem, their journey to adulthood is not easy. An African lion cub is born weak and blind, not opening its eyes for the first week of its life. For six to eight weeks after giving birth, the mother lioness will live in isolation from the rest of her pride. She will nurse her litter and protect the cubs from predators, including other male lions that might kill cubs that are not their own.

Once the cubs are old enough, the mother and her offspring rejoin the pride, and the other lionesses will help each other care for cubs born around the same time. By the age of three, young male lions will leave the pride to establish their own, but female lions typically stay with the same pride for life.

Among lions, females do most of the parental care. Cubs are born weak, blind and helpless. Their mother will hunt solo to provide them with food, leaving them in their den. She moves her cubs from den to den to throw predators off track. Six to eight weeks after birth, the mother and cubs will re-join the pride. Once in he mixes, cubs will suckle from any female – not just their mother. It'll be between wo and three years before they're grown and ready to mate.

Sahana. P
III B. Sc 'B' sec

SPECIAL TIGER PROTECTION FORCE

This report is concerned with the Special Tiger protection force which was published in The Hindu and in International school magazine

A Special Tiger Protection Force (STPF) will be formed based on a recommendation by the National Tiger Conservation Authority (NTCA) to protect tigers in the Mudumalai Tiger reserve and Bandipur Tiger Reserve according to a senior wildlife officer.

A board would be set up with a member each representing the Central police forces and the NTCA to select the personnel for the armed battalion, the officer said.

The battalion will be headed by an officer in the rank of Assistant Conservator of Forests, and will have three Range Officers, 18 Foresters and 90 Forest Guards.

Of the total 90 Guards to be recruited, 30 per cent should be earmarked for local tribal youth. Recruitment for the remaining posts would be done through employment exchanges concerned. The training for the battalion would be imparted by a central paramilitary force. The NTCA would provide the financial assistance for imparting the training, the officer said.

To help the Board, the wildlife wing of the State Forest Department would identify tribals living in the Mudumalai Tiger reserve and Bandipur Tiger Reserve area.

The wing would also make arrangements for officials from employment exchanges to visit Mudumalai and register the names of youth selected by the Board. The Forest Department would notify vacancies to employment exchanges. This proposal has been sent to the State government for its approval.

Karnataka principal chief conservator of forests (wildlife), BK Singh and Viswanathan Shetty is principal at the Karnataka armed police training centre, said the 54 personnel would be divided into three groups and stationed at three locations in the two contiguous national parks (Bandipur and Nagarahole). He said 54 more STPF personnel would be recruited shortly to strengthen the existing development of the STPF in the two contiguous Tiger reserve.

The commandos will be armed with .315 rifles. When a commando reaches the age of 40 years, he will be taken off.

India is home to half of the world's rapidly dwindling wild tiger population but has been struggling to halt the decline in their population owing to poachers, international smuggling network and loss of tiger's habitat. From an estimated 40,000 tigers in 1947, their numbers reduced to 1,706 in 2001, but slightly increased to 1,411 in 2006.

Karnataka is India's most Tiger dense state with about 300 of the wild cats prowling it's six major reserve in 2010.

Karnataka, with about 300 tigers in six forest reserve, has the highest Tiger population in the country. But about 25 tigers have been killed in the last five years.

The state plans double the commando force from 54 to 108 in the coming years. Similar forces will also be trained to patrol 13 other Tiger reserved across the country.

India, with about 1,700 tigers, accounts for nearly half the world's Tiger population. Experts say that animal's survival here will determine the future of the species.

Varun Kumar. C. V
III B. Sc 'B' sec

RARE, MOHAWK-WEARING FISH DISCOVERED 'WALKING' ON SEAFLOOR.

January 25, 2018 04:23pm ET

The discovery of a new group of weird fish, which sport bright-red, Mohawk-like fins on their head and finger like fins on their sides to help them "walk" on the ocean floor has delighted the divers who encountered them, just as they were trying to document the extremely endangered species.

Until now, scientists had known of only one population, that is, one group — of red hand fish (*Thymichthys politus*) was formerly known as *Brachionichthys politus*. The group comprises between 20 and 40 individual fish that are living in Frederick Henry Bay, off the southeastern coast of the island of Tasmania, Australia.

Last week, divers from the Institute for Marine and Antarctic Studies (IMAS) and the citizen science project Reef Life Survey (RLS) encountered a new population, which also has between 20 and 40 of these bizarre, punkish-looking fish.

(RLS) have discovered a new population of what is believed to be the world's rarest fish. A team of divers from the Institute for Marine and Antarctic Studies (IMAS) and the citizen science project Reef Life Survey

Description: Despite being red, this species can be very difficult to find amongst the base of seaweeds. Females lay eggs at the base of green *Caulerpa* seaweeds in spring and stand guard until they hatch. Arguably one of the rarest marine fish species in the world. Found at Port Arthur in the 1800's and once spread across south-eastern Tasmania, it has only been known only from a single 50 m strip of rocky reef in south-eastern Tasmania for the last 15 years. A recent discovery of a second population has doubled the population estimate to 40-80 individuals. *note the occurrence information below reflects its occurrence at the one site monitored by RLS divers within its known distribution.

Information

- **Max Size:** 10 cm
- **Depth:** 2 - 7 m
- **Habitat:** Rocky

The newfound population lives a few miles away from the other one, but to protect the fish, researchers aren't disclosing its exact location, according to a statement from the University of Tasmania. Each population lives in an area about the size of two tennis courts — a range that's relatively small, because these relatively sedentary fish don't swim; rather, they walk on the seafloor with their hand-like pectoral fins, the divers said.

"That second population's just a huge relief," Rick Stuart-Smith, an IMAS scientist and RLS co-founder, said "It effectively doubles how many we think there are left on the planet. But it also gives us hope that there may be other populations out there."

There are about 10 known species of handfish, but little is known about their biology and behavior, according to the Australian government's Department of the Environment and Heritage. These fish live in diverse habitats, ranging from shallow estuaries to deeper shelf waters. But researchers know the basic facts about *T. politus*. The roughly 5-inch-long (13.6 centimeters) fish is covered with small, close-set, flattened warts, and most of its scales and associated spines are fully embedded in its skin, according to an Australian government report. Moreover, although *T. politus* was first collected in the 1800s, and later found again in 1950 and the 1980s and 1990s, "It appears that the red handfish has undergone a marked decline in both distribution and abundance," with some underwater surveys void of any red handfish at all, the report said. Habitat degradation is one of the major threats facing the species. Other threats include invasive species, pollution, siltation (in which fine particles are suspended in the water) and rising water temperatures (warm water doesn't hold as much oxygen as cold water), the report said. Moreover, because the fish are so slow, illegal collectors can easily catch them.

What's more, red handfish appear to sometimes lay their eggs on green algae. But finding the algae has become a challenge for the fish because the green aquatic plants are being eaten by *Heliocidaris erythrogramma* — a sea urchin that's native to southeastern Tasmania whose numbers have spiked in recent years.

"Finding a new population that is definitely distinct from the existing one is very exciting," Antonia Cooper, IMAS technical officer, said in the statement**. "It means there's potentially a bigger gene pool and also that there are potentially other populations out there that we're yet to find."**

Shivani Kumari
III B. Sc 'B' sec

ANOTHER BEAUTIFUL ANIMAL LOST, THE EASTERN PUMA IS OFFICIALLY DECLARED EXTINCT

In animals systematic hunting and habitat destruction by human beings have once again led to the extinction of another species of cats in North America. It has been 80 years since the last Eastern Puma was sighted in North America.

The big cats which once used to roam around the North American landscape, have now been officially declared extinct by the US Fish and Wildlife Service.

Survival of the species had been a matter of concern since the beginning of 1900s when it was listed as 'endangered species'. Since then, programs have been underway to conserve the big cats, but in vain.

The animal scientifically known as Puma concolor couguar was last spotted in Maine in 1938.

Extinction of Eastern Puma is a matter of grave concern as the species helped maintain a healthy ecosystem. Speaking to The Weather Channel, CBD conservation advocate Michael Robinson said,

We need large carnivores like cougars to keep the wild food web healthy, so we hope eastern and midwestern states will reintroduce them. Cougars would curb deer overpopulation and tick-borne diseases that threaten human health.

Studies also suggest that most Eastern Cougars disappeared in the 1800s, as they were killed out of fear for human and livestock safety are victims of massive deforestation. They were also hunted for their fur which fetched high commercial value.

Extinction of the Eastern Puma should be more than enough to give us a warning that we seriously need to protect our environment and other such beautiful and crucial species in our ecosystem.

Yaseen
III B. Sc ‘B’ sec

LAUGHING AT YOURSELF MAY BE GOOD FOR MENTAL WELL – BEING

SOURCE: Deccan Herald (DH)

DATED: February 12th 2018, Monday

Mirror talk

Laughing at yourself may be good for mental well-being

LONDON, PTI: People who frequently crack jokes about themselves to gain approval of others have greater levels of psychological well-being, a study has found.

The findings, published in the journal Personality and Individual Differences, contradict some of the research carried out to date in the psychology of humour.

Up until now, a significant deal of the research literature has suggested that self-defeating humour is exclusively associated with negative psychological effects among individuals who regularly employ this style of humour.

"In particular, we have observed that a greater tendency to employ self-defeating humour is indicative of high scores in psychological well-being dimensions such as happiness and, to a lesser extent, sociability," said Jorge Torres Marin from University of Granada in Spain.

"The results, as well as being consistent with the positive connotations traditionally attributed to the act of 'laughing at oneself' in our country, also suggest that the effects of self-defeating humour on well-being may differ depending on where the research takes places," Marin said.

"Consequently, we believe it is necessary to conduct new studies aimed at analysing potential cultural differences in the use of this kind of humour," he said.

"Our research fits into one of the theoretical models that aim to overcome these limitations and provide the psychology of humour with a well-founded, accurate theoretical body of knowledge," said Hugo Carretero Dios, from University of Granada.

Nonetheless, researchers also point out that certain styles of humour may be employed to conceal negative intentions and feelings.

"Humour enables individuals with low scores in honesty to build trust, closeness, etc. with other people and thereby use important information in order to manipulate them or obtain advantages in the future," said Gines Navarro-Carrillo from University of Granada.

The results regarding the relationship between the use of humour and anger management suggests that the capacity for maintaining a humorous perspective in adverse situations, ie the use of self-enhancing humour, is typically found among people who manage anger more effectively, as well as among those with lower tendencies to exhibit angry feelings or reactions.

By contrast, people who tend to use aggressive or self-defeating humour do not manage anger or rage as well.

In particular, aggressive humour is mainly associated with the expression of anger towards others and a greater propensity to experience anger in everyday life.

By using aggressive humour, individuals may express negative feelings (for example, anger, superiority, hate, etc) less explicitly than they would through physical or verbal abuse, since they can allude to the humorous nature of the comments they make in order to justify them.

Self-defeating humour was linked to a greater tendency to suppress anger.

Nothing works faster and more effectively than laughter. It is a powerful antidote to stress, pain and conflict, brings your body and mind into balance.

People who frequently laugh at themselves to gain approval of others have greater levels of psychological well – being. Laughter triggers the release of Endorphins, the body's natural "Feel Good" chemicals. ENDORPHIN promotes an overall sense of well-being and can even relive pain temporarily.

It has been observed that humour enables individual low score in honesty to build trust, closeness, etc. with other people and thereby use important information in order to manipulate them or obtain advantages in the future.

Maintaining a humorous perspective in adverse situations, i.e. use of self-enhancing humour, is typically found among people who manage anger more effectively, as well as among those with lower tendencies to exhibit anger.

Laughing at oneself is not easy, but it is better than the frowns. Laughter does not consume energy. It takes only 16 facial muscles to smile, whereas a lot more to frown. So, laugh frequently, laugh it off, shake it off. Our mental well-being is in our hand. Keep laughing. A smile a day keeps the doctor away and tensions at bay.

LAUGHTER IS THE BEST MEDICINE

Deepa. S
III B. Sc 'B' sec

STUDY SHOWS E-CIGARETTE VAPOUR'S CONTAIN LEAD AND OTHER TOXIC METALS

This article was published in science updates on 21 Feb 2018 by Harvard University

E-cigarettes typically use a battery supplied electric current that pass through a Metal coil to heat nicotine containing "E-Liquids" creating an aerosol a mix including Vaporized e-liquid and tiny liquid droplets. vaping, the practice of inhaling this aerosol as if it were cigarette smoke, is now popular especially among teens, young adults and former smokers.

Vaping is popular in part because it provides the nicotine "HIT" and the look and feel of tobacco-smoking but without smoking's extreme health risks. The e-cigarette liquids contain flavourings and other chemicals that harm cells in standard toxicology tests. The significant levels of toxic metals in e-liquid exposed to the e-cigarette heating coil.

The minimal amounts of metals in the e-liquids within refilling dispensers, but much larger amount of some metals in the e-liquids that had been exposed to heating coils with in E cigarette tanks. The difference indicated that the metals almost certainly had come from the coils. Most importantly, that the metal contamination carried over to the aerosols produced by heating the e-liquids. The metals significantly present in the aerosols are lead, chromium; nickel and manganese were the ones of most concern, as all are toxic when inhaled.

The levels of nickel and chromium in urine and saliva were related to those measured in the aerosol, confirming that e-cigarette users are exposed to these metals.

The aerosol metal concentrations tended to be higher for e-cigarettes with more frequently changed coils suggesting that fresher coils give off metals more readily.

Conclusion: smoking is a passion for teens, and they are addicted to it. The inhaling of the toxic chronic chemicals causes lung cancers, damages the liver, cardiovascular and brain damage, weakens the immune system.

DON'T SPOIL THE PRECIOUS LIFE FOR PASSION LIFE.

Kavya. R
III B. Sc 'B' sec

BREAST CANCER

Breast cancer is a kind of cancer that develops from breast cells and it is a excessive cell growth that causes cancer. It usually starts off in the inner lining of milk ducts or the lobules that supply them with milk. A breast cancer that started off in lobules is known as lobular carcinoma. While the one that developed from the duct is called ductal carcinoma.

Breast cancer occurs when cell in breast grow abnormally. As the breast cancer grows, it can spread to nearby tissues and lymph nodes. Advanced breast cancer can affect the bone, liver and brain.

The symptoms of breast cancer are: Swelling of part of a breast, skin irritation or dimpling, breast or nipple pain, nipple retardation, redness, scaliness, thickening of nipple or breast skin, bloody discharge from the nipple, or a milk discharge if you are not breastfeeding.

The physical occurrence of breast cancer:

(a) Breast lumps – Noticing of painful lumps in breast while showering or doing a regular breast self-exam. While a lump is the most common sign of breast cancer, other non-cancerous condition like cysts, can also cause breast lumps.

(b) Breast tumors – tumors are growths that form when the cells continue to divide without stopping.

Stages of breast cancer

Stage 0 – Breast cancer stage starts at 0 meaning the abnormal cancerous cells are still within the origin site of the breast where they started. This means they are non-invasive.

Stage I – Stage one occurs when the cancer cells break through the original site and invade surrounding tissue. At this stage the tumor is just under or at 2cm. The cancer is still within the boundaries of the breast. There is no lymph node involvement. There is micro metastasis in 1 to 3 lymph nodes.

Stage II –The tumor is more than 2cm but smaller than 5cm with lymph node involvement. The tumor is larger than 2cmbut without lymph node involvement or large than 5cm but not attached to the chest wall and still without lymph node involvement.

Stage III – The tumor is less than 5cm, spread to 1 to 9 lymph nodes but has not spread to distant sites. The tumor has grown in the chest wall or skin, but without lymph node involvement or up to 9 auxillary lymph node. The tumor can be any size, spread to 10 or more lymph nodes in areas such as under the clavicle, above the clavicle, enlarged the mammary lymph nodes.

Stage IV – It is the advanced stage where cancer has spread beyond the breast and its adjacent lymph nodes to other organs of the body that may include the brain, lungs or liver. This is also called metastatic cancer.

Treatment for breast cancer:

Early stage of breast cancer can be cured in most women. DCIS stands for ductal carcinoma in – Situ, which means cancerous cells have started to grow within one of the milk-ducts of your breast. The treatment can be done through surgery, and in higher cases it is done by radiotherapy, chemotherapy, hormone therapy etc.

Chandana. P
III B. Sc 'H' sec

YEAST TO PREVENT NUCLEAR APOCALYPSE?

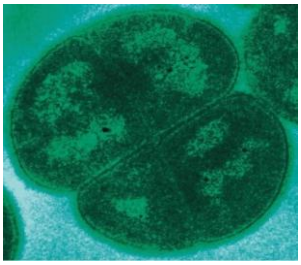
Nuclear power forms a very vital energy source of a developing and developed nation. It releases tones of energy, which can light up an entire city for about 3-4 days, sans any power blackouts. Yet, all those nations which produce nuclear power face a problem- safe disposal of nuclear wastes. As we inch ever-closer to a nuclear apocalypse, there may be a solution for the safe disposal of the inevitable radioactive waste.

Scientists have discovered that the solution to stop the radioactive contamination from spreading could be as simple as yeast.

In a study, researchers discovered that yeasts are surprisingly capable of withstanding radioactive and acidic conditions, like those that would follow a nuclear detonation. A species of yeast called ***Rhodotorula taiwanensis*** can even form a type of shield, called a biofilm, to stop the radioactivity from spreading. The reddish fungus, dubbed as the "hardcore yeast", was originally found in an abandoned acid mine in Maryland. It has even proved more effective in halting radioactive spread than a microbe that researchers nicknamed "Conan the Bacterium" for its resistance to radiation.

The potential for the yeast is enormous. The researchers are hoping to use their newfound fungal ally to stop the leakage of Cold War-era nuclear waste, which is stored at around 120 sites around the country. The largest of these is the Hanford Site in southeastern Washington, which houses more than 50 million gallons of nuclear byproduct and has contaminated 10,000 football fields' worth of soil since it was used to assemble the first atomic bombs during the Manhattan Project.

Is remains to be seen that the failure to act immediately to stop the radioactivity from spreading and containing it can result in radioactive poisoning due to the leakage of the nuclear wastes.With the mighty yeast on their side, these scientists are hopeful that they can contain the dangerous waste.



Rashmi. R
III B. Sc 'H' sec

SNAKE VENOM- A STOREHOUSE OF DRUGS?

Venomous snakes are known to bite prey or intruders, for the purpose of feeding or self-defense. Generally, most of us try to get through life without having to cross paths with a venomous animal. However, the dangerous substances in a snake's bite or a scorpion's sting may actually have value. In recent years, scientists have begun to investigate the disease-fighting properties of venom.

Cancer treatment is an emerging area in venom research. Also of interest in venom research subjects are venomous marine snails, which are described as "walking drug factories," due to the useful medicinal compounds obtained from their venom.

There's a growing body of research examining the chemicals in various animal and plant toxins and their potential effectiveness in treating conditions from chronic pain to HIV-AIDS. Experiments show that some of these substances have a curious ability to bind selectively to cancer cells and inhibit their growth.

Among the toxic molecules that could treat cancer are melittin, a peptide in bee venom, and contortrostatin, a protein in copperhead snake venom. A multidisciplinary study demonstrated the ability of a component of snake venom to inhibit cancer cell migration. The protein, called **contortrostatin**, was discovered into the venom of the ***Agkistrodon contortrix contortrix*** (a member of the pit viper family). Although experts can't fully explain exactly how the toxins bind to cancer cells, this quality makes them ideal for treating cancer.

Using venom to treat cancer is not a totally new idea. One cancer therapy method in traditional Chinese medicine, known as **Huachansu**, uses the venom secreted from a Bufo toad's skin glands and has been around for over 1,000 years. The desert-wandering Israelites in the Old Testament looked upon a bronze snake to be healed, and modern patients may one day owe thanks to the real thinking.

Further evidence of venom's promise in cancer research came from the Fred Hutchinson Cancer Center in Seattle, where James Olson and his colleagues found that **chlorotoxin** from the Israeli yellow scorpion could bind to tumor cells and help neurosurgeons highlight the boundaries of brain cancer during the operation. Since this discovery in 2007, eventually dubbed as the "tumor paint," Olson's laboratory has been devoted to looking at venom for sources of potential cancer drugs and has zeroed in on a class of proteins with knotted structures called knottins.

They're tough little proteins, and they're often found in venom. Knottins are known to be full of functions that can affect the cancer cells.

Using venom to treat cancer is not as simple as injecting these proteins into a patient, which could actually be quite dangerous. A courier is needed to deliver the protein right to the cancer cells.

Dipanjan Pan, an assistant professor in bioengineering at the University of Illinois at Urbana-Champaign, leads one of several labs that are exploring the use of nanotechnology to point the venom-derived proteins toward the right target.

Pan injects dense amounts of synthesized proteins, which are modelled after the ones found in bee and scorpion venom into plastic nanoparticles, and applies these nanoparticles to breast cancer and melanoma cells in the laboratory.

Holford compares this sneaky nanotechnological method of delivery to the classic Trojan horse: In this case, the body's immune system has to be fooled into letting the package in through its defenses.

Using nanoparticles to deliver these peptides is safe, as they don't induce an immune response. This yields a reaction in the body unlike the conventional Antigen-Antibody reaction that occur due to an immune response. This makes the venom- based treatments more desirable, rather than chemotherapy.

The ability of venom-based therapy to avoid damaging healthy cells gives it an advantage over more conventional treatments for cancer, such as chemotherapy.

In addition to attacking rapidly dividing tumor cells, chemotherapeutic drugs can destroy fast-growing normal cells, such as those in hair and mucous membranes along the mouth and throat, leading to unpleasant side effects. Mehlin proposes that drugs developed from these venom-based proteins would be small enough to target protein-to-protein interactions involved in a cancer's growth. Since there's been limited testing of venom-based therapies in animal models, let alone in humans, it could be a while before cancer drugs made from venom become available.

Some of the other drugs synthesized using venom is:

- Venom is extracted from snakes in order to produce antivenins.
- Neurotoxins, for instance, could be used to treat some brain injuries, strokes, or Alzheimer’s disease. And the blood thinning compounds in venom might help treat heart attacks or blood disorders.

There are numerous toxins found in venom that have evolved to target vital processes in the body. They appear to have a lot more selectivity than many chemical drugs. Researchers have been studying sea snake venom in hopes of finding toxins that target particular brain cells involved in learning and memory. Neurotoxins might be useful for working out what is happening in the brains of people with memory disorders such as Alzheimer’s. Such understanding, could lead to new treatments and discoveries of new drugs.

- The Research has already led to several new drugs. One is **Aggrastat**, a “super aspirin” that prevents blood clots that was introduced in 1998. The compound grew directly out of venom studies. Doctors knew that some snakebite victims bleed to death because the venom contains anti-clotting proteins.

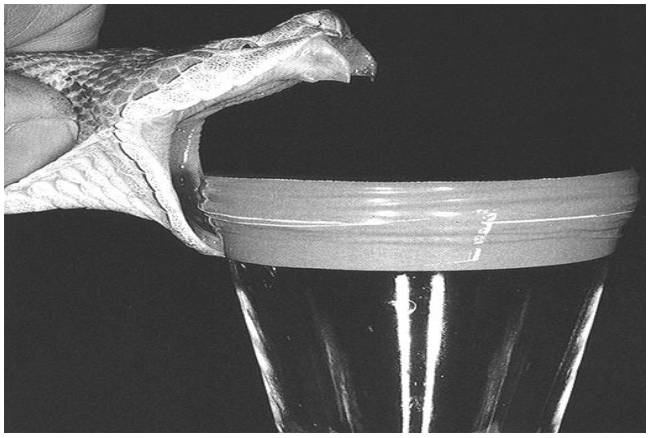
- Researchers from Philadelphia isolated one of those proteins from an African snake called the **Saw-scaled viper**. Then Merck built the Aggrastat molecule to mimic the snake venom’s anti-clotting effect, minus the toxins. The new medicine helps prevent heart attacks in people hospitalized with a dangerous type of severe chest pain.

So far, however, researchers fully understand only a few of the many compounds found in snake venom so there may be many more drugs to come.

- French scientists, for instance, believe one compound from copperhead venom might be useful for fighting breast cancer.
- A Malayan pit viper has yielded a chemical that could treat stroke. Cobra venom is being investigated for its use in treating Parkinson's disease.

These studies, researchers say, will hopefully prove that snake venom can be a powerful tool in the development of life-saving drugs.

However, researchers look forward to testing these drugs on animal subjects in the near future.



Milking a snake to obtain the venom

Fangs are specialized teeth that are attached to the venom sac

Rashmi. R
III B. Sc 'H' sec

THE HIDDEN FOE

All of us are aware the fact that the human and the animal body are hosts for many microbes within them, which are helping the hosts to function better. The parts of the body in which these organisms survive varies in different species of the organism. Also existence of these microbes plays a role in the individual's immunity.

In contrast, a recent research study, (dated 8.03.2018) at Yale University reveals that a bacteria found in the small intestines of mice and man can travel to other organs and trigger an autoimmune response. This autoimmune response can be suppressed with an antibiotic or vaccine designed to target the bacteria. Gut bacteria have been linked to a range of diseases, including autoimmune conditions characterized by immune system attack of healthy tissues.

The bacteria *Enterococcus gallinarum* is able to spontaneously "translocate" outside of the gut to the lymph nodes, the liver and the spleen. In these tissues outside the gut this microbe initiates the production of auto-antibodies and inflammation which are the hallmarks of the autoimmune responses. Some of the autoimmune diseases are type 1 diabetes, lupus and celiac disease. According to National Institutes of Health (NIH), around 23.5 million people in the US are affected by autoimmune diseases.

Earlier studies in mice have found that colonization of the gut can lay groundwork for the development of autoimmune disorders in future. Further studies on the same helped the researchers to find a solution.

The autoimmunity in mice could be suppressed with an antibiotic or a vaccine which targets *E. gallinarum* and its growth in the tissues and its effects on the immune system would be blunted. The vaccine against *E. gallinarum* is a specific approach, as vaccinations against other bacteria did not prevent mortality or autoimmunity. The vaccine is delivered via an injection to muscle in order to avoid targeting the other bacteria residing in the gut.

Hence, "treatment with an antibiotic and other approaches such a s vaccination is promising ways to improve the lives of patients with autoimmune disease" says Martin Kriegel, a senior author of this research paper.

The discoveries of new microbes and their pros and cons is a continuous process in the field of Life Science from time immemorial. Thanks to all our scientists and researchers who have made a constant effort to throw light on this topic and create awareness among the individuals.

Anagha. S
III B. Sc 'I' sec

GOOD NUTRITION CAN PREVENTS BRAIN CELLS DAMAGE AND AGING

A research study from McMaster University showed that dietary supplement can help in regenerating brain cells and delays aging of brain in Alzheimer's, ALS and Parkinson's disease. The dietary supplement includes 30 vitamins and minerals which shows remarkable property of antiaging. (Includes vitamin A, B, C and D, folic acid, cod liver oil, nutraceuticals and green tea extracts etc.,)

From a very long time studies have been conducted to understand the relationship with brain and food and it is believed that when the moisture of the brain in removed completely it would consist of lipids or fats as major composition with proteins, amino acids, and traces of micro nutrients and glucose. Brain functioning is more than these independent elements. Each element plays important role in behavior, mood, sleep and wake cycle and etc.

The important fats are omega 3 and 6 fatty acids these play important in improving degenerative brain conditions these must be included in diet. Omegas are good fats for the brain. The proteins and amino acids are important for development of brain and influences mood, behavior and attention as these elements influences dopamine, epinephrine and norepinephrine and ultimately influences our mood, behavior and attention. Like other body parts brain also requires micronutrients which acts as antioxidants and prevents damage of brain cells from free radicles and also helps in overall cognitive development. Brain also requires large amount of energy to function effectively; this energy is obtained from intake of carbohydrates which is converted to glucose in our body. Brain burns around 20 to 50 % of calories every day and this shows the great functioning of it.

It is believed from our mythological texts that food we eat definitely has influence on our brain. But there was no scientific evidences for that, but works from all over the world has shown that Yes what we eat has influence on our brain ultimately on the way we behave, our mood, attention and etc.

I feel our ancestors had better attention span, memory and brain power than what present generation has today; the main reason for this could be the quality of food. Those days they did not have fast foods, ready to eat foods and etc., which was not healthy to brain. They had good freshly cooked foods which was very much healthier to the brain and over all body. The disease like Alzheimer's and Parkinson's where also very less among them. People lived longer and healthier.

Healthy food = Happy brain = Good life.

P. Padma Sri Lekha
III B. Sc 'I' sec