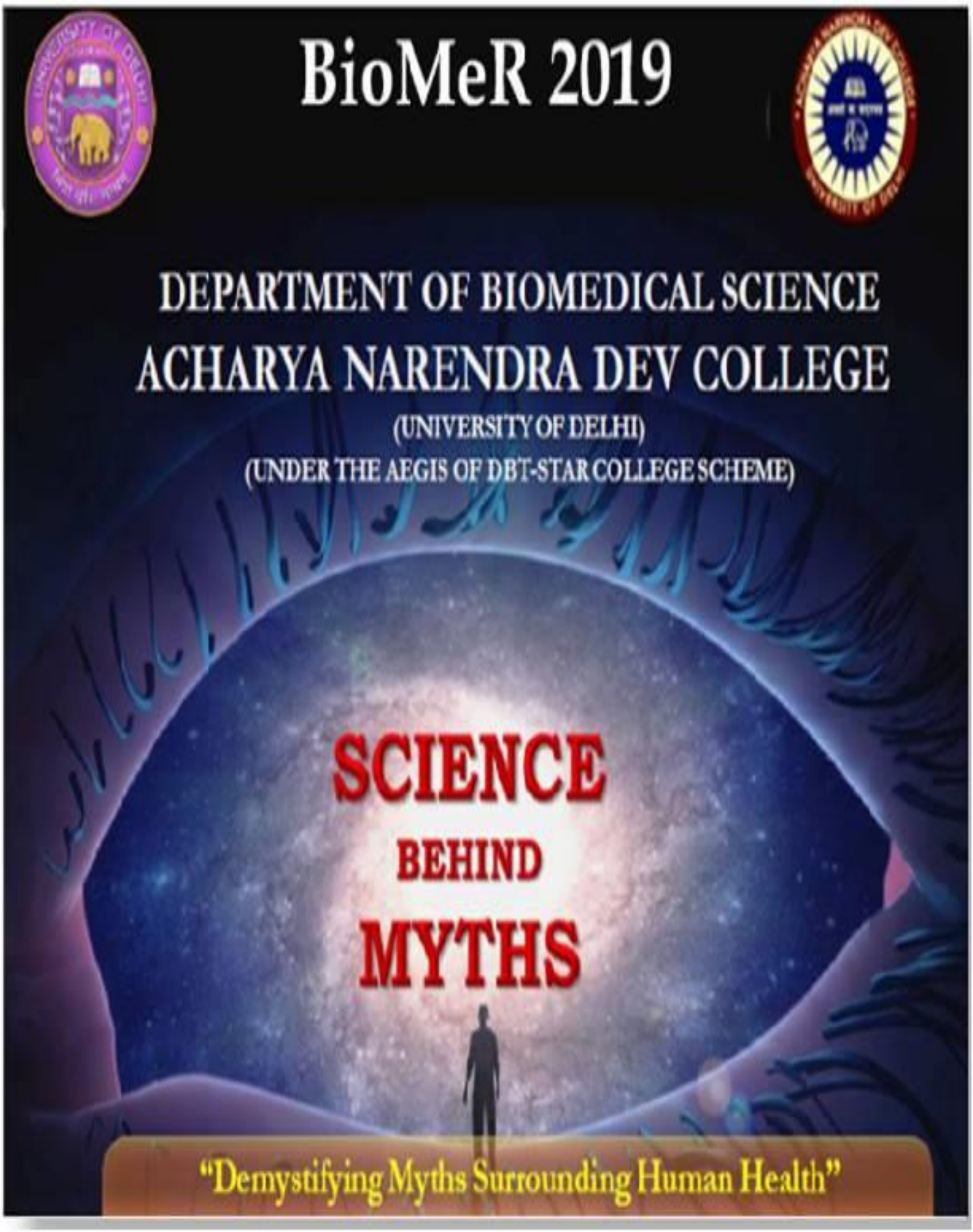
BioMeR 2019

DEPARTMENT OF BIOMEDICAL SCIENCE

ACHARYA NARENDRA DEV COLLEGE

(UNIVERSITY OF DELHI)

(UNDER THE AEGIS OF DBT-STAR COLLEGE SCHEME)



Special Thanks to

All the students of BMS and the Members of Teaching and Non-teaching Staff

BioMeR' 19

The Biomedical Science Reporter

Annual Magazine Released by

"Cathexis"

The Student Society of Department of Biomedical Science

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From the Principal's Desk

I congratulate Department of Biomedical Science for bringing out yet another issue of ***Biomer***. Over the years *Biomer* has become an integral part of the Department. This is the platform where students express not only scientific but also creative ideas. This clearly reflects that the Department focusses on overall development of the students and strongly blends with the twin ideologies— '*Beyond the Classroom…* and '*Preparing for the Future…*' of the College.

I sincerely appreciate the efforts and hard work put in by the students in collating this magazine. Surely, this will inculcate the habit of working in team, taking decisions and organizing themselves. Hope you all will enjoy reading this magazine. Wishing the students every success in all of their endeavors.

Dr. Ravi Toteja
Acting Principal

Message from the Desk of Head of the Department

Dear Students and Colleagues,

Having been associated with the Department of Biomedical Science since its inception in 1999, I could see its gradual ascendant from a naive, hesitant course to a flagship undergraduate programme providing comprehensive and interdisciplinary exposure to research enthusiasts which satiates their desire for knowledge and experimental skills. Down the years the dedicated and motivated teachers have provided a milieu which infuses students not only to excel in diverse disciplines of Biomedical sciences but has also groomed them to take informed decisions about their career choices. The metamorphosis from a shy first year undergraduate to a confident and zealous third year ANDCian is evident from the placements our students have consistently achieved in many of the prestigious institutions world-wide. Many have often reverted with innovative start-ups, patents, patient friendly kits and classical inroads, all because of their basic grounding in Biomedical Sciences.

Our society "Cathexis" and its annual magazine "Biomer" attempts to chronicle the scientific temperament and spirit of our scholars. Besides providing a platform to hone one's writing skills it takes teaching beyond classroom by focusing on a thematic topic each year. This year the effort has been to unravel and demystify the truth behind myths which have been prevalentvis-à-vis human health since a long time. This demystification would indeed go a long way inproviding an insight with a take home message even to a non-scientific person leading to more rationality in the understanding of human health. The eternal question whether the "chick came first or the hen" if dealt scientifically then the egg laying animals evolved much before birds evolved, if to be on the side that egg came first. However for chick to come, hen has to lay eggs in order to produce males. Thus it is one's wish to cater to either school of thought. On a lighter side we do note that the virus that causes common cold has not been found to increase in cold environment. There are many such questions which need to be addressed and researched thoroughly. The journal "Biomer' and the activities of Cathexis is one such attempt. Our sincere endeavor has been throughout and would continue in future too, to address both academic and the professional angle in our B.Sc. (H) course to ensure that our students build up a choice career in India as well as abroad. It is our commitment that the feathers which have already been added in our cap should grow -in fact mushroom. I wish that for the entire fraternity of the Department of Biomedical Science.

Sunita

Brief Introduction of Invited Speaker

Dr Anurag Agrawal is Director, CSIR Institute of Genomics & Integrative Biology (IGIB). He graduated in medicine from the All India Institute of Medical Sciences in 1994, followed by specialization in Internal Medicine, Pulmonary Disease, and Critical Care from Baylor College of Medicine, Houston, (2003) and a PhD in physiology (Delhi University).

He has led inter-disciplinary programs related to research in respiratory diseases and the use of information technology to advance healthcare. A recipient of multiple national and international honors, including the Shanti Swaroop Bhatnagar prize for medical sciences and fellowship of national science academies, he is an advocate for the smart use of emerging technologies, such as genomics and AI, to advance public health.

Anurag Agrawal MD PhD FNA FASc
Director, CSIR Institute of Genomics & Integrative Biology

Summary of Talk

"Myths are widely held but false beliefs. Science is a systematic body of knowledge founded on testable natural explanations and predictions. Magic is the power of supernatural influence upon events. Myths rooted in unnatural magical thought are easily demystified by science, but poor science also leads to mythical beliefs that are much harder to displace. We will talk about magic, myths, and science; exploring not only how science can be used to demystify myths, but also the myth creation potential inherent to any system of knowledge in absence of rigorous questioning and testing".

1. How Scientific Are Our Myths?

Ashwin Uday, B.Sc (H) Biomedical Science, II Year

How scientific are our myths? Horror stories are one of the most interesting parts of the fun life of children. They share such stories to flaunt their courage and enjoy seeing their friends get scared. Closed rooms, burning candles and eerie voices add to the horror filled false stories of children. Most of these are made up stories while some of them are simply myths. And one such terrifying myth is "hair and nails grow even after death" - sounds scary. People believe it's the presence of the spirit or the ghost, which make it happen. So this makes people avoid cemeteries and mortuaries and get frightened them at the narration of such stories. This idea might have probably found its way into the society when corpses began to be kept in ice or kept without being buried and people observed that as days passed the hair and the nails of the corpse began to grow. But it's just a myth.

No dead body has ever grown a hair or nail. It's just that these things appear to happen. First, once the person is dead, all the metabolic activities stop – making and breaking of molecules and hormone system is no more driven in the body. Therefore, there is nothing in the body that promotes growth. Growth of these basically requires glucose which is not available in the body once the person dies. Thus, skin cells, hair cells and nail cells do not continue dividing to produce new cells. Second, this growth is one that just appears to happen even though it does not happen. This is because in post death, there is no mechanism for maintenance of moisture, so the body gets desiccated. This causes shrinking of the body outline. So the skin near the nail and hair retract inwards and this results in the appearance that the length of the nails and hair is increasing which is mistaken for hair and nail growth occurring post mortem. So, this notion that hair and nails grow even after death is just a myth and does not actually happen. But people should realize that it is just a myth and try to understand what really happens.

2. Is She Impure?

MamtaChhetri, B.Sc (H) Biomedical Science, III Year

I have always proven to be a bag of questions for my mother, I used to sit with her for hours and bombard her self-proclaimed maturity with my part of immaturity for which I would merely get convincing answers. As soon as I hit puberty and had my first menstrual cycle, I faced a curiosity surge. Since my mother had opened the doors of basics for me a few years back, it wasn't surprising to see myself bleeding without being injured. But what made me feel ridiculous was the way I was treated, like an untouchable, or as if I have committed some sort of sin. My mother could never tell me the reasons for all those practices that she was so convinced about, may be because she herself was never answered.

In 1991, the Kerala High Court restricted entry of women of the menstruating age (10-50) from Sabarimala Shrine. The ban was recently lifted by the Supreme Court on 28th September 2018. It said that discrimination against women on any grounds, even religious, is unconstitutional. So, it took 27 years for our judicial system to realize this.

We have been practicing the rituals for years now and we are still not aware of the actual reasons for which they were taken into practice, we tell menstruating women not to enter the temples letting her feel impure or filthy without knowing the roots of this practice which go deeper than we can imagine. Life revolves around "energy" and so does the explanations around the menstrual practices. Our body functions are supervised by the three main doshas of Ayurveda namely Vata (characterized by the mobile nature of Wind (Air) energy), Pitta (embodies the transformative nature of Fire energy) and Kapha (reflects the binding nature of Water energy.). All the three doshas are equally important for a body's physiological activities but Vata predominantly governs the downward flow of blood during menstruation. . During menstruation a woman is considered to have high energy, her temperature increases than usual.

Temples are created at specific places, considering the energy of that spot, for which reason one feels relieved and peaceful when in a temple. The energy of that place is so high that it can lead to phenomenon like earthquakes if left open, so the energy is diverted to a straight point that we shape

into a temple. This energy flows in an upward direction unlike the energy of a menstruating women (*Apanavayu*, one of the elemental air functions of the *VataDosha*, is responsible for the downward flow of menstruation).

When a woman during her periods visits temple the upward energy flow of the temple interferes with the downward flow of energy in her body, making it painful for her as the apanavayu (*Apanavayu*is responsible for regulating the outward flow of "prana- *life giving force*" from the body and governs elimination of physical wastes and toxins from the body.) is pulled upwards by the force of a temple. When a menstruating woman touches the idol, exchange of energy occurs which can make the stone structure act abnormally. Hence for these reasons a woman was not allowed to visit temples during her menstrual cycles. She was never considered impure, instead was seen as a goddess. However this doesn't restrict her from preaching god who is omnipresent, also not all the temples nowadays are built at the energy centers.

We have been blindly following the age old beliefs without seeking the logic. Moreover we somehow managed to transform the practices made for a woman's betterment to something completely opposite. The menstrual practices were suitable when they were made and might not be as necessary now as they were then. Menstrual cycles don't make a women sinner or impure, she is the spirit of the world; she keeps the world going and is capable of creating a life. Cherish her and let her know the facts just the way you put all your efforts in making her believe that periods make her impure.

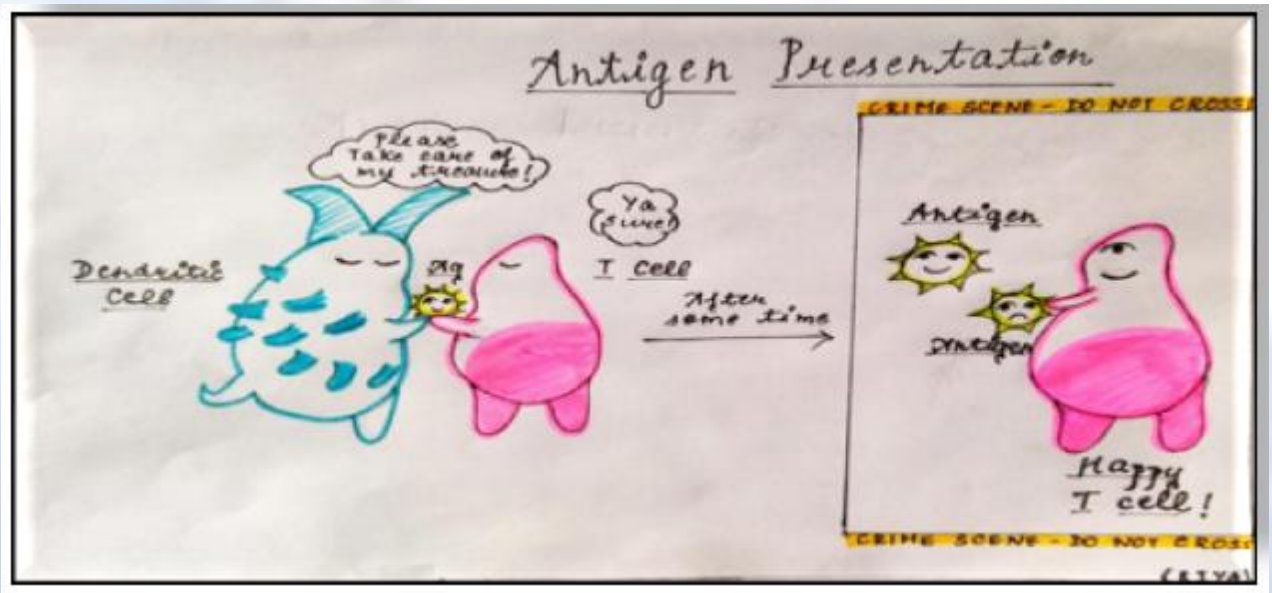
3. Spirits on Tree

Swarnasankha Acharjee,B.Sc. (H) Biomedical Science, II Year

One of the most common myth among villagers is that spirits reside on Neem trees during the night and everyone should avoid going there at night. Many people going there at night have felt heaviness in chest and suffocation. They have found it difficult to breathe under the tree at night.

This happens because trees breathe in oxygen and exhales out carbon dioxide. Since photosynthesis does not takes place at night, oxygen is not liberated. Anyone sleeping under a tree(Not just Neem) is exposed to carbon dioxide rich environment. The excess of carbon dioxide in the environment also means the person will intake more of carbon dioxide while breathing.

This makes the person feel suffocated. He will feel excess of weight on his chest and breathing problems. The excess of carbon dioxide intake will also lead to toxic effects on the body. Cells may begin to die due to lack of oxygen. For this reason, many people imagine paranormal activities happening around believing that if they sleep under Neem tree at night, a spirit may sit on their chest.



4. Does Your Heart Stop When You Sneeze?

Koyel Ray, B.Sc (H) Biomedical Science, II Year

It's not uncommon for people to say "God bless you" every time you sneeze. But how is God related to you sneezing, anyway? It is believed that this myth originated in Rome, when a bubonic disease was rampaging the lives of its people, some of the symptoms of bubonic diseasewas coughing and sneezing. It was then, that Gregory the Great suggested, saying the words"God bless you" would protect the denizens from the otherwise inevitable death by the plague. The expression might also have originated from superstition of some ancient men believing that the soul was in the form of air residing in the head. And a forceful sneeze would expel it out of the body! Can you believe that? However, the most recent of the myths regarding this is people believing that one's heart stops beating when he sneezes. That is not the case. In fact, sneezing is a very important part of the immune system. It helps to eliminate the first attack of bacteria or virus through forceful expulsion of air through the nose and mouth.

A tickling sensation in the nerve endings sends a message to the brain of the need to expel out the irritants on the lining of the nose. We first take a deep breath and hold it, which tightens our chest muscle, building pressure in our chest followed by a sudden and fast release of breath through the nose. That's briefly what happens when we sneeze. This change in chest pressure might occasionally result in the heart skipping a beat. This might in turn, result in changing the blood flow, but a sneeze doesn't stop the heart from beating. Cardiology says, due to the skip, there is often a prolonged delay before the next beat which is more forceful and noticeable, often giving a funny sensation in upper chest.

5. Demythification of Alternative Medicine through Research

Rohit R. Gokhale, B.Sc (H) Biomedical Science, I Year

In this era of conventional medicine featuring the dominance of allopathy, traditional medicine is often belittled and branded as "unscientific". Ayurveda, homeopathy, yoga, and meditation are a few examples that were projected to be scientifically baseless by the glittering western world. Our susceptibility to herd mentality made sure that we drifted away from our traditional medicine towards the modern western medicine and land into the world of allopathy. However, the current situation presents a strange paradox with the world now focusing a lot more into understanding the tenets of alternative medicine. Have we Indians just been caught wrong-footed?

These changing paradigms can be attributed to recent research breakthroughs, which are making it clear by the day that diseases no longer can be cured just by quelling the symptoms with drugs - the overriding philosophy of allopathy. Also, western medicine lacks personalization for the patients. Two different people with a given condition are getting the same drug whilst ignoring the differences between their body's responses and physiology. No wonder the biological complexities are making it harder to find actual cures and with the cumbersome procedure of drug development, it is surely going to be a race against time to keep finding newer drugs.Thus, it may not be incorrect to say that the age of this "concept-based" and symptom-specific conventional medicine is now changing! Alternative medicine on the other hand has been shown to have healing effects but is largely observation-based. Ancient Indian and Chinese civilizations, for example, have perfected treatments by simple observation and documentation. Concepts such as why curd should not be eaten at night, why chhaas or buttermilk is medicinal but curd or normal milk aren't as much, the concepts of suryanamaskara and so on are not mere myths as people perceived them to be. These are statements backed by solid scientific reasons that are continuously being unraveled by modern-day research.

Personalized treatment for patients that recognizes the difference between individuals and provides nature-derived medicines is a key feature. No wonder, now the concepts of gut

microbiome are becoming an important facet of human health. German born homeopathy was also

based on the observation of "like-cures-like" which essentially means that if you are being treated for a bee sting, you are likely to be treated with bee venom! Also it's concept of "dilution increases potency" which was thought to be illogical on the physical level is now being shown to have some sense by contemporary research on low-dose cytokine regimens. Also, the world is trying to find anti-toxins by trying to use low concentrations of snake, crab and scorpion venoms- which are actually the reasons for toxicity!

This type of traditional medicine seems mythical because of patients being misled by people, lack of knowledge, less scientific evidence. While it does work on placebo effect (all medicines do) to an extent but we are eventually heading into the unconventional and alternative direction with advancements in research!It is the need of the hour to keep squashing myths related to alternative medicine and with the inception of fields such as ayurgenomics (Ayurveda), biomechanics (yoga) along with promotion of homeopathy, we are achieving what we want! However, I should emphatically underline that we should stay away from whimsical claims and irrational talks that do more harm and take the focus away from the need of developing rational scientific approaches.With the winds of change blowing and the world re-shifting its focus back at principles of alternative medicinal therapies, we must set sail and continue proving to the world that the facts, which were disdainfully called as 'myths', are actually scientific principles.Alternative therapies are now being aligned in such a way that they gain maximum public outreach. Without a doubt, it will surely complement conventional medicine along with any other further advancements in biomedicine. What the world perceives as myths can be validated through research and development, which will establish them firmly.The onus is on us, the next generation young scientists to demystify and hence 'demythify' alternative medicine through research and develop a scientific basis for all the observational theories such that we can use its benefits for the great human race!

6. Does Consuming Milk After Eating Fish Cause Leukoderma (Vitiligo)?

Deepak Sahni,B.Sc (H) Biomedical Science, III Year

Leukoderma is also known as Vitiligo, It is a skin disease that causes loss of skin pigment (melanin) which leads to skin whitening of skin. When the condition gets severe, the spots cover almost all parts of the body including the scalp, face and the genitals. Most cases occur before the age of 20. It occurs commonly in horses with ventral midline dermatitis, viral skin diseases, freezing, burns, or sun damage. It can result due to contact of the skin with chemicals which inhibit or interfere with melanogenesis, such as phenol and rubber products containing monobenzyl ether or hydroquinone. It is a common belief that if fish and milk are consumed together, it may lead to development of depigmented patches on the skin but has never been scientifically validated. There are a number of fish dishes that use curd or other dairy products as an important ingredient.This fact opposes the belief of developing skin patches or the condition of leukoderma, when milk and fish are taken in combination. Although some dermatologist agree with the fact that this combination of milk and fish leads to terrible allergic reaction, it varies from person to person.

According to Ayurvedicscience, consuming the combination together increases the “Tamasguna” in the body which could lead to an imbalance which gives rise to certain chemical changes in the blood. This leads to skin depigmentation or a condition also known as leucoderma. “Tamas” is one of the three gunas, a philosophical and psychological concept developed by the Samkhya school of Hindu philosophy, which have qualities of inertia, inactivity, dullness, or lethargy. The other two gunasare “Rajas” (passion and activity) and “Sattva” (purity, goodness).While some nutritionists believe that the combination is not compatible because milk has a cooling effect on the body while fish has a heating effect on the body as it is rich in proteins and when they breakdown during digestion, a lot of energy is released. With majority of people inclined towards believing that fish and milk is a harmful duo, science does not assert the same. There is still no explicit evidence to prove the consequences. An ideal Mediterranean meal, which is now being considered as one of the healthiest diets globally, includes a combination of fish, yogurt or milk along with cereals, healthy fats and nuts.

7. A Contradiction...

Mani Gupta, B.Sc (H) Biomedical Science, III Year

Some people are strong but weak with their feelings...

Some people are bold but shy...

Some people have everything but have nothing...

Some people are zealot but quiet...

Some people are joyful but seem serious...

Some people are passionate lovers but fail to accept love...

Some people have good control on their emotions but fail to control their emotion in front of someone...

Some people are leaders but fail to lead themselves...

Some people seem arrogant but soft inside...

Some people admire honesty but don't live up to it...

Some people understand it all but live in denial...

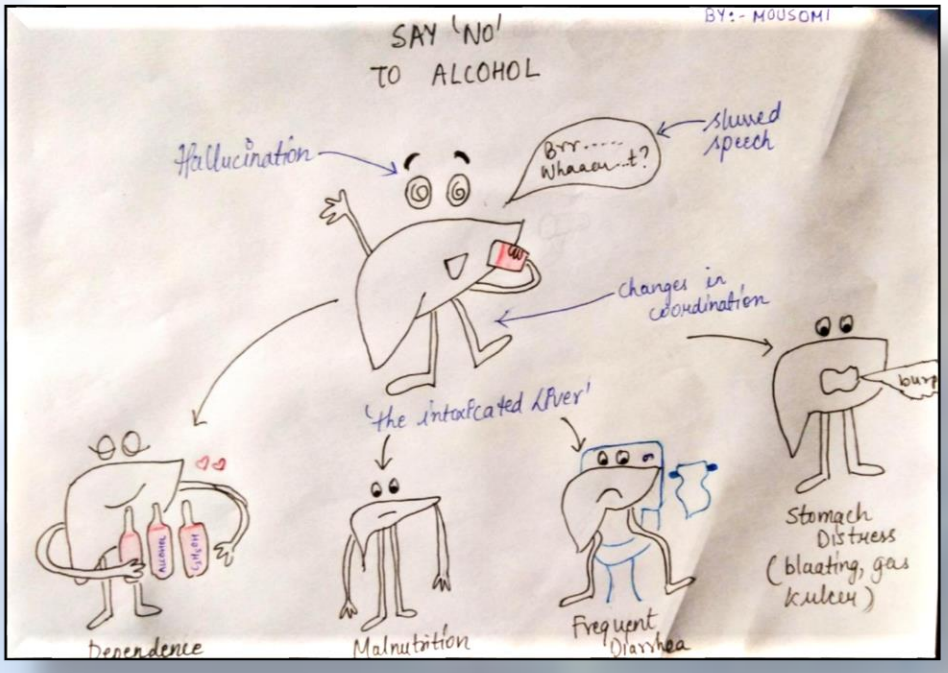
Some people handle everything but not their feelings...

These all may become you or you may become them all...

8. Yoga Cannot Cure Cancer

Mansi Arora, B.Sc. (H) Biomedical Science, I Year

Nothing is more difficult than competing with a myth, one amongst them is that "*YOGA CAN CURE CANCER*". Recent studies have suggested that yoga practice can influence gene expression of immune cells. People tend to believe that yoga can decreasethe side effects and symptoms of cancer. But there is no scientific evidence to prove that yoga can cure or prevent any type of cancer. Yoga can help to reduce anxiety, stress and depression. It can also provide mental peace to the patient instead of curing physically. Only improvement in the quality of life and general well-being can be observed in cancer patients, who practice yoga. Yoga has its positive upshots on other health problems such as: high blood pressure, joint problems, epilepsy etc. however Yoga cannot cure cancer.



9. Flat Feet; Bad Luck?

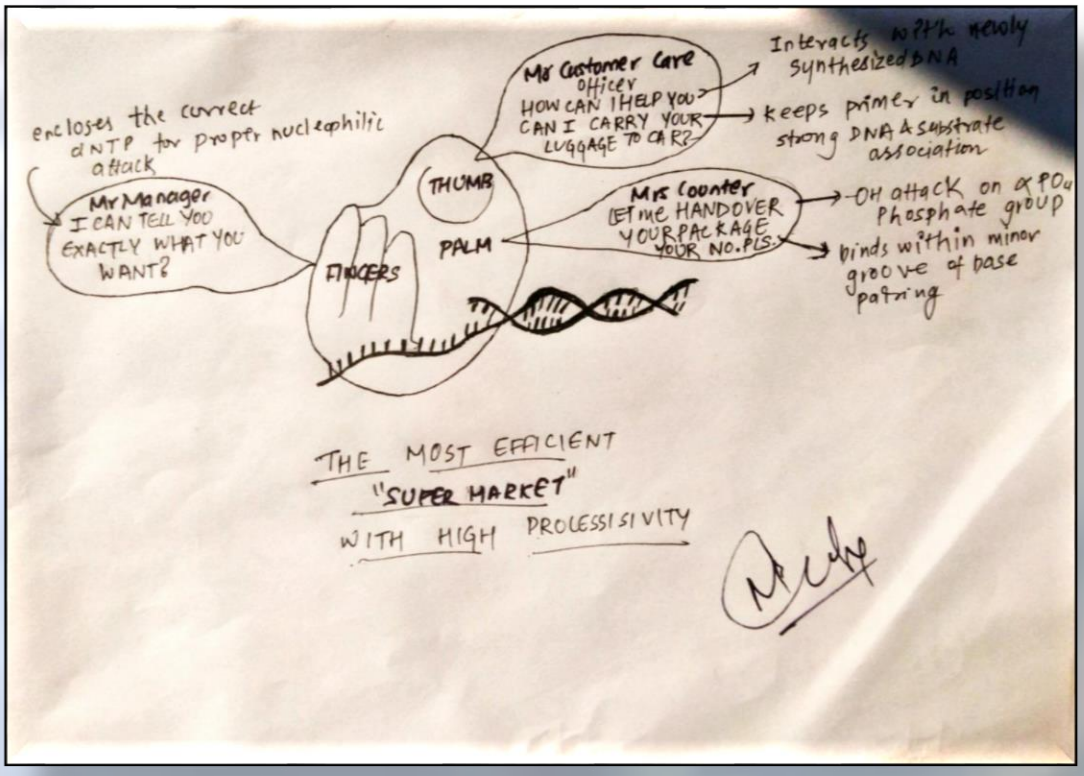
Varshini Padmanabhan, B.Sc (H) Biomedical Science, III Year

Superstitions have engraved themselves very deeply at the heart of the Indian culture; roots with such depth, that even in an unconscious state of mind, we tend to be cognizant of any out of the ordinary incidences, or mindful of mandates which have now become a custom. Some of these customary beliefs are not a consequence of make- believe games but do have a scientific explanation to cement their integrity. Following this trail of thought, one common Indian superstition is, 'People with flat feet bring bad luck.' Those with flat feet have a very low or a non -existent arch on their foot meaning that one or both of their feet tend to lie flat on a smooth and uniform surface. Why does flat feet emit such a sense of foreboding?

Well, simply because the arches help in the distribution of body weight across the feet and legs, functioning as shock absorbents. For every step that is taken, the foot in its normal arch configuration is gradually lowered as the body weight presses down on it, thereby absorbing shocks. However, for a flat foot, there is no lowering of the arch and the responsibility to hold the body weight is dissipated inappropriately to the knee, hips and lower back.

The biomechanics have been altered in a fashion that the structures not designed to carry out such operations, now consistently accept greater loads which may result in future back problems due to years of use and abuse of body. Yet another very common foot problem seen in an orthopedic office is plantar fasciitis. The plantar fascia is a thick, web-like ligament that connects the heel to the front of the foot, supporting the arch of the foot. With the lowered arch there tends to be an excessive pulling of the plantar fascia, which leads to chronic heel and arch pain. Tight Achilles tendon, which are the tendons attaching the calf muscles to the heels, may also result in plantar fascia pain. Simply wearing shoes with soft soles and poor arch support can also result in plantar fasciitis. Too much pressure on the feet can damage or tear the ligaments; the plantar fascia becomes inflamed, and the inflammation causes heel pain and stiffness. Yikes! Flat foot people do certainly have a relative disadvantage to the ones who have normal arched feet but affirming them as, 'harbinger's of bad luck',Woah! that is mildly harsh. But of course, there are those that are born with a silver spoon of luck, and others with the best bodily faculties but still somewhat end up falling into a ditch. Luck in its metaphorical sense; however scientifically we wish to

define it, does have a play on an individual's life. After all, not every flat footed person will have limiting physical constitution.



10. Hardworking ~10 % Brain

Mousumi Chakraborty, B.Sc (H) Biomedical Science, II Year

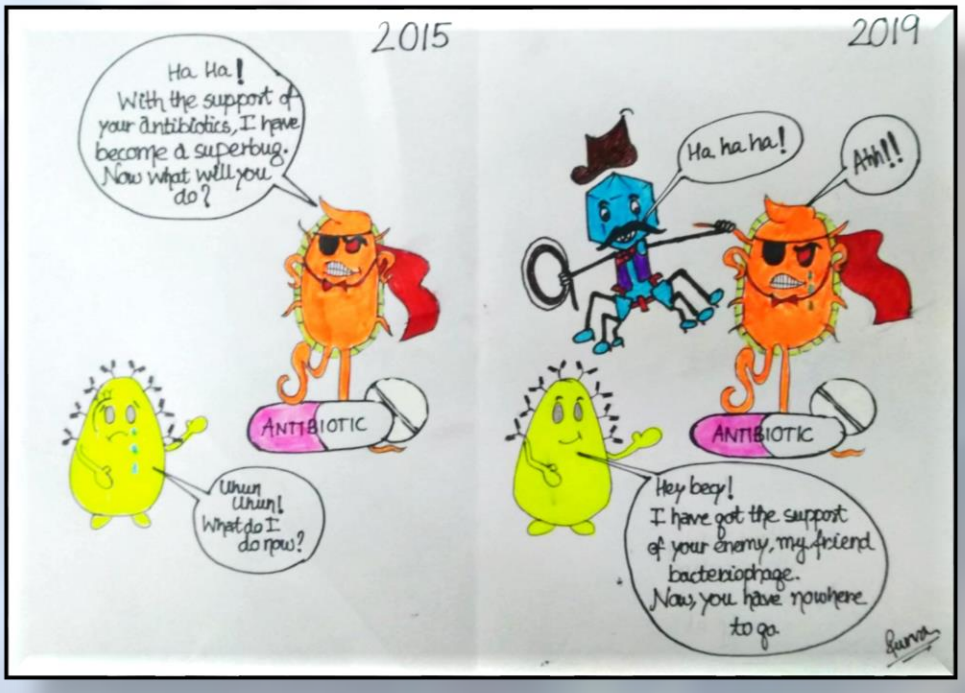
Since early childhood we have heard that we use only ~10% of our brain and the rest 90 % brain potential remains untapped. This rumour perpetuated and influenced many writers to come up with the stories of a human who uses 100% of the brain potential, and the next thing we know is, we are sitting in a cinema hall with popcorn in our hands watching "Lucy" .If you haven't watched, good for you,because you didn't let the myth seep into your only 10 % 'functional brain'. Well, it's true that we use ~ 10 % of brain but it's not true that we are wasting the remaining 90 %. Let's start out with some facts. A human brain forms 2% of the total body weight and consumes around 20 % of total energy used by the body. That's a whole lot expenditure on just 2 % weight of our body and remember this is for when ~10 % is used. We have 86million of densely packed neurons in brain. Also,majority of the energy is used up to maintain the neuronal structure by pumping sodium and potassium ions across the membrane the also to maintain membrane potential. 3.4×10^{21} ATP molecules are consumed per minute just for this maintenance. Now, for doing tasks the brain has to fire action potential by releasing neurotransmitters which also consumes energy adding up to the earlier maintenance expenditure. Sometimes you have to be Gregor Mendel to derive a good conclusion in Biology. So, can we use full 100 % of brain potential?

Yeah you have guessed it right it's unfeasible! Before you go questioning why the evolution didn't go in the direction to find a mechanism to use greater % of brain , apply the brakes,because it is able to achieve something great. Human brain can carry a huge amountof information while using the least amount of energy- a feat achieved by nature even before 100,000 years, which humans achieved to do so artificially just a few decades ago. It uses Sparse coding - using only small % of brain cells at a particular time thereby, decreasing the energy load and increasing the amount of information stored.

So next time –

- ✓ Appreciate your brain during exams to have evolved in such a way to store large amount of information.

- ✓ Let your brain take some rest in between study session and never forget to have food (source of ATP).
- ✓ DO TELL OTHERS ABOUT THIS MYTH BUSTER!



11. Do the bulls get angry on red color?

Shubham Shukla, B.Sc. (H) Biomedical Science, I Year

We all have heard of the game of bull fighting. In this game there is a bullfighter (matador) and he has a cape of color red (muleta). He waves that cape in front of a bull and the bull became angry. It looks like the bull become angry due to the red color of the cape but in reality, it doesn't. Bulls are color blind for red color and hence cannot differentiate between red and green color. So what makes the bull angry? Actually, it isn't the red color which makes bull angry but the movement of the cape. The bulls used for bullfights belongs to a very aggressive breed so when matador waves the cape then the bulls gets annoyed and become angry.

For revealing this truth, The MythBusters conducted some experiments on bulls;

Experiment-1They placed three flags of red,blue and white colors in front of a bull and the bull charged at all three flags regardless of their colours

Experiment-2They placed three dummies of red blue and white colors in a ring and the result was same as the above experiment, the bull got charged at all three colours

Experiment-3They used three persons, one wore red color and the other two didn't. The person in red color stood still but the other two were made to move constantly. The bull targeted the two who were moving and left the person wearing red color.

So why they use the color red in bullfighting?

There are no hard facts about it. It was just a traditional practice.

12. Questioning the five senses myth

Kamakshi Tomar, B.Sc. (H) Biomedical Science, I Year

How many senses does a human have? What a simple question to answer. Isn't it? We all have learned about the FIVE senses that a human has from our middle school textbooks. To list those five senses, most of us would begin with touch, smell, taste, sight, and hearing. We all are familiar with the presence of all these senses. When we raise our hand while keeping our eyes closed, we still sense the stretch of our muscles that cause our muscles to handle a load of our bones while we raise our hand and that too when we are not visualizing the movement of our hand. How are we able to know that we have completely raised our hand to the maximum position that our arm can acquire without even visualizing? This shows that we all have another sense that keeps us aware of our bodily movement and position. In a similar way, we have many other senses in our body that we feel which do not fall into the category of the aforementioned five senses.

Now the question comes that how many sense does a human actually have?To begin with, Sense is a physiological capacity of organisms that provide data for the perception of an external or internal stimulus. The nervous system has a specific sensory nervous system, and a sense organ, or sensor, dedicated to each sense. The ancient scriptures of different cultures supported the presence of a different number of senses in the human body. Like the Hindu scriptures supported the presence of panchindriyan whereas the Buddhist scriptures named six senses. Similarly, the West African Hausa have a tradition of distinguishing only two senses: vision and everything else. In the 16^{th} century, the concept of "wit" and "sense" used to overlap; consequently, their meanings were most of the time misunderstood.

Aristotle, in his work De anima book II, talked about five different sorts of wits that a human contains and that idea became very popular among the masses. These views became a part of classical psychology and the idea of five aforementioned senses lingers as a fallacy among the folks. These conceptions of how we sense our environment have been the topic of a couple of thousand years of philosophical scrutiny and more recent scientific inquiry.

Yet it is notable that both the scientific evidence on the topic and numerous theories in the history of psychology, seem to have rejected the idea of the five senses. The development in the field of psychology led to the decline of Aristotle's five wits theory.

By mid-1850s, Gustav Fechner and Hermann von Helmholtz independently conducted research on the relationship between physical stimuli and sensory reactions. Both contributed research findings that remain valid until now, and they were able to establish the rigorous methods that continue to form the basis of psychophysical studies. The onset of categorization of senses began from these early discoveries. In the 19th century, Wilhelm Wundt and Edward Titchener independently theorized about atomistic elements of sensitization. Like the periodic table of elements in chemistry, they prepared table containing the elements of sensitization. Their table consists of more than 44,000 distinct sensory elements including hues, durations, extents, affective dispositions, and other low-level phenomenological qualities.

In the same context, work done by Charles Myer, in the field of experimental psychology, led to the development in the knowledge of other distinct senses. He explicitly described several different distinct senses such as labyrinthine sensations (balance-inner ear); motor sensations (kinesthetic reactions); auditory sensations (cochlea); visual sensations (retina); gustatory sensations (taste buds); olfactory sensations (nose); and a complex group of cutaneous and visceral reactions – with likely distinctions between sensations of temperature and pressure. The current shreds of evidence are still consistent with the Myer's work. In 1875, William James theorized that sensory reactions provided the foundational pieces of our conscious experience and supported neural plasticity (the ability of the brain to change throughout an individual's life). So now we know that humans have a multitude of senses. To begin with, Sight (vision), hearing (audition), taste (gustation), smell (olfaction), and touch (somatosensation) are the five traditionally recognized senses. Other additional senses include senses such as Balance or equilibrioception, which is the sense that allows an organism to sense body movement, direction, and acceleration, and to attain and maintain postural equilibrium and balance, that is being controlled by the vestibular system; Thermoception, which is the sense of the heat flux (the rate of heat flow) on the skin and internal areas; Proprioception or the kinesthetic sense, provides the parietal cortex of the brain with information on the movement and relative positions of the parts of the body; Nociception (physiological pain) signals nerve-damage or damage to tissue; Sexual stimulation is any stimulus (including bodily contact) that leads to, enhances and maintains sexual arousal; Interoception which is defined as

"any sense that is normally stimulated from within the body" which involve numerous sensory receptors in internal organs, such as stretch receptors that are neurologically linked to the brain.

There are some perceptions which are not sense organ based such as chronoception, which refers to how the passage of time is perceived and experienced. Although the sense of time is not associated with a specific sensory system, the work of psychologists and neuroscientists indicates that human brains do have a system governing the perception of time, composed of a highly distributed system involving the cerebral cortex, cerebellum and basal ganglia. The sense of agency is also one of the aforementioned senses which refers to the subjective feeling of having chosen a particular action. In some conditions such as schizophrenia, the loss of this perception makes the patient feel like a machine or even the patient can encounter delusions of being controlled by some external agency. Recognition memory is also one type of sense which doesn't associate with any sense organ, which is sometimes divided into two functions: familiarity and recollection. A strong sense of familiarity can occur in cases of deja vu. The temporal lobe, in particular, the perirhinal cortex, responds differently to stimuli which feel novel than to things which feel familiar. Humans are also currently thought to have a perception of magnetic fields (magnetoreception) too but not many pieces of evidence are present in this field to prove this conjecture. Therefore all these senses in the human body work in harmony to provide the consciousness that we require to survive. In total, there are 14 to 21 senses present in a human.

Other mammals and other organisms many other different types of senses such as perception of infrared rays in snakes, the perception of moisture change in the environment (hygroreception), the perception of electric fields (electroreception) etc. Aristotle was very far behind in knowing the actual senses in the human body. Its crude hypothesis still pervades among the minds as a myth which needed to be debunked.

13. Vaccine Myths Debunked

Asad Ali, B.Sc. (H) Biomedical Science, II Year

Recentlymanyparentsaredenyingtovaccinatetheirchildren.AccordingtoCDC'sschedulebytheageof6children mustgetupto14vaccination– withinlasttwentyyearsmanyvaccinesweredeveloped.Manyparentsdon'ttrusttheseveral vaccinesandthinktherecanbepotentialriskandlongterm sideeffects.However,researchshowsmostoftheissuesareillusionsormyths.

Myth#1: So many vaccines can't be handled by a baby's immune system. Immunesystem ofinfantisstrongerthanyoumightthink.Theoreticallyababyhaveenoughantibodiesintheirbloodtorespondtoatho usandvaccinationsatatime.Itwouldnottakemorethan0.1%ofbaby'simmunesystem evenifallthescheduled14vaccinationsaregiventokidsaltogether.Andscientistsbelievethiscapacityispurelytheo retical.Due tocells inoursystembeingconstantlyreplenisheditisimpossibleforvaccinestocompletelyoverwhelm theimmunesystem.Inreality,ifcomparedtodailyexposuretobacteriaandvirusestheimmunizationofbabyisneglig ible.

Myth#2:Toxinsin vaccines. Vaccinemaycontainformaldehyde,mercuryoraluminum whichconcernpeople.Factually,certainlevelofthesechemicalistoxictohumanbody,butthesechemicals areintraceamountinFDAapprovedvaccines.Factually,ourownmetabolicsystem produceformaldehydeathigherrateasreportedbyFDAandCDCandsofartherearenoevidencetoprovethesechemi calinlowlevelcanbeharmfulinvaccination.

Myth#3:Diseasecanbecausedbythevaccineswhichit'stryingtoprevent.

Mildsymptom ofdiseaseswhichvaccinationpreventmayappearafterthevaccination.Thesesymptomsarecommonlymisunderst oodassignofinfection.Infact,inthesmallpercentage(lessthan1inonemillioncases)wheresymptomsdooccur,itis notdiseaseitselfbut immune responsetothevaccine.OnlyOralPolioVaccine(OPV)isreportedtocausethediseasebythevaccination.

14. Is obesity the only reason for Hypertension?

K. N. Devi,B.Sc (H) Biomedical Science, II Year

We are often nagged by our elders on what kind of food and how much we eat. They even claim that fat people are sure to have hypertension sooner or later. Well, we do see a lot of fat people suffering from hypertension at older age by mere coincidences and thus we believe what our elders told us. However, have we ever spared some minutes to think about why those sayings might be true and what might be the possible reason behind that?Myths are not always about history, nor folktales. Sometimes, people around us also create and spread myths, professing their own ideas and concerns about things or conditions prevailing at the time. But you know what, it is really fun trying to look at scientific reasons behind all those myths surrounding our daily life. Maybe because majority of the mass are educated or partly because they want to have a rational way of thinking where we can explain confidently with facts, since science is based on facts not hypothesis. But we also see cases where thin people also suffer from hypertension while other fat people live healthy and long life.Why did our elders claim things when they were not even familiar with science? If we doubt them for such reason, it would be a big mistake on our part. Our curiosity should not criticize their scientific knowledge, rather we should research the underlying reasons to the questions our mind asks.

Scientifically, what do you mean by hypertension? What causes hypertension? Is being fat or obese the only cause of hypertension? Hypertension is a condition when a person`s diastolic blood pressure (BP) rises higher than 90mm of Hg and systolic pressure higher than 140mm of Hg, indicating an elevated blood pressure on the wall of arteries. It can be chronic and can be inherited genetically. The actual cause of hypertension is still not confirmed or known. Being fat or obese is a great risk factor for hypertension but not the only cause. Hypertension is also resulted from a number of risk factors other than obesity including stress, sleep deprivation, administration of steroidal drugs or taking hormone pills, physiological disorders like kidney problems, etc. There is also risk of old age, lifestyle regarding high salt diet, excessive cholesterol intake, lack exercise (sedentary lifestyle). How does hypertension relate to obesity?

Obesity is a term we use for the condition of an overweight person whose body has excess fat deposition to a hazardous extent. It is also an emerging lifestyle disorder worldwide. Besides being itself a high risk factor of hypertension, it also worsens the cases of chronic or long term hypertension. It may lead to

arthero-sclerosis - a condition in which the walls of arteries become narrower and hardened by forming plaques on the blood vessel walls and may ultimately damage the cardio vascular system, causing strokes Statistically, 60-70% of hypertension are involved with obesity. This may be the reason why our elders said fat people are prone to hypertension. But, you do not have to worry too much as we can reduce the risk by maintaining a healthy lifestyle. Too much worry can become stress, which is also a risk factor of hypertension. We can still try! Hypertension can be reduced by following a healthy, low fat and low salt diet; regular exercise, taking anti-hypertensive medications (calcium ion channel blockers, beta- blockers, etc), adequate sleep, avoiding intake of alcohols, junk foods, etc. So, instead of worrying over the disease, everyone can prevent themselves from potential risks optimistically.

15. ROS can be good too!

Sibaram Sadangi, B.Sc. (H) Biomedical Sciences, III Year

A common myth persisting among researchers doing biomedical research is the belief that Reactive Oxygen Species (ROS) are exclusively evil harbingers of several pathological conditions. Historically, the ROS family was considered to be a harmful byproduct of aerobic respiration. Undoubtedly, the pathological characteristics of $^{\bullet}O_2^-$, H_2O_2, $\bullet OH$ and $^1O_2$ etc. have been implicated in several diseases including cancer and neurodegenerative diseases. However going down the lane of evolution, if we were to ponder on the origin of life which occurred in highly reducing atmospheric and oceanic conditions, there remains a high possibility that the initially formed oxygen would have transformed into Oxygen free radicals or intermediates. The presence of ROS scavenging enzyme superoxide dismutase (SOD) across various life forms from archaebacteria to mammals corroborates the hypothesis. But a more important question is, 'is there any beneficial biological relevance of ROS; a supposedly degrading cellular agent?'

Certainly YES!

In normal physiological conditions, mitochondria, endoplasmic reticulum and the cell membrane also generate ROS which has a significant physiological role of mediating the oxidation and reduction of other biomolecules. It works as a central signaling molecules by interacting with cysteine amino acid of proteins in a cellular system for growth, proliferation and differentiation. A basal level of ROS is indispensable for proper functioning of several ROS-dependent signal transduction pathways in the presence of growth factors. ROS influences the microenvironment of bone marrow and plays a pivotal role in regulation of self-renewal, growth, development and further movement of hematopoietic stem cells (HSC) into blood stream. ROS's significance as critical mediators of inflammation and autoimmune diseases have provided novel insights in this direction. Megan Scudellari in her published Nature article on "Myths that will not die" states, 'antioxidants are good and free radicals are bad' as one of the most commonly prevalent myths in the society. She writes that the myth has spiraled down deep and has, in fact, started modulating our habits so much that the global market depends heavily on antioxidant products ranging from morning beverages to vitamin supplements. We should anticipate and welcome such research that investigates the beneficial roles of free radicals.

16. Science Behind "Winter Blues"

Harmanpreet Kaur, B.Sc. (H) Biomedical Sciences, Iii Year

Winter Blues generally refers to a feeling of sadness, sleepiness and lethargy during winter season. In scientific terms, it is a Seasonal affective disorder (SAD), a depressive state recurring in the cold months especially December, January and February. An important factor is the decrease in availability of sunlight. This results in low levels of vitamin D3 (calcitriol) in our body since UV-B radiation is required for its production. The vitamin formation happens in a multi-step pathway, beginning with the conversion of cholesterol present in the skin.Low 25(OH)D_3serum concentrations have been associated with an increased risk of many mental conditions like bipolar disorder, depression, schizophrenia, antisocial and impulsive behavior. Vitamin D3 is a ligand for nuclear receptors controlling the transcription of genes by acting on vitamin D response elements. Vitamin D3 is thought to control the production of serotonin in brain by acting as a transcription factor of the serotonin-synthesizing gene called tryptophan hydroxylase 2.

Serotonin plays an important role in functioning of brain by acting as a neurotransmitter. Serotonin is concentrated in the regions of brain which are known for regulation of social understanding and decision-making that have been altogether called "the social brain". Hence, decreased levels of serotonin negatively affect our social behavior. Further, melatonin production is increased by the pineal gland in response to decreased exposure to daylight in winters. This gives the feeling of sleepiness and tiredness. As a result, it is harder to get out of bed during winter mornings. A few changes in the routine behavior such as spending more time under the sun light, taking vitamin D supplements, eating fish or using fish oils are recommended to achieve optimal vitamin D levels in the body. These measures can significantly alter the depressed state of mind.

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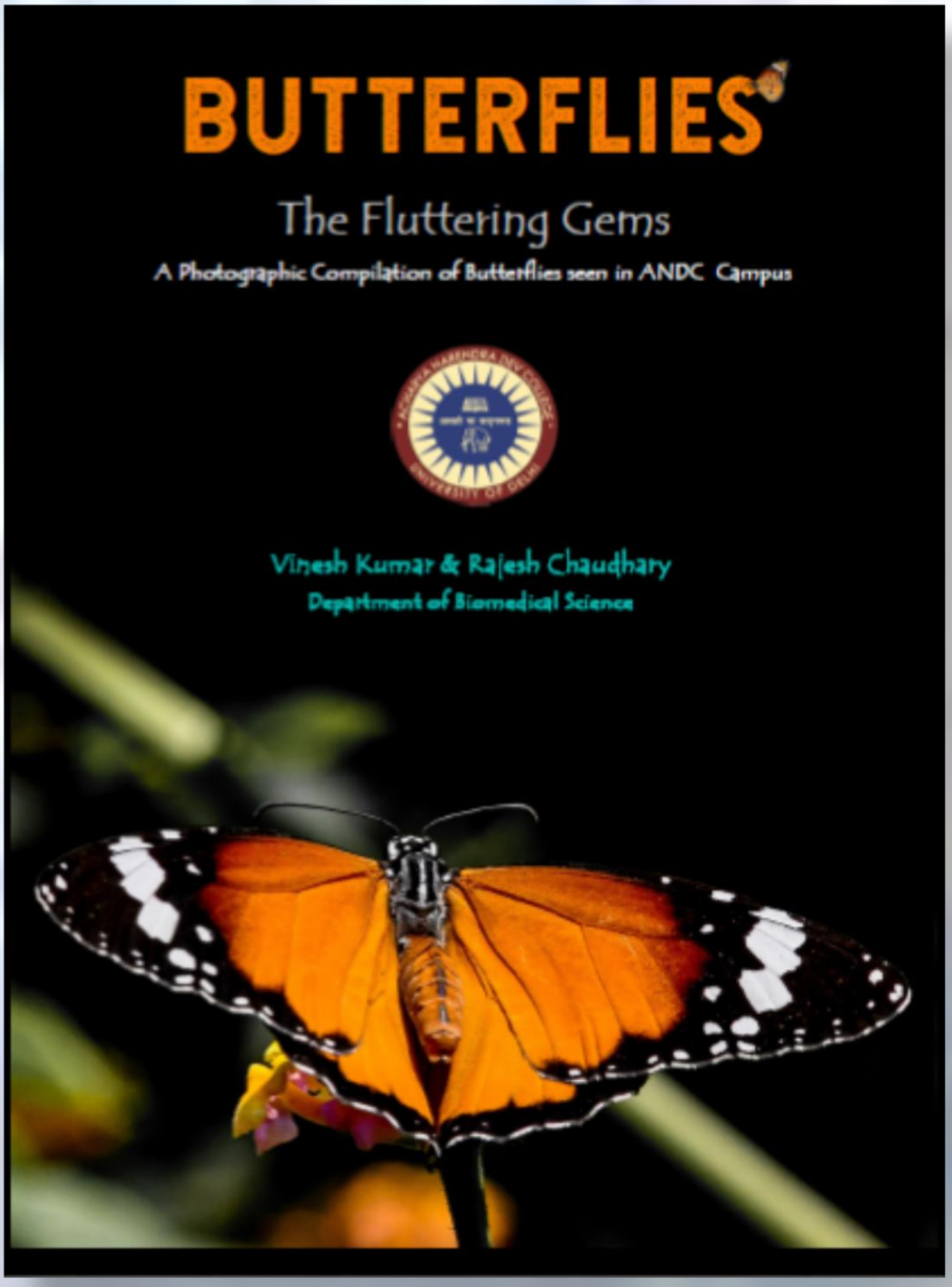
Quotes

- **The life of a myth will decrease with increase in scientific attitude.**
- **The zeal to bust myths develop scientific temperament.**
- **Curiosity bought myths and science bought reasoning.**
- **Every religious mythology says one thing, but they all need science for validation**
- **Whenever there is a broken myth, there is rise in hope for science.**

Hidden Gems of ANDC




The Fluttering Gems
Common Leopard (Phalanta phalantha)
Common Evening Brown (Melanitis leda)
Striped Tiger (Danaus genutia)
Yellow Pansy (Junonia hierta)
Common Redpoint (Catopsilia pomona)
Plains Cupid (Chilades pandava)
Spotless Grass Yellow (Eurema laeta)
Common Baron (Euthalia aconthea)
Fox Blue (Lampides boeticus)
Tiny Grass Blue (Zizula hylax)
Psyche (Leptosia nina)
Dark Grass Blue (Zizeeria karsandra)
Copyright: Vineet Kumar & Rajesh Chaudhary


The Fluttering Centre
Yellow Orange-tip (Ixias pyrene)
Common Castor (Ariadne merione)
Mottled Emigrant (Catopsilia pyranthe)
Grass Blue (Zizeeria otis)
Painted Lady (Vanessa cardui)
Common Grass Yellow (Eurema hecabe)
Peacock Pansy (Junonia almana)
Forget-me-not (Catochrysops strabo)
Common Mormon (Papilio polytes)
Indian Cabbage White (Pieris canidia)
Zebra Blue (Leptotes plinius)
Common Jay (Graphium doson)
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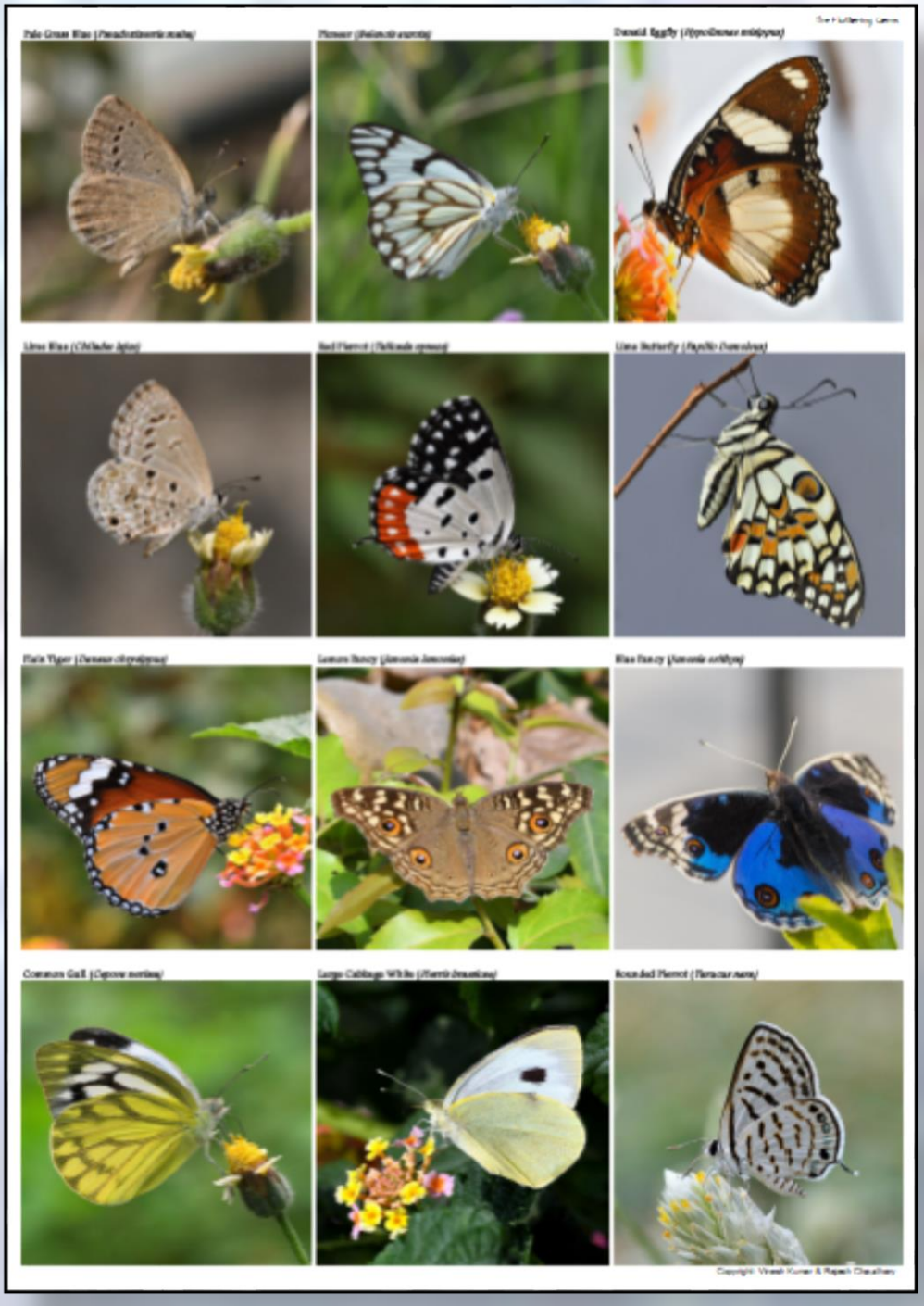
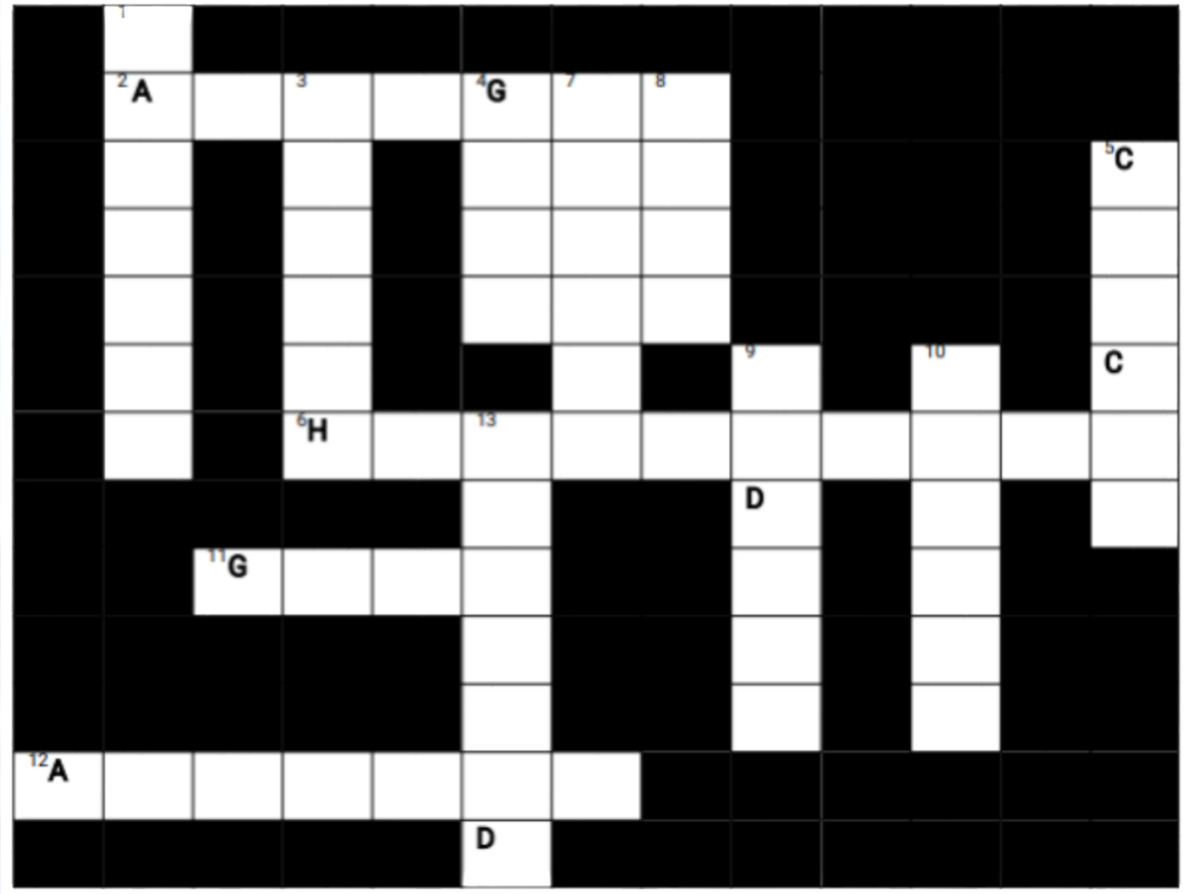


BMS Family

Crossword puzzle



Vertical

1. Don’toverdo, oryou'llgetit.
3. Mythsays,whenyougetitinyoureyeit'sgoodluck.
4. I’mresponsibleforyourtraits.
5. Doyoubelieveinzodiac?
7. I’minyourintestine.
8. WhenDNAgetsabreak.
9. Deciphermeintriplet.

10.IuntangleDNA.

13.I'mroundandindependent.

Horizontal

2. Yourimmunitygot affinityforme.

12. What’scommoninyourbloodandeggwhites?

11. IelevateyourMood.

6.Imakeupyourliver.

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