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In The News

A Star Is Gone

Kamolika Roy Chowdhury

Dr. Boman Framji Chhapgar, one of the finest carcinologists of India, breathed his last on the 5th of August, 2018. A marine biologist, a hiker, an excellent scout in his younger days, a certified scuba diver, a martial arts champion and overall a simple and wonderful human being, he was all rolled into one. He loved and adored the natural world and chose to explore the oceans and mountains and lived his life to the fullest and therefore his life was one that certainly needs to be celebrated.

Love for nature on the whole was instilled in him at quite a young age. He grew up in British Bombay and was fascinated by the sea surrounding the island city and needless to say what lay beneath it. He always looked for opportunities to be at sea and the natural elements seemed to have uncannily connived and provided him opportunities to be where he liked to be most. He participated in the first cruise of India's oceanographic ship O.R.V. SAGAR KANYA to Kenya in 1983.

Among the many anecdotes he shared with me, he mentioned that while being part of the Fisheries department, he often ventured out into the high seas with the Koli fishermen on their small fishing boats to experience the ocean and see if he could spot any new species. Interestingly, while heading to sea, he too would typically dress like a Koli fisherman in a lungi and tuck it their way. According to him that was the most appropriate and convenient attire to wear at sea. We must not forget here that shorts were not in vogue about 40 years back. Despite a comfortable office job, he refused to keep himself confined within the four walls the entire day. He was someone who believed more in hands on experience and being in the field rather than being at the desk. He was always in the quest for something more. Despite his innumerable achievements and his vast knowledge of the oceans and its mystical world, he believed that there was no end to learning. For him sky was the limit.

Apart from the numerous scientific journals and papers published by him, he wrote several articles and books for the popular audience under the pseudonym of Beefsea. Dr. Chhapgar was elected Life Fellow of the International Oceanographic Foundation and his portrait is included in the Gallery of Carcinologists in the Smithsonian Institute National Museum of Natural History in Washington D.C. He served on the Board of Governors of the Maharashtra Nature Parks Association and on the Executive Committee of the Bombay Natural History Society.

A star is gone but his light shone in the lives of many, including mine! The void he has left cannot be filled in completely but the lessons learnt from him will stay and his books and articles will continue to inspire many more generations to come. Look out for his wonderful books…they indeed are a sea of treasure !

Kamolika Roy Chowdhury is a close associate of Dr. Chhapgar who helped him initiate his Wikepedia page.

REFERENCE:

http://www.sanctuaryasia.com/magazines/features/10196--a-hundred-more-years-to-go-a-tribute-to-dr-chhapgar.html

Insight

Your Genes Load The Gun
Your Lifestyle Pulls The Trigger!

-Mehmet Öz

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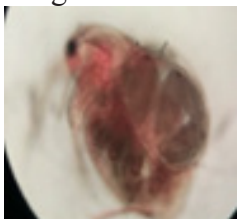
The title of this article is a quote by Mehmet Öz suggesting that environmental conditions are important decision makers in how genes function. Identical twins originate from the same DNA, right? So how can they turn out so differently? Why might one of the twins get a heart attack at the age of 30 whereas the other runs a marathon at the same age? What is the reason behind this? Is it only their genes that play a role in shaping their personality or is it the environment that has molded them into such a manner! The deeper related answer to this is `Epigenetics'. What do you mean by this term? 'Epigenetics' refers to the functional unfolding of gene expression. In other words, it has to do with processes that link genetic information (the genotype) to form, structure, behaviour, and so on (the phenotype), all without any permanent change in the DNA sequence itself. It doesn't change the genetic code rather it changes the reading pattern. Perfectly normal genes can turn into cancerous ones due to our lifestyle mutually connecting our environment. Genes are equivalent to bricks; epigenetics is the contractor, they just modify the assembly so as to get the best outcome.

Can we actually observe epigenetics? Yes, the changes in the environment that can interfere with production of proteins coded by specific genes is easily observed in *Moina*, small water crustacean. *Moina* have a transparent exoskeleton and can be considered as a distant cousin of *Daphnia*, prawns. Under normoxic (normal oxygen) conditions, these crustaceans appear white while when oxygen levels are low they appear red ! This is because when enough oxygen is available production of hemoglobin is enough for oxygen transport but is not enough to give a red color to the animal. Under hypoxic (low oxygen) conditions, the genes responsible for production of hemoglobin are more active and produce much more hemoglobin than in normal conditions. As a result, the *Moina* appears to be red under such hypoxic conditions which are clearly visible owing to their transparent exoskeleton. So, the question here arises is what made *Moina* switch to making more hemoglobin ? One of the probable answers to this is `epigenetics', which fine tunes protein production as per local needs of the animal and environmental conditions.

As we know our DNA is negatively charged which is wrapped around specific proteins called histones which are positively charged leading to tight packing of DNA over them. Whenever specific proteins are required, the bit of DNA carrying the code for that protein open up and by specific molecular steps, required protein is made in the cells of the animal. A kind of molecular remodeling occurring due to environmental stress. Our cells remodel protein formation in response to environmental stress. Interestingly, these epigenetic modulations can be used to treat certain diseases by regulating their environmental conditions leading to activation of certain genes!

(Animal colorless, normal Hemoglobin)



(Animal red, increased Hemoglobin)

RERENCES:

Yuan H,Marmorstein R (Feb 2013)."Histone acetyltransferase: Rising ancient counterparts to protein kinases". Biopolymers, 99(2):98-111. Roth SY ,Denu JM,Allis ZD (2001)."Histone acetyltransferases. " ,Annu,Rev.Biochem,70 :81-120

Picture reference : Elphinstone Lab, Biotech Department

Through The Lens

This is a bird seen in Rajasthan. Can you identify it ? See if it is around you too.

Science In Daily Life

LAUGHTER!

Jayashree Chandrakant Divekar

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Why do we laugh? Maybe you think that we are born with the capacity to laugh, isn't it? Interestingly, on an average a child laughs 300 times a day while an adult laughs only 17 times a day. Adult with age between 18 to 34 years laugh the most. Just as it is important to sleep and to eat, it is necessary to laugh. It has been observed that people do not usually laugh by sitting alone just by reading jokes, they laugh mostly in groups with family and friends by sharing their joyful experience. A new study says that people laugh by listening to other people laugh even if they are not aware of the reason behind the laughter.

The phrase "laughter is the best medicine" is perhaps

correct! Laughter reduces stress. Laughter is known to reduce the stress hormones such as cortisol and epinephrine. Have you observed that when we are laughing we are completely relaxed? This is because of release of endorphins, the `good feel' chemical which make us feel happy. Endorphins can also temporarily relieve pain. Likewise, when we smile the brain releases dopamine which is a neurotransmitter that produces feelings of happiness. Another neurotransmitter, serotonin, also improves mood and helps to beat depression. Frontal lobe is the largest region of brain which controls emotional responses. According to researchers, various regions of the brain are involved in laughter. Laughter reduces stress hormones and lowers blood pressure and increases blood flow in the body which reduces the chances of heart attack and increases muscle relaxation.

Laughter is also called "internal jogging". About 10 -15 minutes of laughter can burn 40 calories. It can be a replacement to going to gym! Laughter relaxes the whole body, specially the muscles. Laughter boosts the number of antibody producing cells leading to a stronger immunity making the body more resistant to infections. A good laugh is known to help improve concentration. Laughing can make you live longer. It improves blood circulation and reduces the chances of heart attack.

Why do we cry when we are laughing? This is because when we laugh there is too much pressure on the tear ducts and results in reflex tears. Why do people laugh in sleep? Why do we laugh only at funny things? Is laughter contagious? Why do adults laugh so less compared to youngsters? There are many more questions in our mind that are yet to be answered. Scientists perhaps would find answers to most of these questions. Till then keep laughing and remain healthy.

REFERENCE:https://www.helpguide.org/articles/mental-health/laughter-is-the-best-medicine.htm

Stimulate Your Grey

Cyrus Khan, Freelance Science Communicator.

The big rectangle below is composed of 5 small identical rectangles. If the perimeter of the big rectangle is 80, then what is the area of a small rectangle?

Long, Long Ago

Science Books That Changed the World

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Sophia College.

The following books are some of the most path breaking, influential books that laid the foundations of science and continue to shape our world and thinking today.

1. **Voyage of the Beagle** (1839) and **The Origin of Species** (1859) by Charles Darwin

In 1831, Charles Darwin, on his journey to the Galapagos islands, made observations about the slight differences between species of birds called finches and tortoise on different islands. Through his studies in the Galapagos , he gave us the theory of our origins; how such a large diversity of organisms has evolved, due to adaptation for survival of the fittest from common ancestors- the Origin of Species. Modern evolution and development studies now benefit from the use of genetic testing to examine how species evolve and adapt.

2. **On Revolutions of Heavenly Spheres** (1543) by Nicholas Copernicus and **Dialogue Concerning the Two Chief World Systems** (1632) by Galileo Galilei

It is often said that there is no prize for discovering things second. That is not necessarily true. Often great discoveries are disregarded or opposed when they are first proposed especially when they describe things in a way that is different from prevailing knowledge or belief. When Copernicus first put forward his heliocentric model, suggesting the earth and other planets revolve around the sun, he was vehemently opposed; all heavenly bodies were to revolve around earth- the centre of the universe. Long after Copernicus, Galileo Galilei once again promoted Copernicus' heliocentric model and renewed scientific interest in this theory. This time around it was still met with opposition, especially by the Church but eventually was accepted thanks to scientifically testable and observable proofs. Today it is indisputable fact.

3.**Principia Mathematica** (1887) by Isaac Newton

Now that we knew about the sun centred solar system, the next big question was, how do heavenly bodies move. Were they suspended from heaven and pushed around their paths by angels? Isaac Newton in gave us the principles and formulas that govern the movement of heavenly bodies: Principia Mathematica. It covered topics such as the motion of the sun and planets due to gravity, as well as phenomena like tides and the shape of the earth, which are a result of gravity. The principles and theories in the books influenced

the work of a massive number of scientists, including Albert Einstein.

4. **What is Life?** (1944) by Erwin Schrödinger

Erwin Schrödinger, in this book attempts to answer what happens inside a cell in the body, chemically and physically. In a time before DNA was discovered, he described the genetic material in cells to be an 'aperiodic crystal' made of a small number of molecules that would not repeat in structure, therefore encoding for an almost infinite number of possibilities. The book was a source of inspiration to biologists James Watson and Francis Crick, who went on to discover the structure of DNA, based on the work of Rosalind Franklin.

5.**The Age of the Earth** (1914) by Arthur Holmes

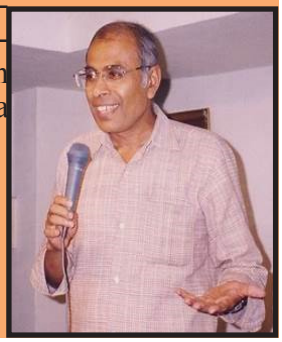
How old is the earth? It is a simple question that betrays the complexity it took to arrive at an accurate answer. It took centuries and advancement from multiple branches of science. It required the work of scientists in the fields of biology, astronomy, archaeology, chemistry and of course geology to better understand how old the earth was. Arthur Holmes arrived at the first accurate modern estimate of the age of the planet: 4.5 billion years. He used the then new technique of radio dating, and faced scepticism from other scientists, but his answer has stood the test of time.

Further reading: http://discovermagazine.com/2006/dec/25-greatest-science-books

Thought Byte

For the first time, this year National Scientific Temper Day was celebrated on 20th August 2018. The day also sadly marked the fifth anniversary of assassination of Narendra Dabholkar, a soft spoken yet strong social reformer, who urged us to ask the question `WHY'! We celebrated the day to re enforce the thoughts and ideas of Narendra Dabholkar and strengthened the fight against superstition in our country. Dr. Dabholkar was a medical doctor who devoted his life to spreading awareness against the destructive practices such as black magic perpetuated by tantriks or self-declared godmen who exploited the poor by promising cures to ailments, especially in rural India. In 1989, he founded and became president of the Maharashtra Andhashraddha Nirmoolan Samiti (MANS) which worked to eradicate superstition in Maharashtra. Dabholkar`s fight was not against religion. He distinguished faith from superstitions using some simple criteria. He suggested that faith that does not allow itself to be questioned on the basis of facts or truth is a superstition. Another criteria he suggested that separated faith from superstition was that faith is always non-violent and rooted in tolerance.

Dabholkar fought relentlessly to get an anti-superstition law enacted in the state of Maharashtra. A day after Dabholkar's murder, the Maharashtra Cabinet cleared the Anti-Superstition and Black Magic Ordinance. After amendments, it was finally enacted as an ordinance on 18 December 2013. Dr. Dabholkar was posthumously awarded the Padma Shri for social work.



Do ask the question `why' as often as you can….!!

Answer to the quiz : 75, Check the website for details.

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