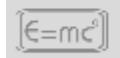




# A Young Explorer's Journey of Science

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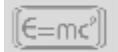
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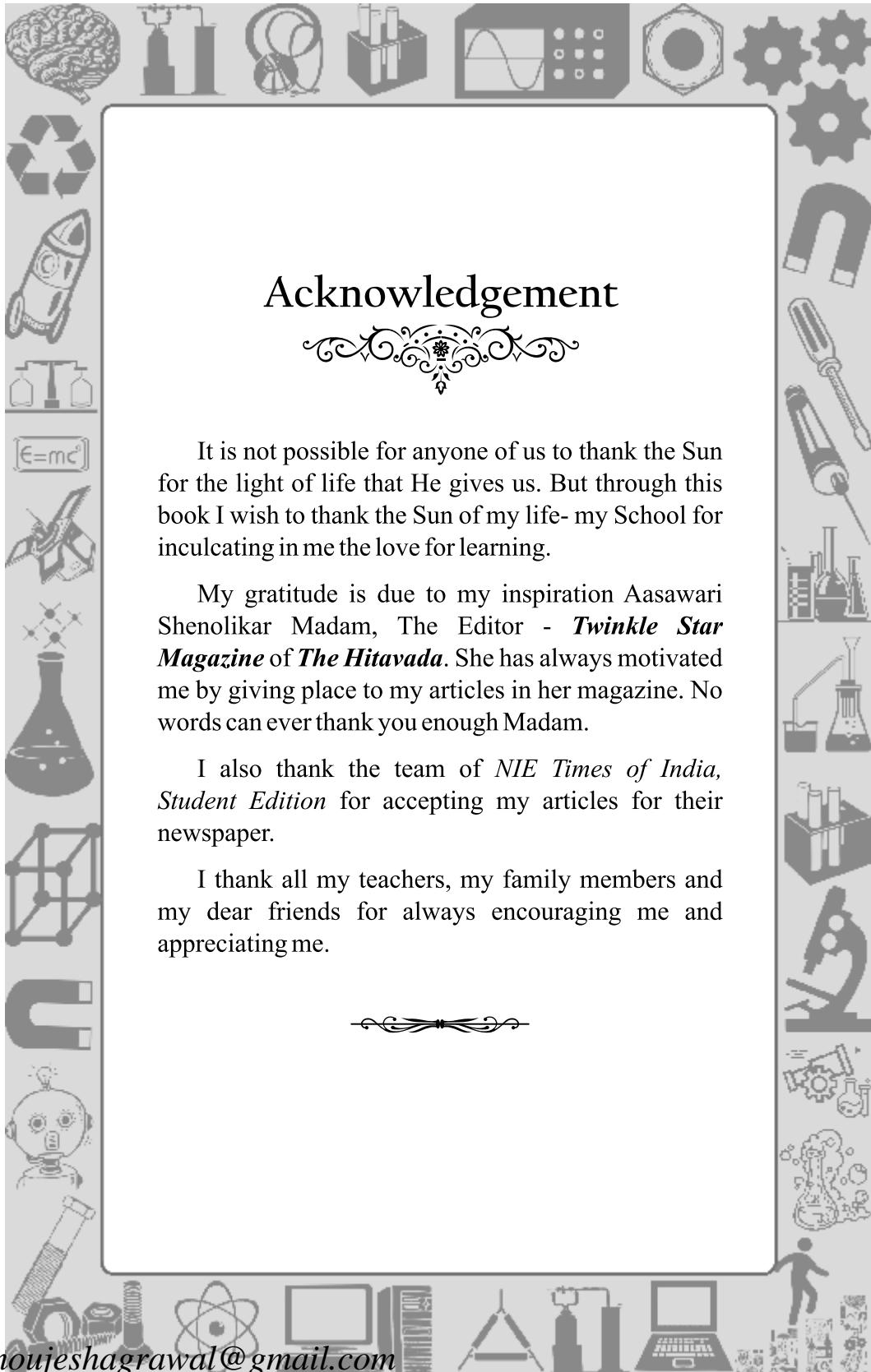
## Dedication



I dedicate my humble effort  
to the teachers of my School -  
**"The Chanda Devi Saraf School"**  
my temple of knowledge.  
My teachers not only taught me how to  
write but also taught me what to write.

I also dedicate the present work to  
the eminent torch bearers of  
**"Vijnana Bharati"**  
A Swadeshi Science Movement,  
who taught me the importance of  
writing for my fellow countrymen.





## Acknowledgement



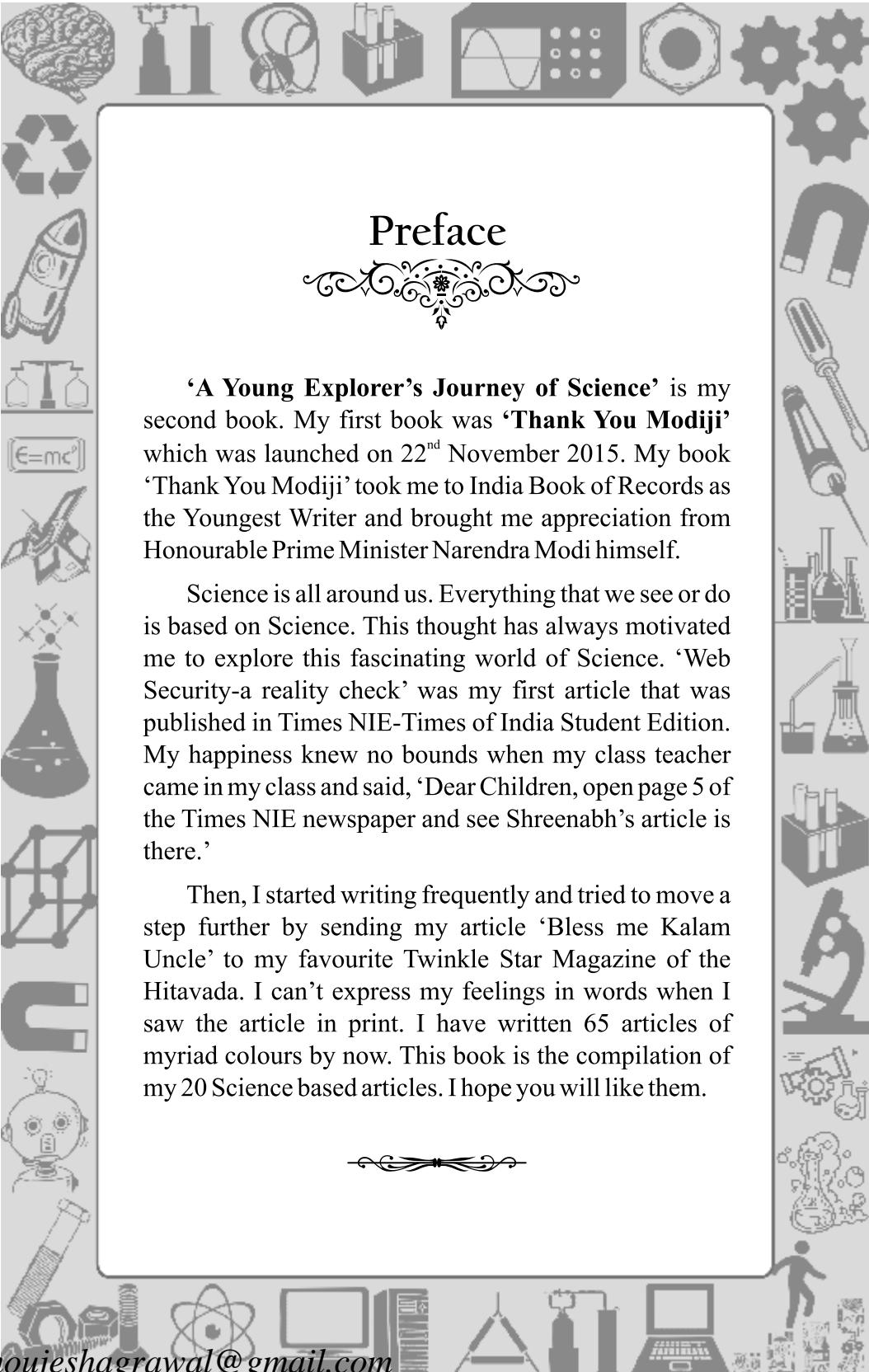
It is not possible for anyone of us to thank the Sun for the light of life that He gives us. But through this book I wish to thank the Sun of my life- my School for inculcating in me the love for learning.

My gratitude is due to my inspiration Aaswari Shenolikar Madam, The Editor - ***Twinkle Star Magazine*** of ***The Hitavada***. She has always motivated me by giving place to my articles in her magazine. No words can ever thank you enough Madam.

I also thank the team of ***NIE Times of India, Student Edition*** for accepting my articles for their newspaper.

I thank all my teachers, my family members and my dear friends for always encouraging me and appreciating me.





## Preface



**'A Young Explorer's Journey of Science'** is my second book. My first book was '**Thank You Modiji**' which was launched on 22<sup>nd</sup> November 2015. My book 'Thank You Modiji' took me to India Book of Records as the Youngest Writer and brought me appreciation from Honourable Prime Minister Narendra Modi himself.

Science is all around us. Everything that we see or do is based on Science. This thought has always motivated me to explore this fascinating world of Science. 'Web Security-a reality check' was my first article that was published in Times NIE-Times of India Student Edition. My happiness knew no bounds when my class teacher came in my class and said, 'Dear Children, open page 5 of the Times NIE newspaper and see Shreenabh's article is there.'

Then, I started writing frequently and tried to move a step further by sending my article 'Bless me Kalam Uncle' to my favourite Twinkle Star Magazine of the Hitavada. I can't express my feelings in words when I saw the article in print. I have written 65 articles of myriad colours by now. This book is the compilation of my 20 Science based articles. I hope you will like them.



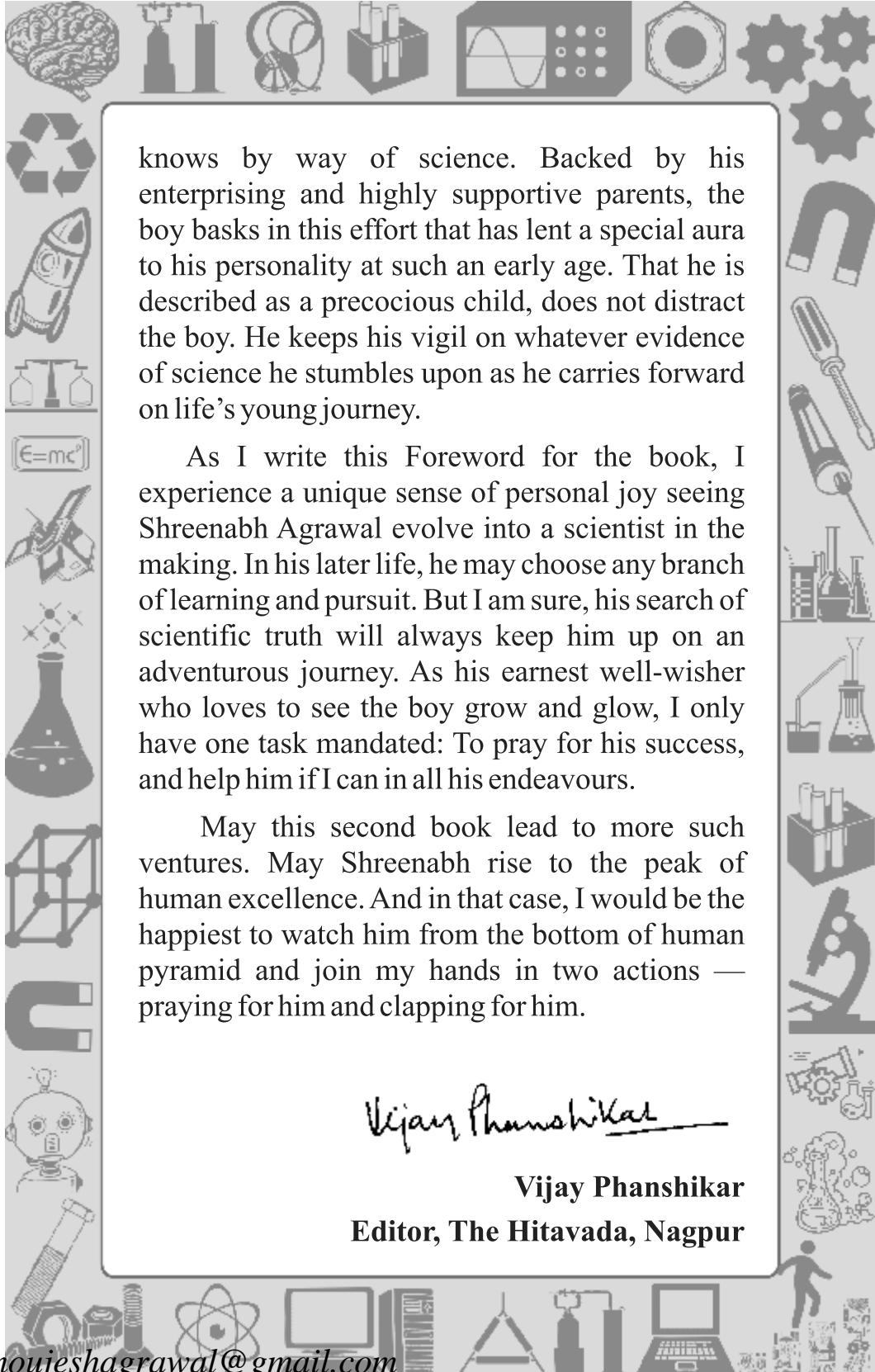


The very eminent Thomas Huxley was more than right when he made the simplest but most comprehensive definition of science. He said famously, "Science is nothing, but a trained and organised common sense". When one looks around carefully, when one tries to understand the underlying principle of a certain thought or action, one starts realising how science engulfs our lives.

As a young explorer, Shreenabh Agrawal has understood this process fairly well. He is engaged in the beautiful process of developing a keen eye and ear to look for evidence of science in life. And he finds it everywhere — from the processes of Nature to examples of excellence of human spirit engaged in search of truths hidden in the surroundings. As he gets engaged in this exploration, Shreenabh enjoys himself. For, the entire endeavour gives the young explorer an opportunity to look for the existence of scientific truth not just in the surroundings but also in himself.

The twenty articles Shreenabh has written in this book, his second, are an outcome of his continuous engagement in search of scientific truth around him. He has dedicated the book to his school where he learned the basics of whatever he





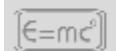
knows by way of science. Backed by his enterprising and highly supportive parents, the boy basks in this effort that has lent a special aura to his personality at such an early age. That he is described as a precocious child, does not distract the boy. He keeps his vigil on whatever evidence of science he stumbles upon as he carries forward on life's young journey.

As I write this Foreword for the book, I experience a unique sense of personal joy seeing Shreenabh Agrawal evolve into a scientist in the making. In his later life, he may choose any branch of learning and pursuit. But I am sure, his search of scientific truth will always keep him up on an adventurous journey. As his earnest well-wisher who loves to see the boy grow and glow, I only have one task mandated: To pray for his success, and help him if I can in all his endeavours.

May this second book lead to more such ventures. May Shreenabh rise to the peak of human excellence. And in that case, I would be the happiest to watch him from the bottom of human pyramid and join my hands in two actions — praying for him and clapping for him.



**Vijay Phanshikar**  
**Editor, The Hitavada, Nagpur**



डॉ. हर्ष वर्धन  
DR. HARSH VARDHAN



मंत्री  
विज्ञान और प्रौद्योगिकी एवं पृथ्वी विज्ञान ;  
पर्यावरण, बन और जलवाया परिवर्तन  
भारत सरकार  
नई दिल्ली - 110001  
MINISTER  
SCIENCE & TECHNOLOGY AND EARTH SCIENCES ;  
ENVIRONMENT, FOREST AND CLIMATE CHANGE  
GOVERNMENT OF INDIA  
NEW DELHI - 110001

### MESSAGE

I am extremely pleased to have received the manuscript of your forthcoming book, 'A young explorer's journey of science.' I am happy to see the love for Science in a child so young. I congratulate you, your family and your school 'The Chanda Devi Saraf School, Nagpur, Maharashtra' on this achievement of yours. It is really a commendable effort towards creating awareness about science in the minds of the young.

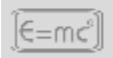
I wish you all the very best for all your future endeavors. May your path be blessed.

(Dr. Harsh Vardhan)

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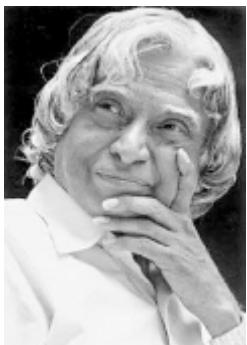


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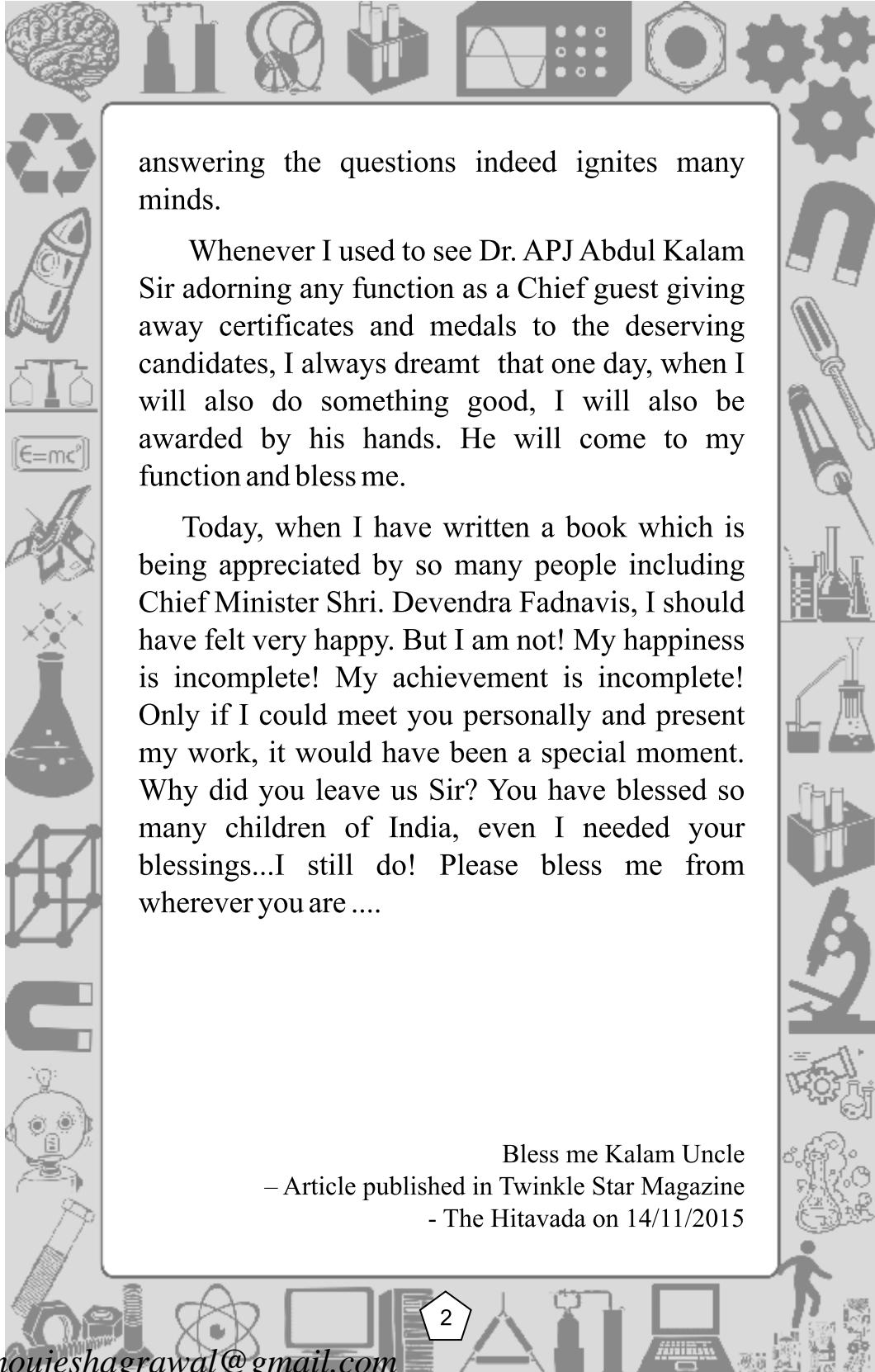
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## Bless Me Kalam Uncle

When I was three and a half years old, I got my Elephant Water colour painting appreciated by Dr. APJ Abdul Kalam Sir. I have preserved the painting carefully and it is still in mint condition. Today, when I see that painting, the comment “This painting is great!” and his signature make me feel very proud. His photograph signing my painting was also sent to me which is more than a treasure for me.

Since early childhood when I started understanding the importance of great work done by great people, Dr. APJ Abdul Kalam Sir had always fascinated me with his work and personality. I have always admired him more than any person on earth. I am currently reading a book named, “Reignited” written by him which contains his thoughts and answers to various questions asked by various students on many scientific topics. His simple and unique way of





answering the questions indeed ignites many minds.

Whenever I used to see Dr. APJ Abdul Kalam Sir adorning any function as a Chief guest giving away certificates and medals to the deserving candidates, I always dreamt that one day, when I will also do something good, I will also be awarded by his hands. He will come to my function and bless me.

Today, when I have written a book which is being appreciated by so many people including Chief Minister Shri. Devendra Fadnavis, I should have felt very happy. But I am not! My happiness is incomplete! My achievement is incomplete! Only if I could meet you personally and present my work, it would have been a special moment. Why did you leave us Sir? You have blessed so many children of India, even I needed your blessings...I still do! Please bless me from wherever you are ....

Bless me Kalam Uncle

– Article published in Twinkle Star Magazine  
- The Hitavada on 14/11/2015



2



## Web Security : Time for a reality check

Internet is a treasure trove of information that allows us to do many things as it enables us to chat with our family, and get useful information, play games, make online transactions, download videos, photos, music and much more. But while we do all these things some people keep an eye on us in order to destroy our website or steal our information. To achieve their aim they send viruses in our computers, tablets and smart phones. This causes loss of our identity and leads to precious data falling in wrong hands. To know how many and what types of websites or people are tracking us, we can download some android or IOS applications which will enable us to take safety measures. Also we can do safe browsing of the internet by downloading antivirus such as Quick Heal, Total Security etc., from authentic websites. Another thing we can do is make difficult passwords that the hackers cannot break. We must follow following do's and don'ts for better security :





## DO'S :

- Use as many symbols, letter and number combinations that we can use
- Make our password unusual
- After making a password check it twice

## DON'TS :

- Don't use names, birthdates or any personal information for making passwords
- While entering a password in a public place hide our monitor and keyboard

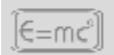
I am sure after reading this article it will be difficult for hackers or others to cheat us.

Before ending the article, I want to tell you one more trick for making the passwords safer. Use first letter of the word of a sentence and its position in English Alphabet. For example, if we use the sentence 'I have a pet' we must use the first letter of each word and their position in the English Alphabet. In this case it is IHAP & 981and 16. So we can make a password 'I9H8A1P16' and if we want we can use symbols like & in the password to make it safer.

Wishing a happy and safe browsing!

'Web Security-time for a reality check'  
- Article published in Times of India  
NIE Students' Edition on 12/08/2015





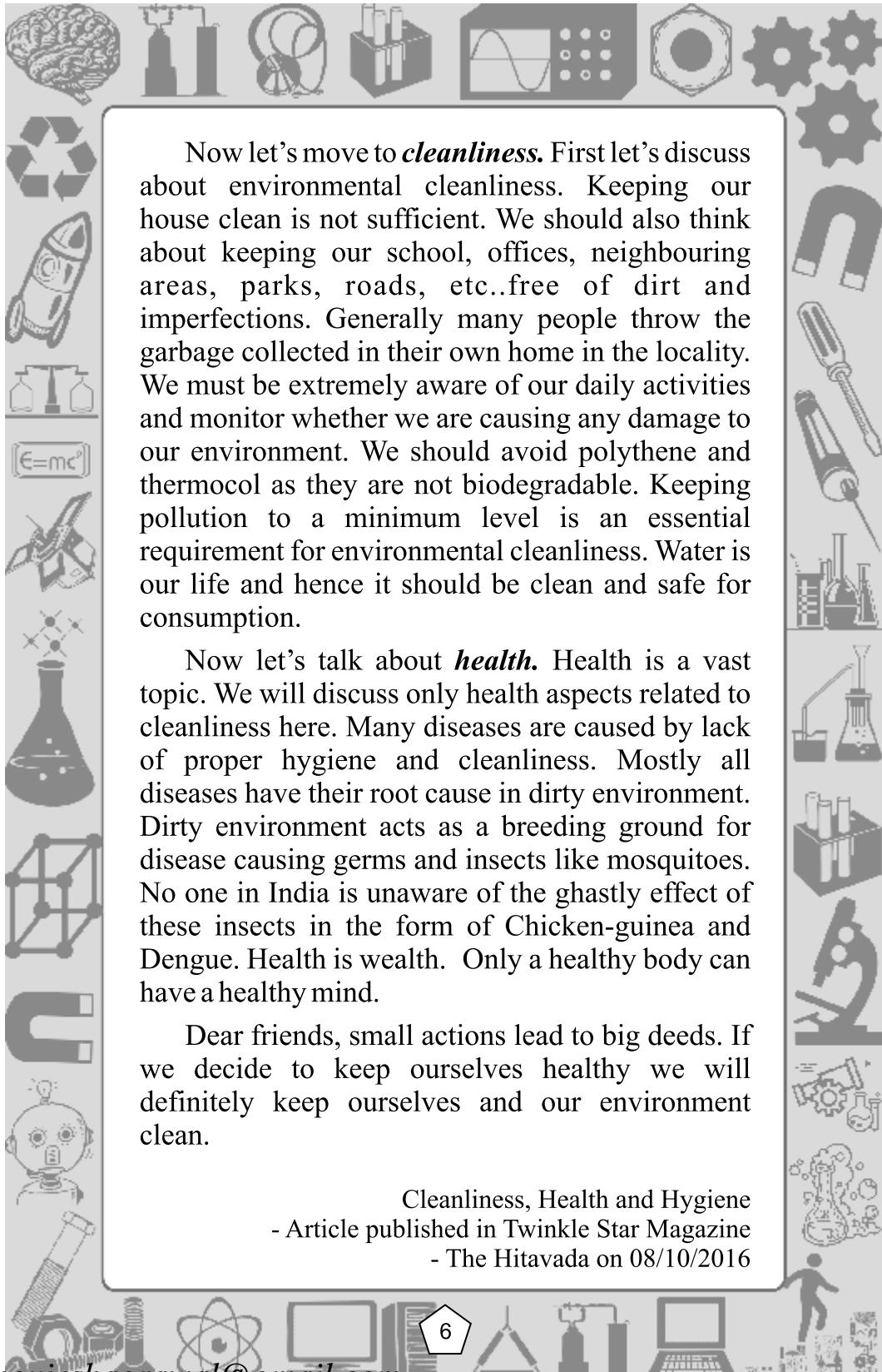
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## Cleanliness, Health and Hygiene

On 2<sup>nd</sup> October 2014, Bapu's birthday was celebrated throughout the nation as 'Swachhta Divas' when our Honourable Prime Minister Narendra Modi launched the 'Swachhta Abhiyaan'. He himself took a broom and gave the nation the message of keeping the country clean. Cleanliness, health and hygiene are three simple words but each of them carries a critical message. All of these are interconnected. Good hygiene leads to good cleanliness which ultimately leads to good health.

Let's begin with **hygiene**. We cannot achieve anything if we are unclean in our body, words or behaviour. No one likes an unclean man whereas a clean one is respected everywhere. We should be clean from head to toe. To keep our personal hygiene we should have a bath every day. We should brush our teeth twice daily. We should only wear clean clothes as dirty clothes also foster diseases. We should cut our nails frequently. It is important that the utensils which we use for cooking and eating are properly washed. Apart from personal hygiene, we should also keep our environment, mind and soul clean. Mental hygiene leads to good behaviour, stress free life and mental peace.



Now let's move to **cleanliness**. First let's discuss about environmental cleanliness. Keeping our house clean is not sufficient. We should also think about keeping our school, offices, neighbouring areas, parks, roads, etc..free of dirt and imperfections. Generally many people throw the garbage collected in their own home in the locality. We must be extremely aware of our daily activities and monitor whether we are causing any damage to our environment. We should avoid polythene and thermocol as they are not biodegradable. Keeping pollution to a minimum level is an essential requirement for environmental cleanliness. Water is our life and hence it should be clean and safe for consumption.

Now let's talk about **health**. Health is a vast topic. We will discuss only health aspects related to cleanliness here. Many diseases are caused by lack of proper hygiene and cleanliness. Mostly all diseases have their root cause in dirty environment. Dirty environment acts as a breeding ground for disease causing germs and insects like mosquitoes. No one in India is unaware of the ghastly effect of these insects in the form of Chicken-guinea and Dengue. Health is wealth. Only a healthy body can have a healthy mind.

Dear friends, small actions lead to big deeds. If we decide to keep ourselves healthy we will definitely keep ourselves and our environment clean.

Cleanliness, Health and Hygiene  
- Article published in Twinkle Star Magazine  
- The Hitavada on 08/10/2016



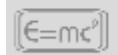
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## Days of Diseases

Every year as there is a change in seasons, from summer to rainy or from rainy to winter, it is the time when the ‘days of diseases’ commence. It is this time when the roads go deserted and the parks go lonely. From children to senior citizens, everyone is down with fever. This article focuses on how we can prevent the days of diseases by doing simple things. Read on!

I am not a medic yet I can at least suggest some things which helped me a lot. So let’s begin with contact. No, not the contact over phone, it’s about sharing. Often, we share a lot of things, from food to water and at least the air in which we breathe. All these things serve as a medium for germs to breed and spread. So we need to be extra conscious. What we can do is, maintain a distance with persons who are already infected and we can prevent going in public at least for a few days.

Secondly, during this time, we should control our cravings. Often, we are attracted towards oily, fatty and sweet food but during these



times, they pose a threat to our health. Instead, as my granny suggests, we should have seasonal fruits and juices as they have many nutrients and also they are enough to fulfill our cravings.

Now a doctors' advice, many diseases could be prevented by having a preventive medicine. As we have heard 'prevention is better than cure' so it's better to prevent. At last, the best part, during winters, cold is quite common. To prevent it, early morning every day, we should have my granny's magic mixture. To prepare it, we have to mix honey, ginger and 'tulsi' (which are a variety of basil cultivated in South Asia that is regarded by Hindus as sacred to the deity Vishnu).

I am sure, after reading this, the 'days of diseases' will not enter your house. So enjoy the advent of winters!

Days of diseases

- Article published in Twinkle Star Magazine

- The Hitavada on 19/11/2016



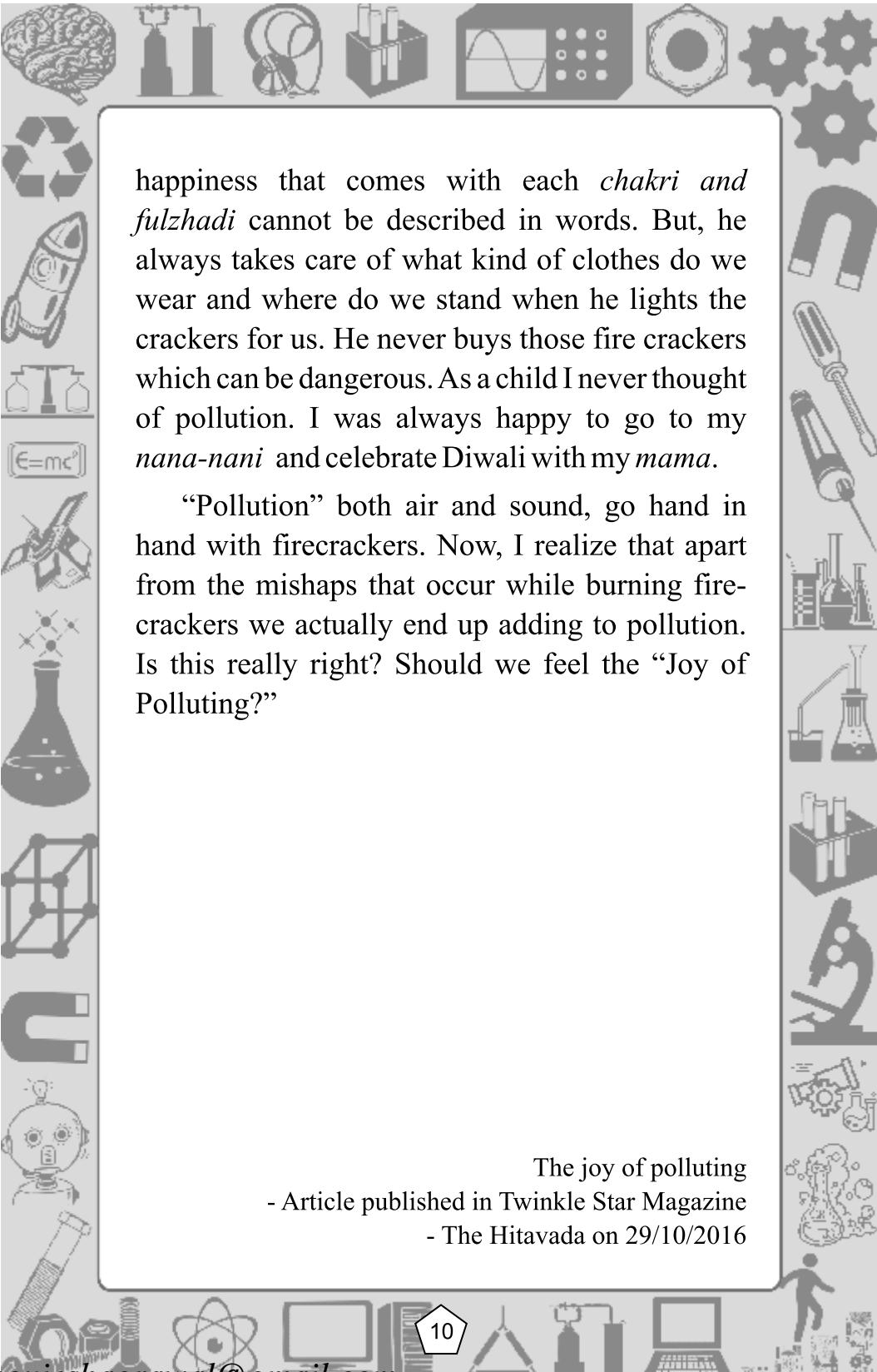
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## The Joy of Polluting

“Joy of polluting?” might sound a little awkward but is true. As *Diwali*, the most awaited festival of India is here, people have already started purchasing crackers and feel immense joy when they burst them and pollute the atmosphere. Every year at this time many NGOs conduct many awareness drives but is there really anyone who does not know that crackers cause pollution?

Firecrackers actually originated in China. It was a type of bamboo which when heated, exploded with a bang. In India, Sivakasi is the place where the firecrackers are manufactured. The use of firecrackers is associated with festivities in India such as marriage ceremonies and festivals.

My memories of firecrackers are full of my *Ashish Mama* who buys a lot of firecrackers and waits for us ; his nephews to come over in Diwali holidays. The smiles, the laughter and the



happiness that comes with each *chakri* and *fulzhadi* cannot be described in words. But, he always takes care of what kind of clothes do we wear and where do we stand when he lights the crackers for us. He never buys those fire crackers which can be dangerous. As a child I never thought of pollution. I was always happy to go to my *nana-nani* and celebrate Diwali with my *mama*.

“Pollution” both air and sound, go hand in hand with firecrackers. Now, I realize that apart from the mishaps that occur while burning firecrackers we actually end up adding to pollution. Is this really right? Should we feel the “Joy of Polluting?”

The joy of polluting

- Article published in Twinkle Star Magazine  
- The Hitavada on 29/10/2016



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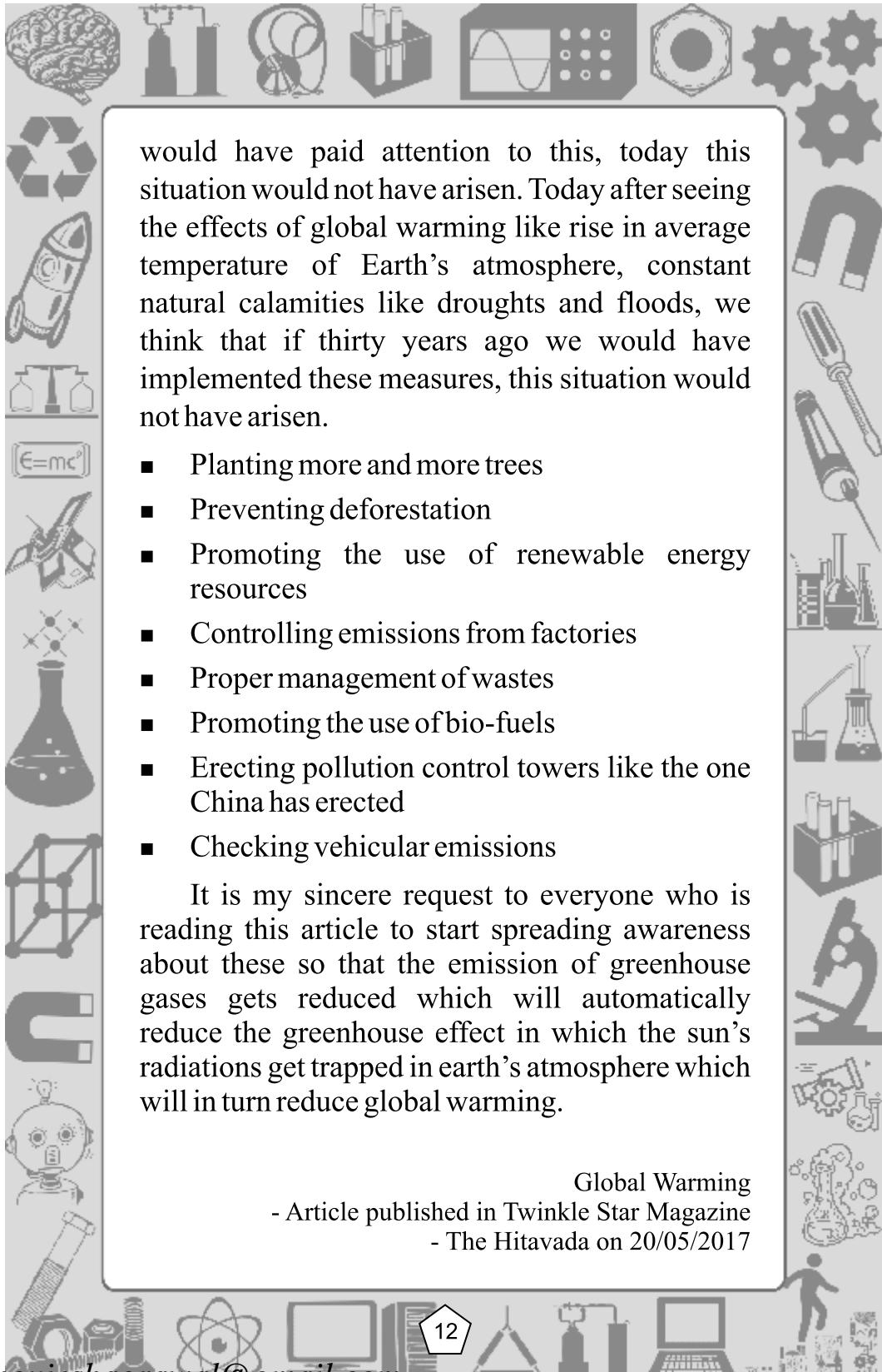
## Global Warming

Today is 15<sup>th</sup> August, 2047. In spite of today being India's 100<sup>th</sup> Independence Day, unlike any other year, today we are not celebrating it because today we are facing the century's biggest flood.

In the last thirty years this is the 17<sup>th</sup> flood and the 29<sup>th</sup> natural disaster that India is facing. Today we have enough technology to convert these natural disasters as they were called thirty years ago into useful products such as electricity. The whole country is now used to such disasters but this flood is quite unusual. It has been caused due to the heavy rains that the country has been receiving for the last three months. It has already affected thirteen states and five provinces (earlier called union territories) but due to new technology no fatality has been reported yet. This is a good example of how poorly we human beings are handling our environment.

Thirty years ago, we did not pay attention to Global Warming but today, the condition is so worse that now nothing can be done. If earlier we





would have paid attention to this, today this situation would not have arisen. Today after seeing the effects of global warming like rise in average temperature of Earth's atmosphere, constant natural calamities like droughts and floods, we think that if thirty years ago we would have implemented these measures, this situation would not have arisen.

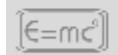
- Planting more and more trees
- Preventing deforestation
- Promoting the use of renewable energy resources
- Controlling emissions from factories
- Proper management of wastes
- Promoting the use of bio-fuels
- Erecting pollution control towers like the one China has erected
- Checking vehicular emissions

It is my sincere request to everyone who is reading this article to start spreading awareness about these so that the emission of greenhouse gases gets reduced which will automatically reduce the greenhouse effect in which the sun's radiations get trapped in earth's atmosphere which will in turn reduce global warming.

Global Warming

- Article published in Twinkle Star Magazine

- The Hitavada on 20/05/2017



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## Seven Wonders of Science

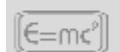
Every day we come across several wonders of science. Science is an observation of our surroundings and taking out inferences from them. It is an unending ocean of facts, theories, experiments and most importantly, knowledge. It has gifted us several boons and today we will discuss about seven such Wonders of Science.

It is difficult to select a handful of inventions and discoveries from the unending ocean of this beautiful discipline. Yet I present to you seven breakthrough inventions and discoveries that changed the world. Read on!!

**Wheel :** Though a little bit unusual, it is one of the most important discoveries or I must say inventions of ancient times without which travelling would not be possible in today's time.

**Internet :** A necessity in today's world, Internet has become an integral part of our lives. One of the toughest things to do in today's time is to imagine a day without it.





**Genetically Altered Seeds, Fertilizers & Pesticides :** These three things have always helped our nation's farmers and have always proved beneficial to them and eventually to all of us.

**Electricity :** It is a breakthrough in science and is empowering the world today. It has made everything possible that people in earlier times could not have even imagined.

**Ball-Point Pen :** This beautiful, cheap and one of the best boons of science, has enabled and inspired us to go further in our lives and write a better future.

**Light Bulb :** This wonder of science invented by Hon. Thomas Alva Edison, has enabled us to lead a better, brighter, and wonderful life.

**Penicillin :** Yes, this life saving drug invented by Hon. Alexander Fleming was a breakthrough in the field of medical sciences. It has saved, is saving and it will be saving thousands and thousands of lives.

From these 'Seven Wonders of Science' each one of us should take inspiration and always try to question every natural phenomenon and also try to find their answers on our own. And at last, happy summer vacations!

Seven wonders of Science

- Article published in Twinkle Star Magazine

- The Hitavada on 22/04/2017



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## How Diverse are Animals?



Hmmm.... if you think they can be classified on the basis of whether they live on land, in water or in the air, Congrats! You are thinking like Aristotle! But according to the accepted system of classification, you are wrong. To find what's right, read on!

Robert Whittaker, in 1969 proposed 'Five kingdom classification' of living organisms. Till date we follow this system. Kingdoms are subgrouped into phylum for animals or division for plants, class, order, family, genus and species. Hence, the basic unit of classification is species. Species includes all the organisms that are similar to breed and produce fertile offspring. Today we will try to understand the various phyla of animal kingdom. We just classified animals on the basis of their mode of living. But in Whittaker's Classification, animals are classified into 10 Phyla *Porifera*, *Coelenterata*, *Platyhelminthes*, *Nematoda*, *Annelida*, *Arthropoda*, *Mollusca*, *Echinodermata*, *Protochordata*, *Vertebrata* on the basis of different features like :



- Cellular or tissue level of body organization
- Body symmetry
- Type of body cavity called as coelom
- Presence or absence of segmentation
- Presence or absence of a backbone.

It all sounds Greek to you if you don't know it already. Don't worry, we will consider each one separately. Let us start with Porifera. These are multicellular organisms, now what's multicellular? Multicellular organisms are organisms that consist of more than one cell, in contrast to unicellular organisms. Poriferans exhibit minimal level of tissue organization. They lack nervous system. Porifera get their name from two words, "pori," meaning "holes," and "fera," meaning "bearing". Porifera includes Sycon, Spongilla and Euplectella. e.g. Sponges.

Coelenterates are radially symmetrical (radial symmetry is the symmetry about a central axis, as in a starfish or a tulip flower) organisms which live in marine habitat. Some are solitary and some are colonial. Coelenterates get their name from two Greek words - "koilos," meaning "hollow," and "enteron," meaning "intestine". e.g. Corals, Hydra.

Platyhelminthes are either free living or parasitic. They are triploblastic (having a body derived from three embryonic cell layers, as in all



multicellular animals) animals. Platyhelminthes get their name from two Greek words - “platy,” meaning “flat,” and “helminthes,” meaning “worms”. E.g. Planaria.

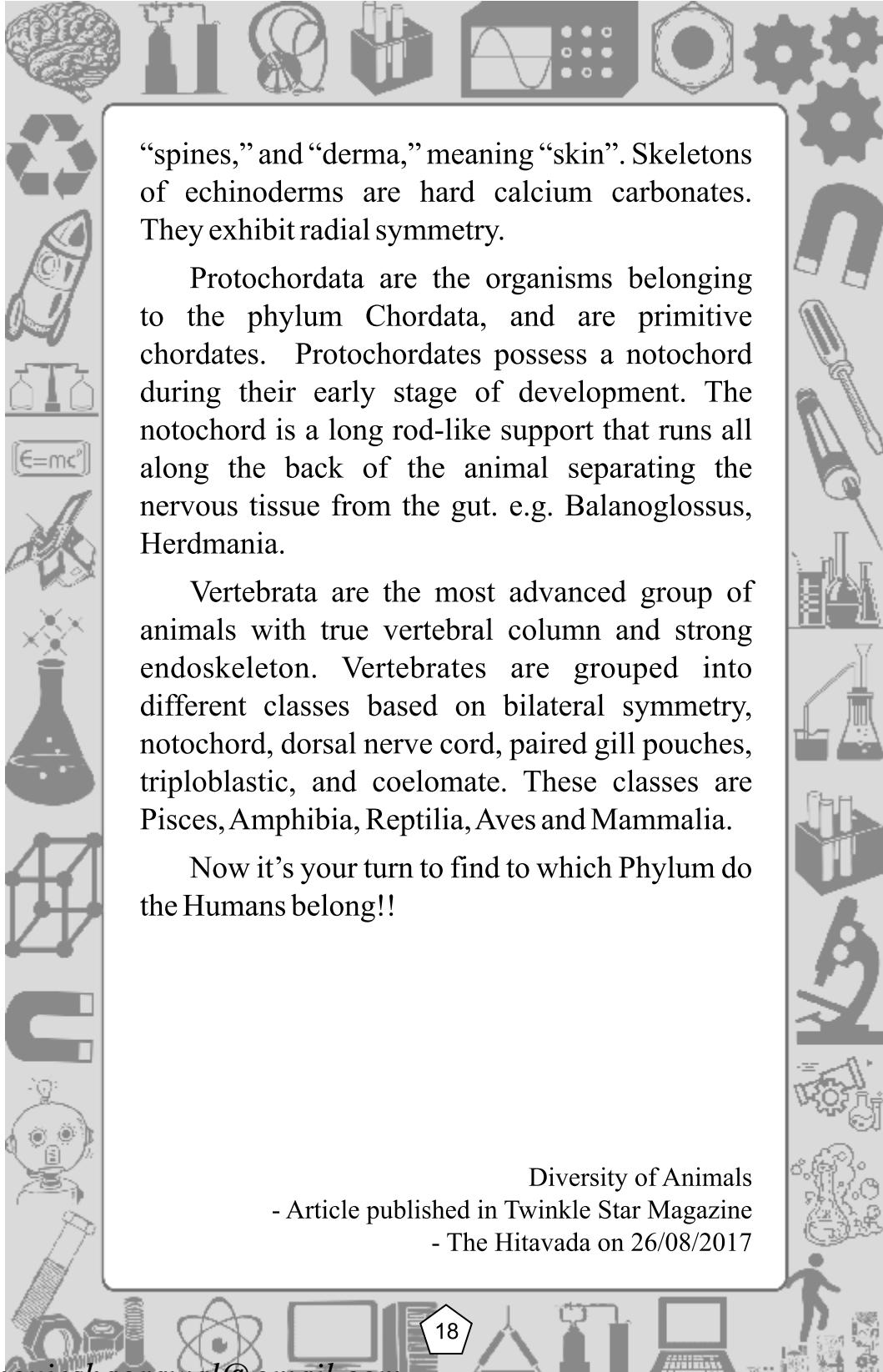
Nematoda are bilaterally symmetrical, triploblastic parasitic worms. Nematoda get their name from two Greek words - “nema,” which means “thread,” and “ode,” which means “like”. Nematodes can be free living or parasitic.

Annelida are bilaterally symmetrical, triploblastic, schizocoelomates with segmented body. Annelida get their name from the Latin word “anellus,” which means “little ring”. Annelids are characterised by the presence of a circulatory system. e.g. Earthworm.

Arthropoda are bilaterally symmetrical, triploblastic animals with true coelom. Arthropoda means “joint legs”. This phylum gets its name from the Greek words arthon, meaning “joint”, and podos, meaning “foot”.

Molluscs are bilaterally symmetrical, triploblastic gastropods with reduced coelom. Mollusca is derived from a Latin word, which means “thin-shelled and soft”.

Echinodermata are triploblastic animals with true coelomic cavity. Echinodermata are spiny skinned organisms which get their name from the Greek words “echinos,” meaning protective



“spines,” and “derma,” meaning “skin”. Skeletons of echinoderms are hard calcium carbonates. They exhibit radial symmetry.

Protochordata are the organisms belonging to the phylum Chordata, and are primitive chordates. Protochordates possess a notochord during their early stage of development. The notochord is a long rod-like support that runs all along the back of the animal separating the nervous tissue from the gut. e.g. *Balanoglossus*, *Herdmania*.

Vertebrata are the most advanced group of animals with true vertebral column and strong endoskeleton. Vertebrates are grouped into different classes based on bilateral symmetry, notochord, dorsal nerve cord, paired gill pouches, triploblastic, and coelomate. These classes are Pisces, Amphibia, Reptilia, Aves and Mammalia.

Now it's your turn to find to which Phylum do the Humans belong!!

Diversity of Animals

- Article published in Twinkle Star Magazine

- The Hitavada on 26/08/2017

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## Chemistry of fireworks



As soon as the bells of the festive season ring and Diwali is just around the corner, I always wait for my box of firecrackers. I generally like the anar (flowerpot), chakri and fuljhadi because of their mesmerising colours. I was always fascinated by these colours. This year when my teacher of Chemistry Sheetal Ma'am introduced my class to the Periodic Table and we read about Sodium, Barium, Phosphorus, Magnesium etc., I understood the reason behind the colours in the firecrackers. If you also want to know the Chemistry behind these lovely firecrackers, read on!

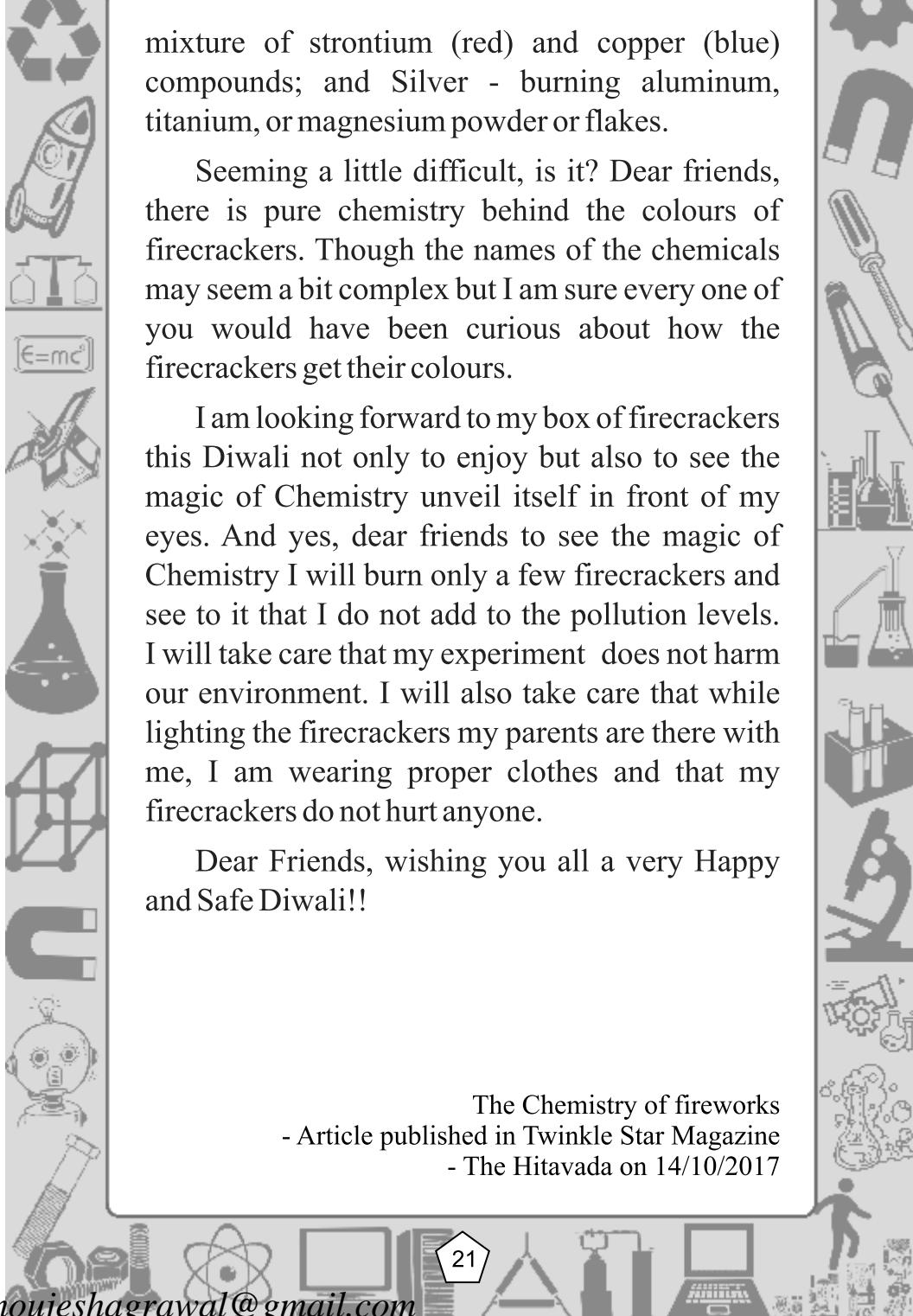
According to <https://gizmodo.com/these-are-the-minerals-that-give-fireworks-their-colors-1715822644>, Fireworks get their colour from metal salts. A salt is a chemical compound formed when an acid and base neutralize each other, resulting in a new compound where the elements are bound together through ionic bonds. Many of the salts include an oxidizer like nitrates, chlorates, or perchlorates. Along with imparting



colour, these oxidizers provide oxygen, allowing the fireworks to burn. The metals or salts can also be stabilizers, keeping the colour-imparting elements stable until showtime. While not explicitly a colour-inducing element, phosphorous is also commonly included in fireworks as a fuel since it spontaneously burns in air, but also as a glowing component in darker fireworks effects. Zinc can be added to create smoke effects.

According to <http://earthsky.org/human-world/how-do-fireworks-get-their-vibrant-colors>, Metal salts commonly used in firework displays include: strontium carbonate (red fireworks), calcium chloride (orange fireworks), sodium nitrate (yellow fireworks), barium chloride (green fireworks) and copper chloride (blue fireworks), a mixture of strontium (red) and copper (blue) compounds (purple fireworks).

According to <https://www.thoughtco.com/chemistry-of-firework-colors-607341>, fireworks get their colours from the chemicals such as for the colour Red-strontium salts, lithium salts; Orange - calcium salts; Gold- incandescence of iron (with carbon), charcoal, or lampblack; Yellow- sodium compounds; Electric White- white-hot metal, such as magnesium or aluminium barium oxide; Green- barium compounds + chlorine producer barium chloride, Blue-copper compounds + chlorine producer copper acetoarsenite; Purple-



mixture of strontium (red) and copper (blue) compounds; and Silver - burning aluminum, titanium, or magnesium powder or flakes.

Seeming a little difficult, is it? Dear friends, there is pure chemistry behind the colours of firecrackers. Though the names of the chemicals may seem a bit complex but I am sure every one of you would have been curious about how the firecrackers get their colours.

I am looking forward to my box of firecrackers this Diwali not only to enjoy but also to see the magic of Chemistry unveil itself in front of my eyes. And yes, dear friends to see the magic of Chemistry I will burn only a few firecrackers and see to it that I do not add to the pollution levels. I will take care that my experiment does not harm our environment. I will also take care that while lighting the firecrackers my parents are there with me, I am wearing proper clothes and that my firecrackers do not hurt anyone.

Dear Friends, wishing you all a very Happy and Safe Diwali!!

The Chemistry of fireworks  
- Article published in Twinkle Star Magazine  
- The Hitavada on 14/10/2017

10

## Indian Scientists who won the Nobel Prize

We all know the name of Sir. C.V Raman and also that he was the first Indian Scientist to be awarded the Nobel Prize for Physics in 1930. But do we know how the idea for “The Raman Effect” came to his mind? Once when Sir Raman was travelling by a ship through the Mediterranean Sea, a doubt came to his mind, “Why is the sea looking blue?” He started experimenting and found that this was due to “Scattering of Light.” This discovery was named as the “Raman Effect.”

Sir C. V. Raman’s nephew Subrahmanyan Chandrashekhar gave the world the “Chandrashekhar Limit” which is equal to 1.44 times a solar mass. Due to his great contribution the discovery of white dwarf, neutron star and black holes was made possible. He was awarded the Nobel Prize in Physics too jointly with the nuclear Physicist W.A.Fowler in 1983.

Indian scientists were not confined to the limits of Physics. Dr.Har Govind Khorana interpreted the genetic code, its functions and



protein synthesis for which along with two foreign scientists he was awarded the Nobel Prize for Physiology or Medicine in 1968.

Chemistry was not left far behind. Venkataraman Ramakrishnan won the Nobel Prize for Chemistry in 2009 along with two foreign nationals as he cracked the complex functions and structures of Ribosomes. Interestingly, he had started for America for his higher studies in Physics but he changed it to Biology and though a student of Biology, he won the Nobel Prize for Chemistry.



Indian Scientists who won the Nobel Prize  
- Article published in Twinkle Star Magazine  
- The Hitavada on 18/03/2017

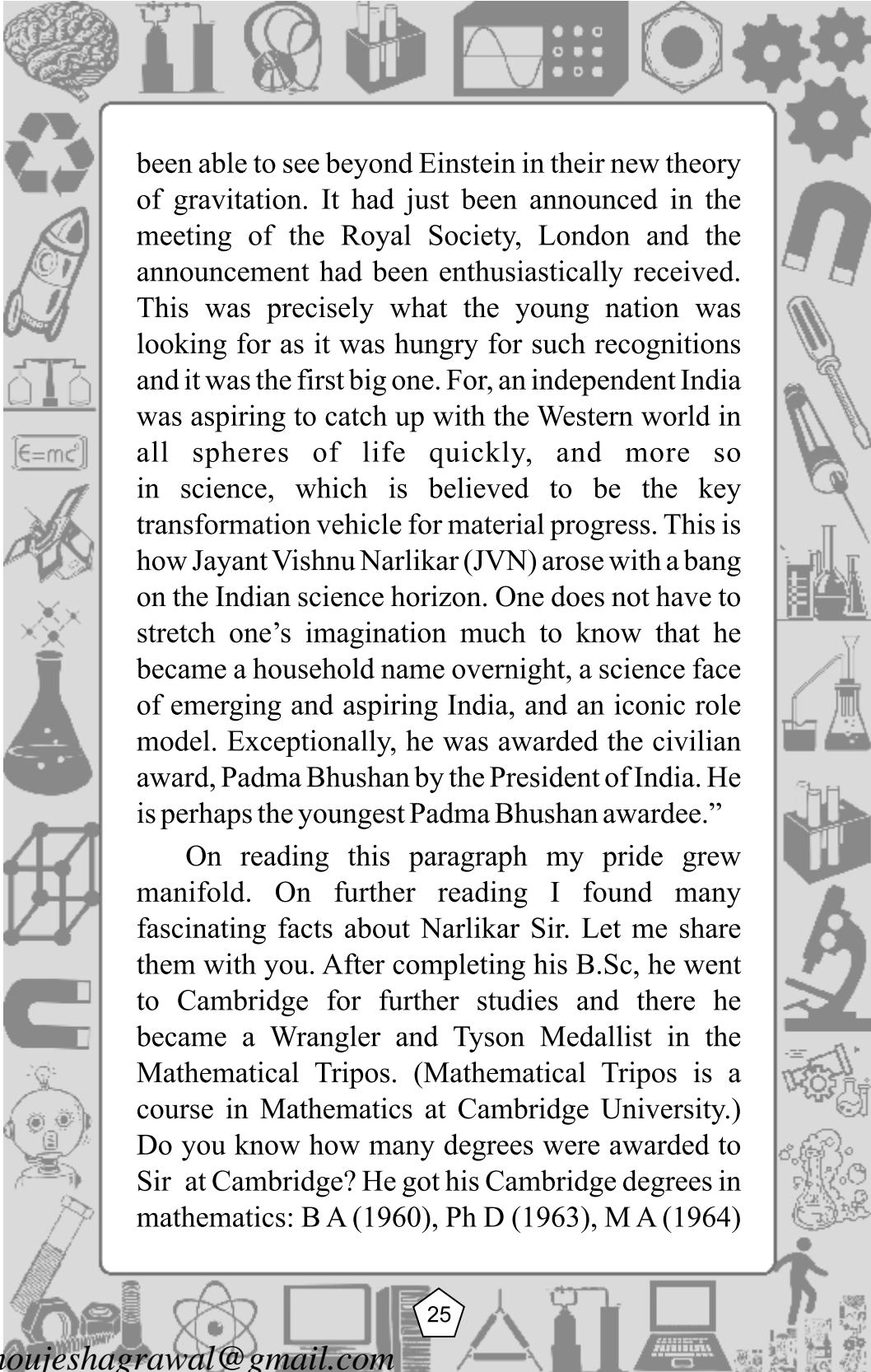




## Jayant Vishnu Narlikar : A Living Legend

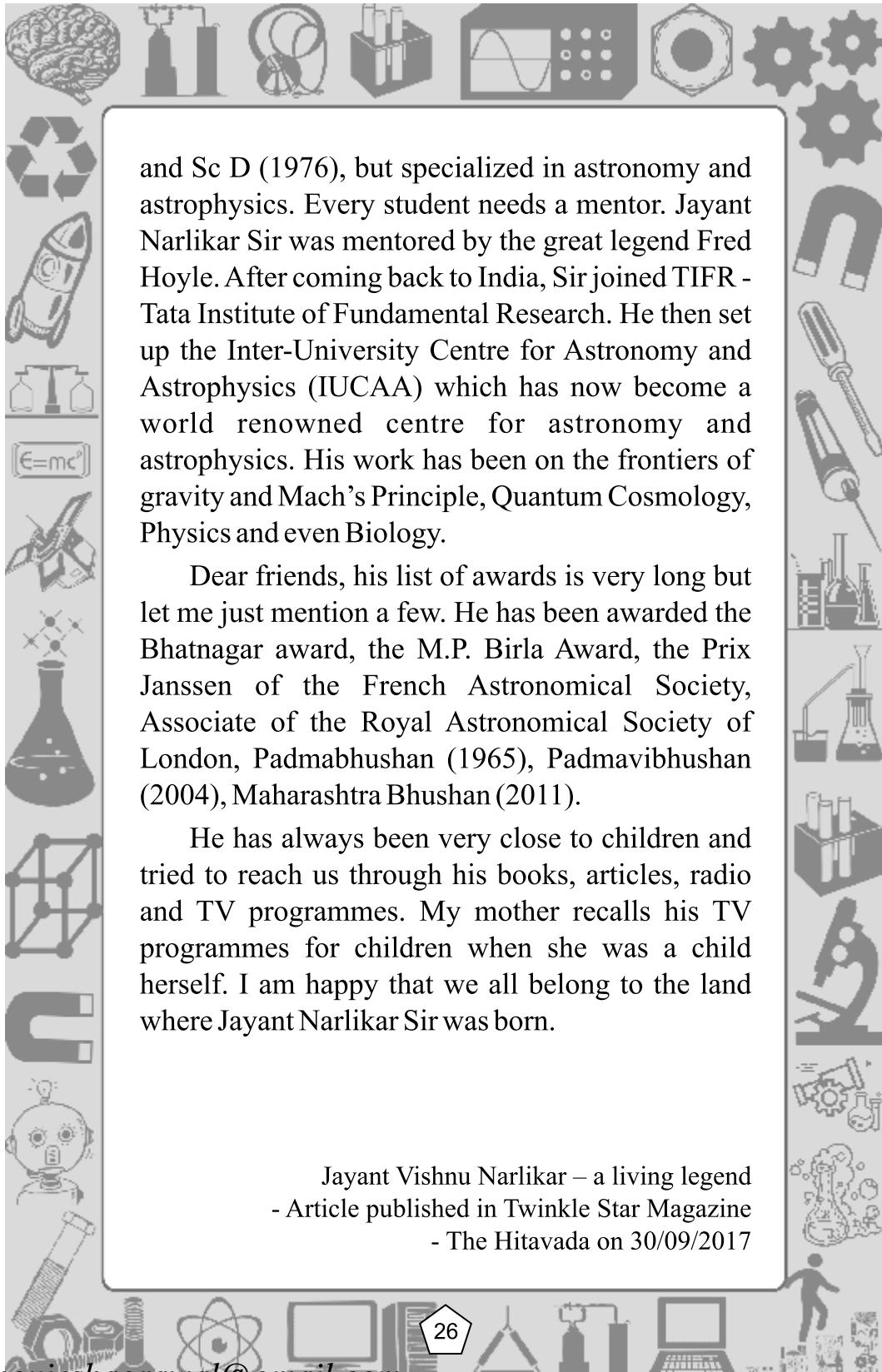
Dear friends, I have always been fascinated by the great work of Narlikar Sir and still dream to meet him personally one day. Today morning when I was browsing the website of IIT Gandhinagar, I saw a link ‘Living Legends in Indian Science’ - <http://www.iitgn.ac.in/llis.htm>. The list included the names of the stalwarts- Mambillikalathil Govind Kumar Menon, Asoke Nath Mitra, H.Y. Mohan Ram, T. N. Ananthakrishnan, Marthanda Varma Sankaran Valiathan, C. V. Subramanian, Udupi Ramachandra Rao, Bullusu Lakshmana Deekshatulu, Roddam Narasimha and my favourite Jayant Vishnu Narlikar. I could not resist myself from clicking the link further which led me to an article on Narlikar Sir published in the Current Science, Volume 107, Number 1, July 2014. To know what I found about Sir in that article, Read On!!

The article started with the following lines, “It was late 1964; newspapers all over the country had a big front page splash, a young Indian don at Cambridge and his senior research collaborator had



been able to see beyond Einstein in their new theory of gravitation. It had just been announced in the meeting of the Royal Society, London and the announcement had been enthusiastically received. This was precisely what the young nation was looking for as it was hungry for such recognitions and it was the first big one. For, an independent India was aspiring to catch up with the Western world in all spheres of life quickly, and more so in science, which is believed to be the key transformation vehicle for material progress. This is how Jayant Vishnu Narlikar (JVN) arose with a bang on the Indian science horizon. One does not have to stretch one's imagination much to know that he became a household name overnight, a science face of emerging and aspiring India, and an iconic role model. Exceptionally, he was awarded the civilian award, Padma Bhushan by the President of India. He is perhaps the youngest Padma Bhushan awardee."

On reading this paragraph my pride grew manifold. On further reading I found many fascinating facts about Narlikar Sir. Let me share them with you. After completing his B.Sc, he went to Cambridge for further studies and there he became a Wrangler and Tyson Medallist in the Mathematical Tripos. (Mathematical Tripos is a course in Mathematics at Cambridge University.) Do you know how many degrees were awarded to Sir at Cambridge? He got his Cambridge degrees in mathematics: B A (1960), Ph D (1963), M A (1964)

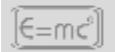


and Sc D (1976), but specialized in astronomy and astrophysics. Every student needs a mentor. Jayant Narlikar Sir was mentored by the great legend Fred Hoyle. After coming back to India, Sir joined TIFR - Tata Institute of Fundamental Research. He then set up the Inter-University Centre for Astronomy and Astrophysics (IUCAA) which has now become a world renowned centre for astronomy and astrophysics. His work has been on the frontiers of gravity and Mach's Principle, Quantum Cosmology, Physics and even Biology.

Dear friends, his list of awards is very long but let me just mention a few. He has been awarded the Bhatnagar award, the M.P. Birla Award, the Prix Janssen of the French Astronomical Society, Associate of the Royal Astronomical Society of London, Padmabhushan (1965), Padmavibhushan (2004), Maharashtra Bhushan (2011).

He has always been very close to children and tried to reach us through his books, articles, radio and TV programmes. My mother recalls his TV programmes for children when she was a child herself. I am happy that we all belong to the land where Jayant Narlikar Sir was born.

Jayant Vishnu Narlikar – a living legend  
- Article published in Twinkle Star Magazine  
- The Hitavada on 30/09/2017



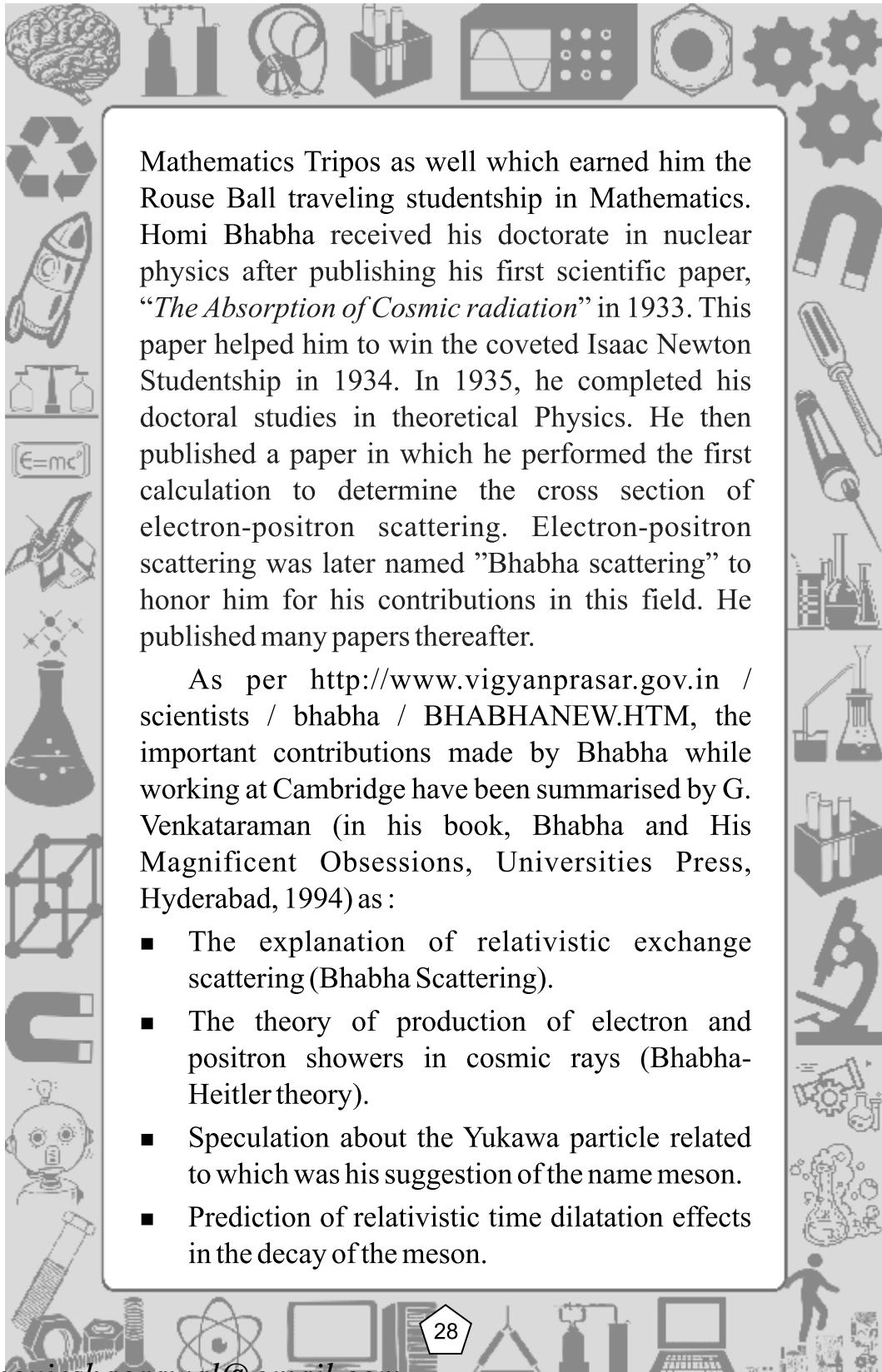
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## Dr.Homi Jehangir Bhabha

Writing about this great scientist fills my heart with pride and I am sure dear friends that his name itself is enough to give each one of us strength and motivation to do something good for Mother India. To read more about the Father of Indian Nuclear Programme, read on!

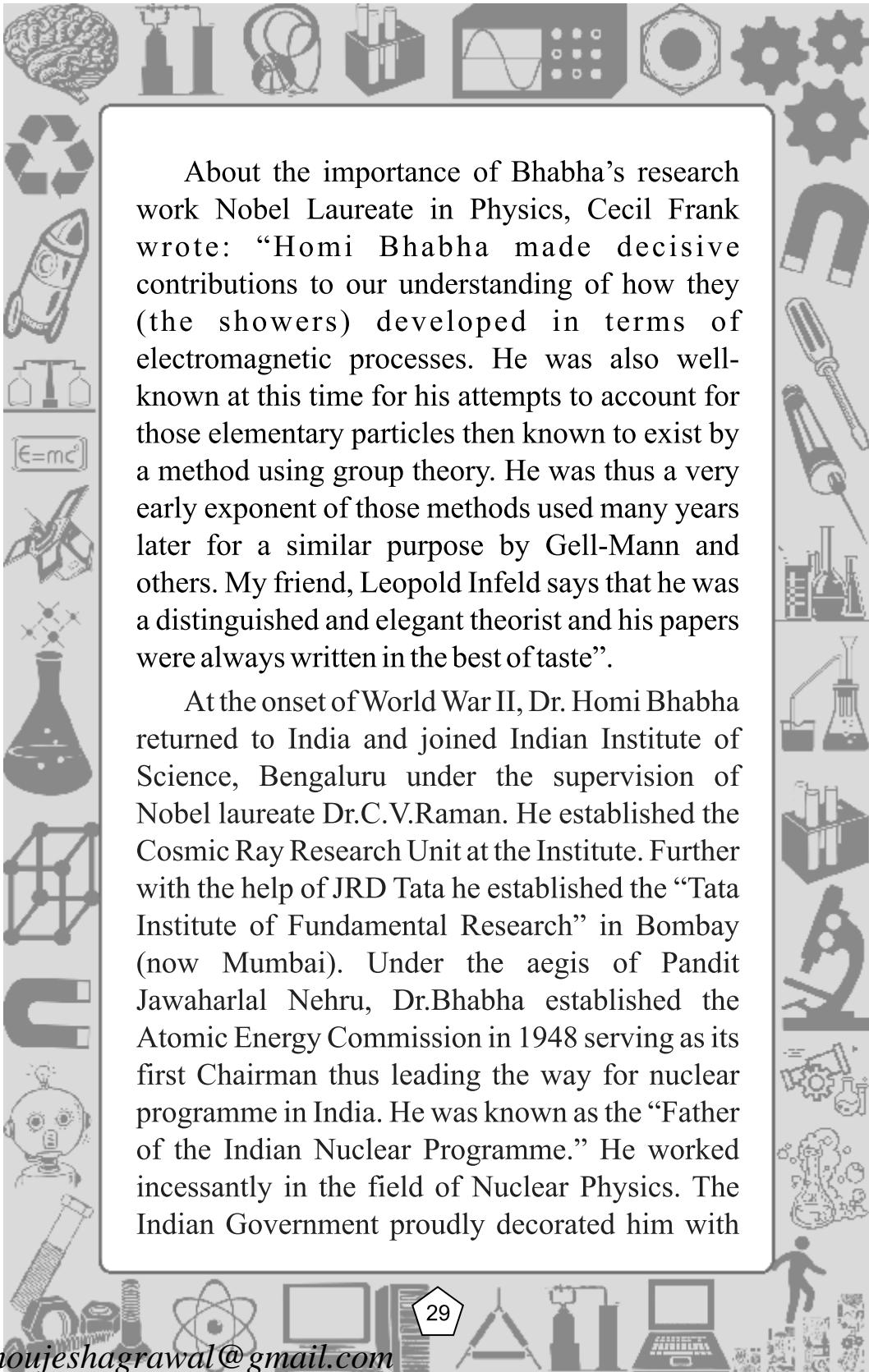
On 30 October 1909, Jehangir Bhabha and Meheren were blessed with a son who brought them the laurels any parent in the world would be proud of. Homi Bhabha showed his interest in Mathematics and Physics and was always supported by his parents and his Uncle Dorabji Tata in his pursuit of education. He did his schooling from Cathedral and John Connon School, Bombay and his junior college studies at Elphinstone College. He then entered into Royal Institute of Science after which he finally went to Caius College of Cambridge University. He then showed interest in pursuing studies in Mathematics for which his father asked him to first clear the Mechanical Sciences Tripos Exam in first class. Homi Bhabha cleared the exam in 1930. He then went on to clear his



Mathematics Tripos as well which earned him the Rouse Ball traveling studentship in Mathematics. Homi Bhabha received his doctorate in nuclear physics after publishing his first scientific paper, “*The Absorption of Cosmic radiation*” in 1933. This paper helped him to win the coveted Isaac Newton Studentship in 1934. In 1935, he completed his doctoral studies in theoretical Physics. He then published a paper in which he performed the first calculation to determine the cross section of electron-positron scattering. Electron-positron scattering was later named ”Bhabha scattering” to honor him for his contributions in this field. He published many papers thereafter.

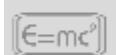
As per [http://www.vigyanprasar.gov.in / scientists / bhabha / BHABHANEW.HTM](http://www.vigyanprasar.gov.in/scientists/bhabha/BHABHANEW.HTM), the important contributions made by Bhabha while working at Cambridge have been summarised by G. Venkataraman (in his book, Bhabha and His Magnificent Obsessions, Universities Press, Hyderabad, 1994) as :

- The explanation of relativistic exchange scattering (Bhabha Scattering).
- The theory of production of electron and positron showers in cosmic rays (Bhabha-Heitler theory).
- Speculation about the Yukawa particle related to which was his suggestion of the name meson.
- Prediction of relativistic time dilatation effects in the decay of the meson.



About the importance of Bhabha's research work Nobel Laureate in Physics, Cecil Frank wrote: "Homi Bhabha made decisive contributions to our understanding of how they (the showers) developed in terms of electromagnetic processes. He was also well-known at this time for his attempts to account for those elementary particles then known to exist by a method using group theory. He was thus a very early exponent of those methods used many years later for a similar purpose by Gell-Mann and others. My friend, Leopold Infeld says that he was a distinguished and elegant theorist and his papers were always written in the best of taste".

At the onset of World War II, Dr. Homi Bhabha returned to India and joined Indian Institute of Science, Bengaluru under the supervision of Nobel laureate Dr.C.V.Raman. He established the Cosmic Ray Research Unit at the Institute. Further with the help of JRD Tata he established the "Tata Institute of Fundamental Research" in Bombay (now Mumbai). Under the aegis of Pandit Jawaharlal Nehru, Dr.Bhabha established the Atomic Energy Commission in 1948 serving as its first Chairman thus leading the way for nuclear programme in India. He was known as the "Father of the Indian Nuclear Programme." He worked incessantly in the field of Nuclear Physics. The Indian Government proudly decorated him with



the much deserved “Padma Bhushan” in 1954. After his death on 24<sup>th</sup> January 1966, the Atomic Energy Establishment at Bombay was renamed as the ”Bhabha Atomic Research Centre” to honour him.

I am so fortunate to be born in the land of stalwarts of the stature of Dr.Homi Jehangir Bhabha and I pledge my entire life to the service of my motherland.

Dr Homi Jehangir Bhabha

- Article published in Twinkle Star Magazine

- The Hitavada on 05/08/2017





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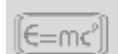
## The Wonder Scientist of India - Sir C.V. Raman

I recently attended a lecture on science and scientists of India. I was really fascinated to know something. Want to know what? Read on!

It was the fact that India won a Nobel Prize in 1930 and it was inspired by a question that had fascinated me from my childhood. It was Sir C.V. Raman who won India's first noble prize. Well, let me tell you what exactly he did.

When working as a professor, he got an invitation from England to attend a conference on Science. As his ship was sailing through the Mediterranean Sea, he wondered, why is the water blue? This question ignited his mind and he came up with an interesting explanation for it. This was named as the 'Raman Effect'. Raman discovered the Raman Effect on 28 February, 1928 and this day is till date observed as 'National Science Day' in India. He was awarded Knighthood by the British Empire in 1929 for this discovery, and also won him the Nobel Prize in Physics in the year 1930.





Sir C.V. Raman's work is very inspiring and so is his success story. In spite of being the first Indian to win a Nobel Prize in science, he was ever humble and a true Indian because when the University of Cambridge offered him a professor's job, he declined it stating he was an Indian and wanted to serve his own country. I salute India's wonder scientist, Sir C.V. Raman.



The wonder scientist of India - Sir. C V Raman  
- Article published in Twinkle Star Magazine  
- The Hitavada on 1/07/2017





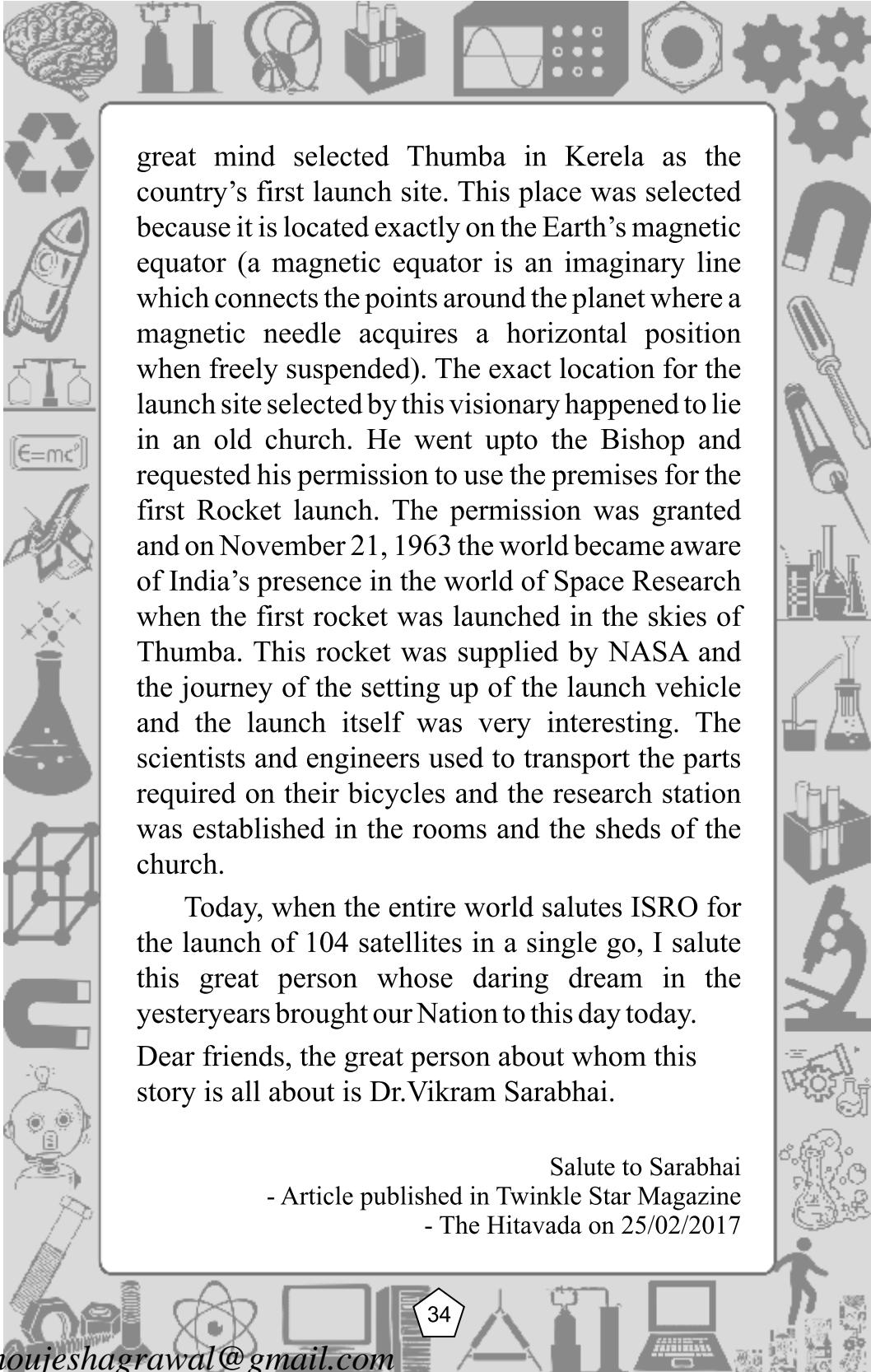
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## Salute to Sarabhai

Yesterday was a memorable day of my life as my father told me the best story I had heard since I was born. I knew bits and parts but the entire story was unfolded just yesterday. Let me share it with you dear friends. Read on!

This story is about the father of India's Space Programme. Being born in a family of industrialists committed to the cause of India's Independence, this young boy always had his motherland as his topmost priority. Space lured him always and at a modest age of 23, he started the Physical Research laboratory at his home to study cosmic rays. Later the Atomic Energy Commission supported this cause of scientific study and the research expanded to radio physics and many other areas. He was not satisfied with a handful of people working for science. He wanted children to take interest and learn more about science. With this aim in mind, he started a Community Science Centre in 1960.

He later convinced Government of India about the importance of Space Program in India and was heartily supported by Homi Jehangir Bhabha to set up the first rocket launching station in India. This



great mind selected Thumba in Kerela as the country's first launch site. This place was selected because it is located exactly on the Earth's magnetic equator (a magnetic equator is an imaginary line which connects the points around the planet where a magnetic needle acquires a horizontal position when freely suspended). The exact location for the launch site selected by this visionary happened to lie in an old church. He went upto the Bishop and requested his permission to use the premises for the first Rocket launch. The permission was granted and on November 21, 1963 the world became aware of India's presence in the world of Space Research when the first rocket was launched in the skies of Thumba. This rocket was supplied by NASA and the journey of the setting up of the launch vehicle and the launch itself was very interesting. The scientists and engineers used to transport the parts required on their bicycles and the research station was established in the rooms and the sheds of the church.

Today, when the entire world salutes ISRO for the launch of 104 satellites in a single go, I salute this great person whose daring dream in the yesteryears brought our Nation to this day today.

Dear friends, the great person about whom this story is all about is Dr.Vikram Sarabhai.

Salute to Sarabhai

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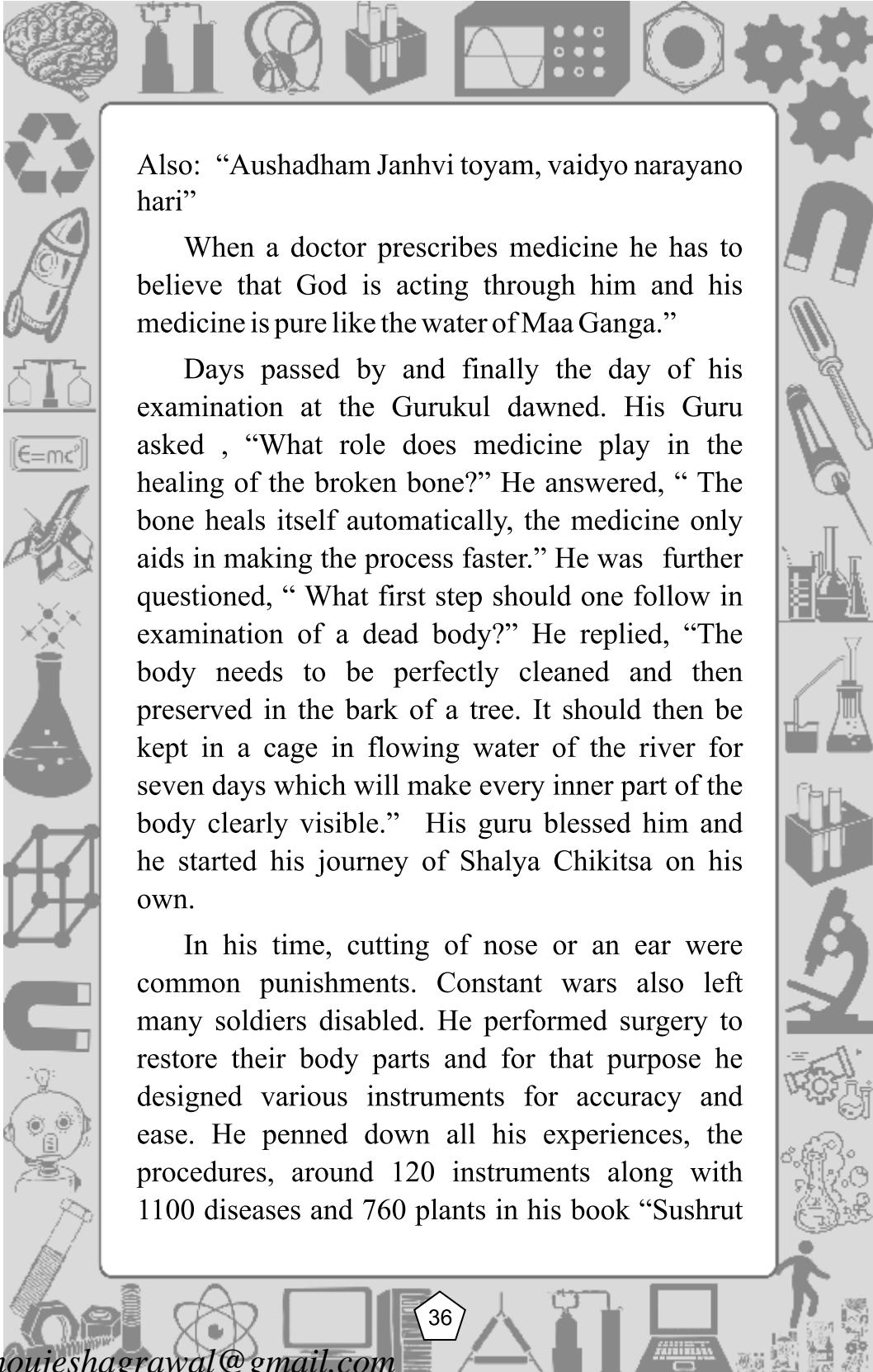
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## Acharya Sushruta : Father of Surgery

Sushruta was born in the kingdom of King Vishwamitra and Mother Madhavi. One fine day his father came to him and said, "Sushruta we are going to Kashi to your grandfather king Divodas, who is known as Dhanvantari the giver of life. From now on he will be your teacher and family." He got the early lessons from his nana before he was sent to Gurukul. There he started studying Shalya Chikitsa.

One day his friend Virechak came wailing in pain. He cried, "Sushrut, look at my finger... It has broken. Oh please do something, stop this bleeding, help me...please join my finger back..." The other shishyas in the gurukul started laughing. Sushruta ran inside, brought a medicine and applied it to the broken part and bandaged it back to its place. He said, "Virechak, apply this medicine for seven days and your finger will be alright." After seven days Virechak came back beaming with joy. He asked, "Sushrut, how did you make this possible?" Sushruta replied, "Whenever tissues of our body are damaged, they don't die instantly. If they are put back in place in time they start healing themselves.



Also: “Aushadham Janhvi toyam, vaidyo narayano hari”

When a doctor prescribes medicine he has to believe that God is acting through him and his medicine is pure like the water of Maa Ganga.”

Days passed by and finally the day of his examination at the Gurukul dawned. His Guru asked , “What role does medicine play in the healing of the broken bone?” He answered, “ The bone heals itself automatically, the medicine only aids in making the process faster.” He was further questioned, “ What first step should one follow in examination of a dead body?” He replied, “The body needs to be perfectly cleaned and then preserved in the bark of a tree. It should then be kept in a cage in flowing water of the river for seven days which will make every inner part of the body clearly visible.” His guru blessed him and he started his journey of Shalya Chikitsa on his own.

In his time, cutting of nose or an ear were common punishments. Constant wars also left many soldiers disabled. He performed surgery to restore their body parts and for that purpose he designed various instruments for accuracy and ease. He penned down all his experiences, the procedures, around 120 instruments along with 1100 diseases and 760 plants in his book “Sushrut



Samhita” for the surgeons of future. He continued his research and often presented his latest findings in conferences. Once he was asked, “Even after taking utmost care, why does a patient die during surgery?” He knew this happened because of the infected instruments. He asked them to heat the instruments before use.

He believed- Surgery is the highest division of the healing arts. Human body is a complex machine made by God and conducting surgery on it has its own challenges. A surgeon should conduct a surgery with a calm and prayerful mind in order to can focus his attention on the task at hand so that he does not fail. Every surgeon must believe that he is an instrument of God and is there to serve the needy.

Acharya Sushruta

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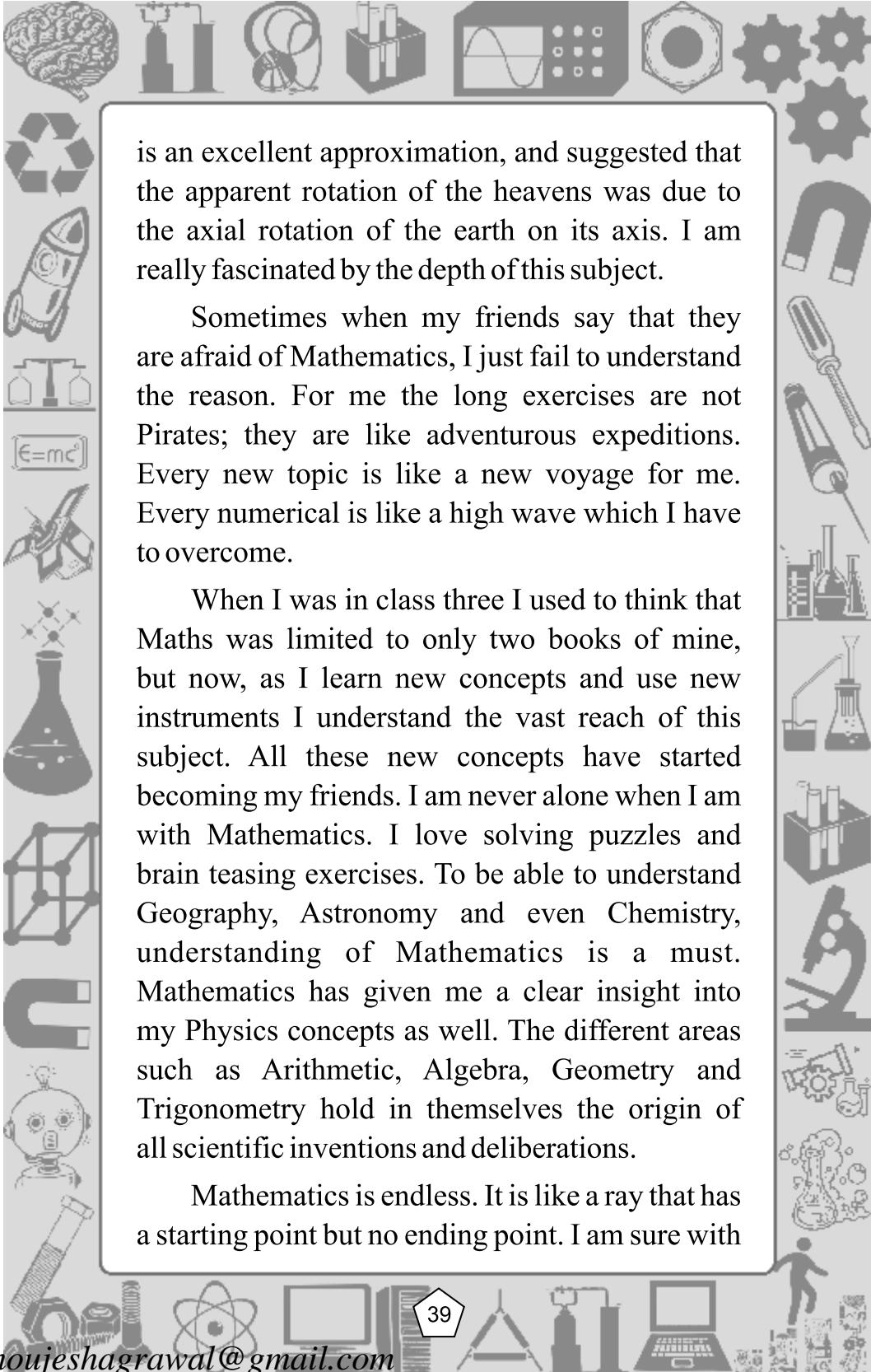




## Mathematics : a fascinating expedition

From my childhood the ten numbers and the four signs have fascinated me a lot. When I came to know that “zero-0” was given to the world by an Indian Mathematician I felt really proud. To know more about the world of fascinating mathematics.....read on!

According to <http://www.thefamouspeople.com/profiles/aryabhata-5427.php>, Aryabhata was a legendary mathematician who was born in Kusumapura (present day Patna) in Bihar, India. At the age of 24, he wrote his famed “Aryabhatiya”. This book “Aryabhatiya” was one of the major contributions of Aryabhata. There are 108 verses preceded by 13 introductory verses in the text. It is divided into four chapters: Gitikapada, Ganitapada, Kalkriyapada and Golapada. He was the first to calculate the value for ‘pi’ accurately to the fourth decimal point. He devised the formula for calculating areas of triangles and circles. He calculated the circumference of the earth as 62,832 miles, which



is an excellent approximation, and suggested that the apparent rotation of the heavens was due to the axial rotation of the earth on its axis. I am really fascinated by the depth of this subject.

Sometimes when my friends say that they are afraid of Mathematics, I just fail to understand the reason. For me the long exercises are not Pirates; they are like adventurous expeditions. Every new topic is like a new voyage for me. Every numerical is like a high wave which I have to overcome.

When I was in class three I used to think that Maths was limited to only two books of mine, but now, as I learn new concepts and use new instruments I understand the vast reach of this subject. All these new concepts have started becoming my friends. I am never alone when I am with Mathematics. I love solving puzzles and brain teasing exercises. To be able to understand Geography, Astronomy and even Chemistry, understanding of Mathematics is a must. Mathematics has given me a clear insight into my Physics concepts as well. The different areas such as Arithmetic, Algebra, Geometry and Trigonometry hold in themselves the origin of all scientific inventions and deliberations.

Mathematics is endless. It is like a ray that has a starting point but no ending point. I am sure with

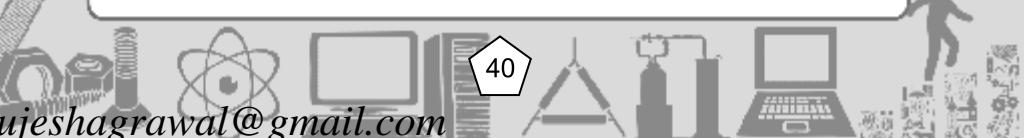


this learning my boat will be able to cross this exciting expedition in the sea of numbers. Dear friends, if we try to understand the basic concepts of Mathematics, we will be able to not only score good marks in our school exams but also be able to visualise the scientific concepts clearly.

Mathematics a fascinating expedition

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- The Hitavada on 12/08/2017



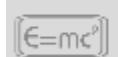
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## Quantum Mechanics : A Sneak Peek



What is light? Hmm... According to internet light is the natural agent that stimulates sight and makes stuff visible. But is the definition so simple? What connection does light have with Quantum Mechanics?

The question which I asked you even today bothers physicists. But we have a much better explanation of what exactly light is. Light follows wave- particle duality. In simple language, it means that light is both a wave and a stream of particles. Difficult to picture right? It is said that as the size or better the mass of an object decreases its wave character increases. This means that even a football has an accompanying wave but the wave character is negligible. But as the mass decreases and becomes equal to that of an electron, it's wave character becomes significant. In a similar way, light is considered to be a stream of photons with an accompanying wave! Now this theory is able to explain both the photoelectric effect which stresses on the particle nature of light and the



double slit experiment which stresses that light has a wave character.

Now let us talk about the mathematical aspect of quantum mechanics. What I just told you is mathematically governed by De Broglie's equation. According to the equation, the wavelength of the wave accompanying the particle is equal to the Planck's constant divided by mass of the particle multiplied by its velocity or simply Planck's constant divided by the particle's momentum. By this it is clear that mass and wavelength are inversely proportional to each other.

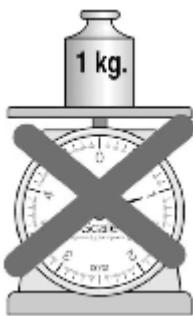
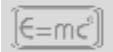
If this article interests you, do read in detail about quantum mechanics. Happy reading!

Quantum Mechanics -A sneak peek

- Article published in Twinkle Star Magazine

- The Hitavada on 30/12/2017





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## The Kilogram is Going to Change

Ever wondered what does your mother exactly want when she says go get a kilogram of butter from the general shop? Hmm.... she exactly wants you to get an equivalent weight of butter as compared to the international prototype made of a platinum- iridium alloy kept at Paris. That's amazing but is even that definition true? Read on to find out!

This prototype was kept in Paris in 1889 but since then, its mass has been constantly changing! If this continues, the magnitude of kilogram will deviate from its original value; thus scientists all over the world realized that they should have a more reliable definition of the kilogram.

There have been many proposals of how should they redefine the kilogram floating around on the web but the one which is most likely to be accepted in an international conference in 2019 is the one that uses a Watt Balance to redefine the kilogram. The new definition proposes to define





the kilogram in terms of the second and the metre. According to Wikipedia, the new kilogram is defined by taking the fixed numerical value of the Planck constant ‘h’ to be  $6.62607015 \times 10^{-34}$  when expressed in the unit JÅ”s, which is equal to kgÅ”mÅ”s”, where the metre and the second are defined in terms of c and Åí. In this definition, the value of the Planck’s constant is governed by the Watt Balance.

One thing to think about is that in the starting when I told you that the current definition of kilogram is equal to the mass of the international prototype made of a platinum- iridium alloy kept at Paris, how scientists came to know that the mass of even the prototype is one kilogram? Actually they came to know this because the mass of that prototype was equal to that of 1 litre pure water at its melting point. Wait, if we already had a pretty good definition of the kilogram that was so simple, why are we so anxious of getting a newer, complicated one? I leave this on you to think.

The Kilogram is going to change

- Article published in Twinkle Star Magazine

- The Hitavada on 6/01/2017



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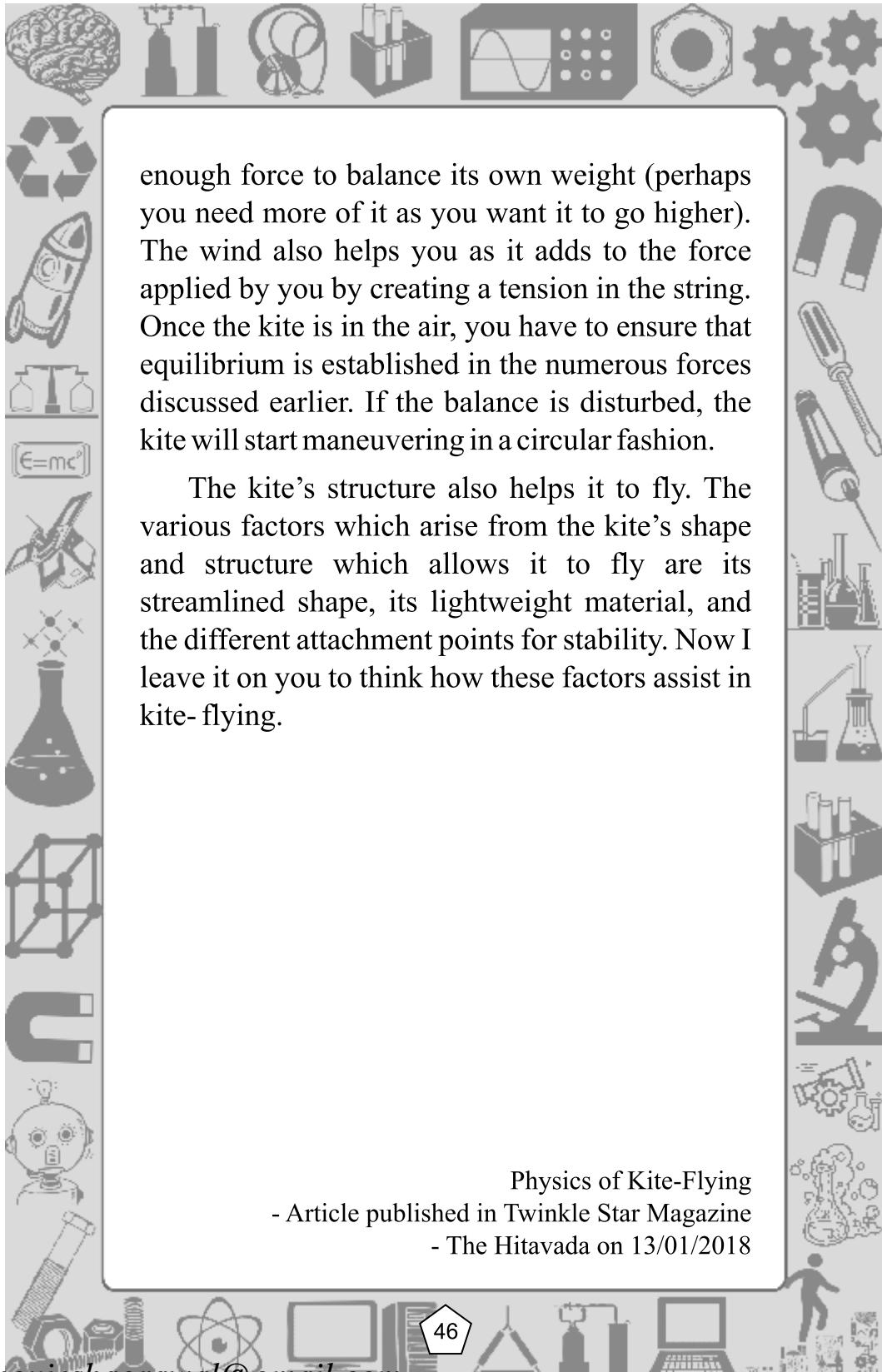
## Physics of Kite-Flying



Hurray! Makar Sankranti is coming! The sky will again be colored and all the heads will look up! Have you ever flown a kite? Kite-flying is fun, right? But have you ever wondered how does a kite fly? What is the physics behind it? Take time and think of it. If you are ready with an answer, read on to find if you are correct!

Kite-flying may seem easy but there is a lot of physics behind it. Just like an airplane take-off, kite-flying has various phases. They are release, launch, climb and cruise. Before we get into the various phases, let us first try to understand what forces are associated with kite flying. There are five major forces that are involved in kite flying. They are the aerodynamic upwards lift, the force due to the wind, the drag, the weight of the kite and the tension supplied by the string. To keep the kite afloat, an equilibrium condition between these five forces should be established.

Now let us take a look at the various phases. Let us start with the release and launch. To have the kite floating in air, you have to provide it with



enough force to balance its own weight (perhaps you need more of it as you want it to go higher). The wind also helps you as it adds to the force applied by you by creating a tension in the string. Once the kite is in the air, you have to ensure that equilibrium is established in the numerous forces discussed earlier. If the balance is disturbed, the kite will start maneuvering in a circular fashion.

The kite's structure also helps it to fly. The various factors which arise from the kite's shape and structure which allows it to fly are its streamlined shape, its lightweight material, and the different attachment points for stability. Now I leave it on you to think how these factors assist in kite-flying.

#### Physics of Kite-Flying

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- The Hitavada on 13/01/2018

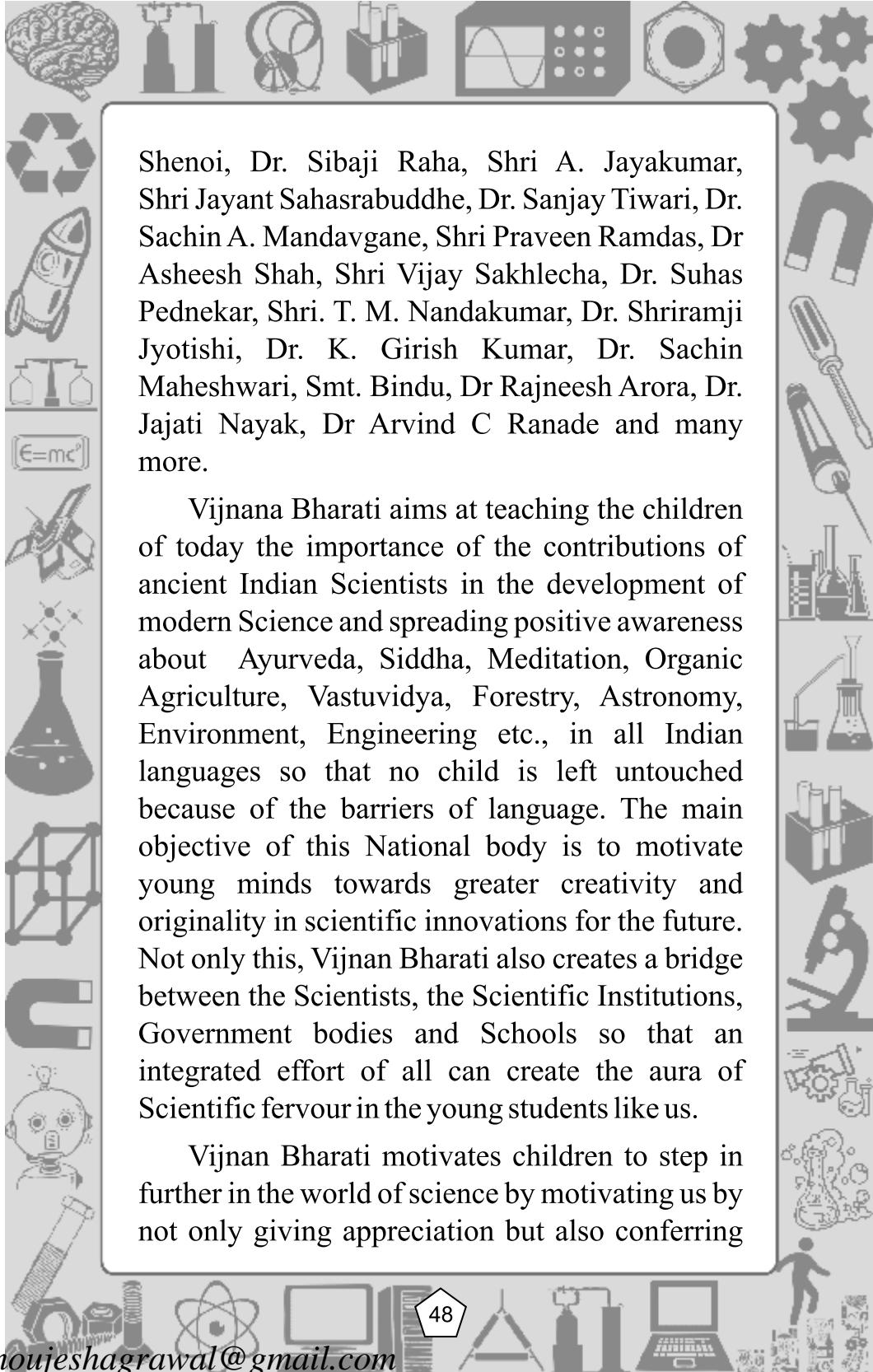
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## Vijnana Bharati : a boon for children



Vijnana Bharati is a Swadeshi Science Movement which was initiated in October 1991 at Nagpur. Since its inception, this movement has gained momentum and achieved great milestones such as its inclusion in the Guinness Book of World Records for the successful conduct of the ‘Largest Practical Science Lesson’, “Giving Back UBM” most Impactful Project of the year for “India International Science Fair” held at IIT Delhi (2015), the ‘Honorable mention Award’ and ‘Popular choice Award’ at Massachusetts Institute of Technology (MIT), USA, Jawaharlal Nehru prize, National Award for Science Communication from Government of India, etc.

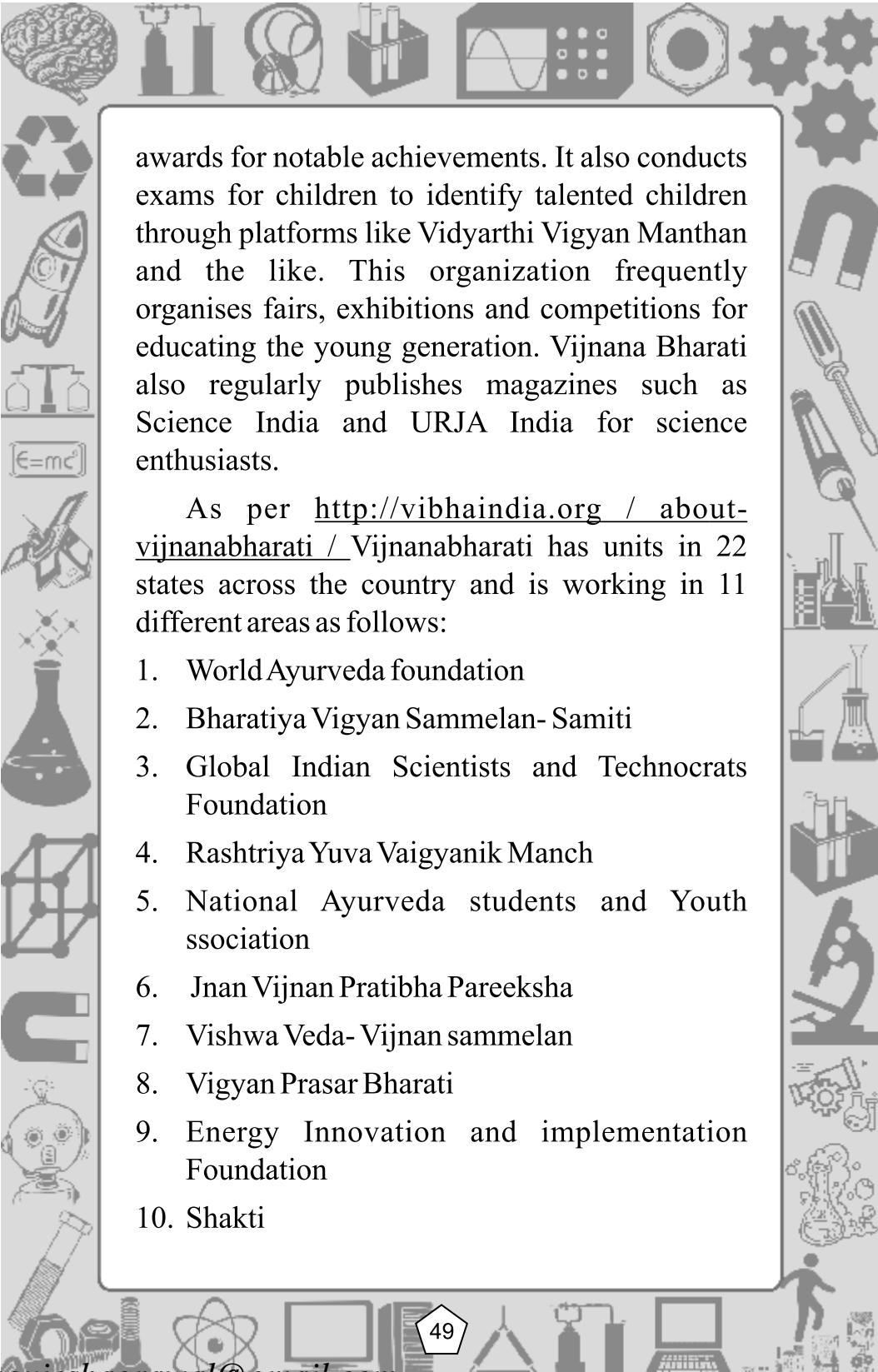
Vijnana Bharati is led by an eminent team of Scientists including Prof. K I Vasu, Dr. Anil Kakodkar, Dr.G Madhavan Nair, Prof. V. N. Rajasekharan Pillai, Dr. Vijay P. Bhatkar, Dr. Sudhir Bhadauriya, Dr. Shekhar Mande, Dr. Shankar Tatwawadi, Dr. V.K. Saraswat, Dr. Satheesh



Shenoi, Dr. Sibaji Raha, Shri A. Jayakumar, Shri Jayant Sahasrabuddhe, Dr. Sanjay Tiwari, Dr. Sachin A. Mandavgane, Shri Praveen Ramdas, Dr Asheesh Shah, Shri Vijay Sakhlecha, Dr. Suhas Pednekar, Shri. T. M. Nandakumar, Dr. Shriramji Jyotishi, Dr. K. Girish Kumar, Dr. Sachin Maheshwari, Smt. Bindu, Dr Rajneesh Arora, Dr. Jajati Nayak, Dr Arvind C Ranade and many more.

Vijnana Bharati aims at teaching the children of today the importance of the contributions of ancient Indian Scientists in the development of modern Science and spreading positive awareness about Ayurveda, Siddha, Meditation, Organic Agriculture, Vastuvidya, Forestry, Astronomy, Environment, Engineering etc., in all Indian languages so that no child is left untouched because of the barriers of language. The main objective of this National body is to motivate young minds towards greater creativity and originality in scientific innovations for the future. Not only this, Vijnan Bharati also creates a bridge between the Scientists, the Scientific Institutions, Government bodies and Schools so that an integrated effort of all can create the aura of Scientific fervour in the young students like us.

Vijnan Bharati motivates children to step in further in the world of science by motivating us by not only giving appreciation but also conferring



awards for notable achievements. It also conducts exams for children to identify talented children through platforms like Vidyarthi Vigyan Manthan and the like. This organization frequently organises fairs, exhibitions and competitions for educating the young generation. Vijnana Bharati also regularly publishes magazines such as Science India and URJA India for science enthusiasts.

As per <http://vibhaindia.org / about-vijnanabharati> / Vijnanabharati has units in 22 states across the country and is working in 11 different areas as follows:

1. World Ayurveda foundation
2. Bharatiya Vigyan Sammelan- Samiti
3. Global Indian Scientists and Technocrats Foundation
4. Rashtriya Yuva Vaigyanik Manch
5. National Ayurveda students and Youth ssociation
6. Jnan Vijnan Pratibha Pareeksha
7. Vishwa Veda- Vijnan sammelan
8. Vigyan Prasar Bharati
9. Energy Innovation and implementation Foundation
10. Shakti



## 11. International Institute of Waste management

Dear friends, Vijnana Bharati has opened its doors for all of us to become a part of its family. We, our parents, grandparents and friends can all join this wonderful movement and this fascinating world of Science. I have been greatly benefited by Vijnana Bharati's work and I request all of you to become a part of Vijnana Bharati's mission of spreading Science awareness by becoming members of this esteemed National body.

Vijnana Bharati: a boon for children  
- Article published in Twinkle Star Magazine  
- The Hitavada on 22/07/2017



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- Author of the book “**Thank You Modiji**”.
- Patent published on “**Triple Lock Bore Hole Protection lid**” in July 2017.
- Research paper “**Voice Disorders in School teachers: An Occupational Hazard**” published in The Botanique-UGC Approved Journal, Sr. No.: 394, J. No. 44025, Volume 21 (50-52), 2017.
- **65 articles published** in Twinkle Star, Times NIE and Science India Portal.
- Youngest Writer to write a book on PM’s Schemes - **India Book of Records**.
- Youngest to write Inspirational articles for children - **Children book of Records**.
- Himalayan 2016-for securing first position in National Vidyarthi Vigyan Manthan Exam held at IIT Delhi
- Award for “**Neer Setu Farming: An Innovation**” presented by CSIR-NEERI
- Completed two **courses in Physics from IIT Kanpur** - ‘Learning Physics through Simple Experiments’ and ‘Physics of Semiconductors.’
- **Around 100 gold medals** in competitive exams of National and International repute.
- Member of **Raman Science Centre & Planetarium** (National Council of Science Museums), Nagpur
- Owner of a **free library** for children ‘Prarambh-My Library’ with around 2000 books.
- Completed various **online courses** on HTML, JavaScript, Light-colour and Life, CSS.
- Made a **stop animation film** on Moon Mission of India ‘Jai Ho’.
- Makes **You Tube videos** for Maths, English, Science, Sustainable Tourism, etc.
- A child with a **religious bent**, he has completed the recital of Shrimad Bhagwad Mahapurana, Shrimad Ramcharitmanas and Shrimad Bhagwadgeeta.
- Interviewed by various **radio channels**-Akashwani, My FM-Jio Dil Se, Red FM and by TV Channel ABP Majha.
- A wonderful musician and knows playing the keyboard and guitar.

