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## Our Planet is in Danger!

Reports are pouring in from numerous scientific studies indicating that our planet is in peril. We are reaching a critical point. If effective action is taken to reverse the build-up of greenhouse gases in the atmosphere before we reach that critical point, there may be a chance of saving the planet. Otherwise an irreversible cascading effect will set in, leading to catastrophic climate change and mass extinction of species.

Reports presented at the September 2019 UN Climate Action Summit have shown that things have not changed much since the first 'United Nations Conference on the Human Environment' that took place in 1972. The present global socio-economic system driven by base profit motive has effectively ensured that plans and treaties aimed at reducing emissions of greenhouse gases and other harmful industrial effluents into the atmosphere remain empty promises.

The burning of the Amazon rainforest—said to be the lungs of the planet—shows how low the profit-mongers can stoop. We are witnessing the silent death of many precious living beings, and only the future will tell how many plant and animal species will have gone extinct.

"Tomorrow is too late" said former President of Cuba, Fidel Castro, at the UN Earth Summit (1992) in Rio di Janeiro. Twenty seven years later it seems the leaders of the world are yet to wake up and face the problem. It is always possible to wake someone from sleep, but no amount of noise will wake someone who is pretending to be asleep.

The Climate Strike called by group of school students on 20 September, 2019,

and the fact that millions responded to it by rallying on the streets all over the globe, sparked optimism. They urged the world leaders to take effective measures to avoid environmental disaster. A recent IPCC report has indicated possible ways to reverse the trend of climate change, and they urged the world leaders to pay heed to it.

The wasteful habits cultivated in a consumerist society are largely to blame. The accumulation of plastics and other non-biodegradable industrial products in the environment has caused great damage. But a greater danger is posed by the rampant exploitation of nature and natural resources for profit-making. Thus the solution to the planet's problems lies in nothing short of a major change of the motive of production and mindless consumption in society. The production process should aim at maximizing the preservation and betterment of natural and human resources, not maximizing profit. Consumption should aim at what we really need for our material and spiritual well-being, not the inflated and unnatural demands created by advertising and propaganda. Unless this brake is applied, the insatiable profit-oriented economic machine will continue to consume and destroy whatever resources remain.

The Climate Strike has seen school students wake up to the real danger of destruction of the planet and their future, issue a wake up call to the rest of us to act before it is too late. They have become the motive force of a movement that can grow if we all stand up to be counted, and help guide it become a mighty global mass movement with clear aims and objectives. We cannot afford for it to become another spontaneous outburst that fizzled out in course of time. Only a sustained democratic mass movement can achieve victory. □

# Scientists Call to Lift Blackout in Academic Institutions in Kashmir

On the 5th of August, 2019, the Union Government announced the abolition of Article 370 of the Indian Constitution, abolition of the statehood of Jammu and Kashmir, and its conversion into a union territory. Following this administrative decision, the whole state has been locked down. Curfew has been imposed, business activities suspended (even apples rotted on the trees as farmers could not sell these), phone connectivity severely restricted and internet connection completely stopped. All educational institutions have been closed down and non-Kashmiri students have been forced to leave the state.

Worried that the academic activities in the region will be adversely affected by the turn of events, Indian scientists and academics issued two statements appealing that, irrespective of the government's security concerns, universities and educational institutions should be allowed to keep their communication channels open.

At the time of this issue going to the Press, normalcy has not been restored in the Valley.

## Statement-1

18 September 2019

It has been six weeks and counting since the Indian government declared significant changes in the status of Jammu and Kashmir, namely the removal of special status, the removal of Statehood, and the bifurcation of the State into two Union

Territories: Jammu and Kashmir, with a Legislative Assembly; and Ladakh, without an Assembly. Simultaneously the government created a communications blackout that included mobile phones, landlines and all forms of internet. While landlines have been restored in phases in many parts of the erstwhile state, mobile telephony and internet access remains blocked in most of the Kashmir valley.

While all residents of Kashmir deserve to be heard, we wish to express our concern about the situation at academic institutions. The University of Kashmir is home to many fine scholars, including young scientists who have returned to India from reputable institutions abroad to set up their own laboratories in Kashmir and train the next generation of scientists, supported by funding from Indian government bodies like DST and DBT and prestigious fellowships like the Early Career Fellowships from India Alliance. Such researchers, and their students, remain cut off from the internet and the world. In today's world, the internet is an absolutely vital tool for conducting and communicating research. Not only are the scientists unreachable, even the University of Kashmir's domain (uok.edu.in) has disappeared from Google's search results for the university. Some other institutions (Central University of Kashmir, National Institute of Technology Srinagar, and others) appear to have functioning websites, but these have not been updated since July.

As reported in The Hindu on September

17, particularly badly affected are Kashmiri students who were due to join other institutions for higher studies, who have been unable to confirm their offers within the deadline or correspond at all with institutions elsewhere in this context. Individuals have been trying to fill the communication gap where they can and request extensions for the joining date where possible.

Regardless of security concerns that the government may have, universities and educational institutions could have been seen as safe places via which researchers and students could remain connected to the world, but, also, the general public could perhaps have been permitted to use those facilities, subject to safeguards, to send messages to their relatives and friends outside the state. These institutions could have been symbols of the freedom offered by India. Instead, teaching and activities there have been dealt a devastating blow.

In a recent discussion of academic freedom, Spannagel calls attention to a precondition of academic freedom called “campus integrity”. By this is meant the “absence of a climate of intimidation through securitisation, targeted physical threats or oppressive surveillance on campus”. She points out that such practices are “widespread in many countries” and that they “can have stark effects on academic activities”.

We stress that the preservation of academic freedom, or indeed of “campus integrity”, is just one of the freedoms that the more fortunate among us take for granted. The freedom to work in an academic setting would appear, to be sure, a relatively minor freedom in a larger context, but it is a vital one. The Government of India has, time and again, emphasised its support for science and technology in the country. This support is merely symbolic without academic freedom and open communication on campuses, which are fundamental for

our development as a democratic society. To continue to maintain links with other institutions, to renew interactions with others outside the state who are concerned about the state of Kashmiri educational and research institutions and to provide a means of access to those Kashmiri students in other parts of India who have been cut off from family and friends is one way in which the present situation might move towards normalcy.

We call upon the government to lift the blackout at these institutions right away, and take all steps possible to help members of the Kashmiri academic community to make up for these lost weeks. We should be making efforts to win hearts and minds — not alienating the best minds of the State who have chosen to live and work in India.

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Signed by more than 160 eminent academics.

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## Statement-2

21 September 2019

We are a group of Indian academics and scientists.

We are writing to express our deep concern about the crisis in Kashmir that has now persisted for over a month, and which was precipitated by the government’s decision to de-operationalize Article 370 of the Constitution and to end Jammu and Kashmir’s full statehood. Since then, the government has restricted communications

in Kashmir, detained opposition leaders and dissidents, and flooded the state with security personnel.

As signatories to this statement, we hold various views on the issue of Article 370 and other substantive questions about the conflict in Kashmir. However, we agree on the following points:

- We are appalled by the government's decision to restrict telecommunications and the internet in Kashmir for over a month. We understand that landlines have been restored in some parts of Kashmir, but since landline teledensity in Kashmir is below 1% according to the government's own statistics<sup>1</sup>, this measure has failed to provide substantive relief to Kashmir's residents. In our own institutions, we have witnessed students suffering because they are unable to maintain contact with their families. Moreover, credible reports suggest that these restrictions have made it difficult for ordinary people in Kashmir to procure medical and essential supplies<sup>2</sup> or even for children to attend school<sup>3</sup>.
- We believe the government's actions in detaining and restricting the communications of opposition leaders and dissidents in Kashmir are deeply undemocratic. Whatever views one might hold

about these individuals, a fundamental norm in a democracy is that the party in power does not have the right to lock up its political opponents when they have not even been accused of any crimes.

- We are disturbed by the multiple reports of human rights violations in Kashmir by Indian security forces<sup>4,5,6</sup>.

We would like to express our solidarity with the people of Kashmir and offer our support to those outside Kashmir, who have been cut off from their families and friends as a result of these decisions taken by the government of India.

We remind the government that it is duty-bound to uphold the rights and protect the welfare of all of its citizens. In line with these obligations, we call on the government to immediately restore full communications in Kashmir, lift the security restrictions that are hampering ordinary life, release dissidents and opposition leaders, and conduct transparent and impartial investigations into the allegations of human rights abuses.

*Signed by 648 scientists and science workers*

<sup>1</sup>Economics Research Unit – Statistics, Telecom Statistics India (Department of Telecommunications, Government of India, 2018) <[dot.gov.in/sites/default/files/statistical Bulletin-2018.pdf](https://dot.gov.in/sites/default/files/statisticalBulletin-2018.pdf)>

<sup>2</sup>Vindu Goel, Karan Deep Singh, and Sameer Yasir, 'India Shut Down Kashmir's Internet Access. Now, "We Cannot Do Anything."', New York Times, 14 August 2019 <<https://www.nytimes.com/2019/08/14/technology/india-kashmir-internet.html>>

<sup>3</sup>Mir Ehsan and Ashiq Hussain, 'How School Kids in Kashmir Are Coping with Curbs after Article 370 Decision', Hindustan Times, 12 September 2019 <<https://www.hindustantimes.com/india-news/how-j-k-school-kids-are-coping-with-curbs/story-pspbVxaqgX2EpCruXru3yM.html>>.

<sup>4</sup>Akash Bisht, 'Kashmir Lockdown: Stories of Torture and Arbitrary Arrests', Al Jazeera, 4 September 2019 <<https://www.aljazeera.com/news/2019/09/kashmir-lockdown-stories-torture-arbitrary-arrests-190904122016072.html>>.

<sup>5</sup>AP News Agency, "'Electric Shocks, Beatings': Kashmiris Allege Abuse by India Army', Al Jazeera, 10 September 2019 <<https://www.aljazeera.com/news/2019/09/shocks-beatings-kashmiris-allege-abuse-india-army-190910114145774.html>>.

<sup>6</sup>Sameer Hashmi, "'Don't Beat Us, Just Shoot Us': Kashmiris Allege Violent Army Crackdown', BBC (Kashmir, 29 August 2019). <<https://www.bbc.com/news/world-asia-india-49481180>>

# Debunking some prevalent superstitions and myths

Amitabha Basu \*

## Introduction

About a decade ago, some retired senior scientists of National Physical Laboratory, New Delhi, who had formed the NPL Former Scientists Forum some years earlier, felt the need to debunk prevailing superstitions and myths in society by rational and scientific reasoning, in order to promote scientific temper in society. They initiated a programme of listing commonly held superstitions and myths, debunking them, carrying out surveys among students and teachers in schools and colleges to pinpoint the most prevalent superstitions and myths, and arranging lectures in schools and colleges to clarify the unscientific, illogical and irrational foundations of these superstitions and myths. The programme proceeded for a couple of years, but advancing age and related health and immobility problems of the main initiating scientists, coupled by the lack of sustained interest among the younger members of the Forum, led to the programme petering out. As a tribute to my octogenarian senior colleagues who had started this programme, the debunking of some common superstitions and myths (which had been initiated and executed by Dr. V N Bindal, Dr P C Jain, Dr Kailash Chandra, Sh G K Arora, Sh V P Wasan, Dr. A P Jain, among others) is presented below. Several superstitions are faith-based and difficult to eradicate (by pure

scientific reasoning that there is no rational basis for these beliefs) in the minds of the believers, but some myths can be busted more readily. This has been attempted here.

## What are Superstitions and Myths?

Myths are generally popular beliefs and views which are based on fictitious ideas or opinions, far from the actual truth, and which have been passed on from parents, teachers and even strangers from one generation to the next. According to the Oxford dictionary, a myth is a purely fictitious narrative, involving supernatural persons and embodying popular ideas on natural phenomena, etc. In simple language, a myth can be summed up as follows:

- A traditional, legendary or mythological story, usually concerning some being or hero or event, with or without a determinable basis of fact or a natural explanation, especially one that is concerned with deities or demigods and explains some practice, rite, or phenomenon of nature.
- An imaginary or fictitious story, folklore, idea, or concept about a thing or person.
- An unproved or false collective belief that is used to justify a social institution.

Superstitions are beliefs, practices, and rituals resulting from ignorance, fear of the

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unknown and belief in magic or chance. They exist in all societies in spite of the evidence that they are irrational and fictitious, far from the actual truth. They cut across the boundaries of religion, caste, creed, education, and influence our behaviour, keeping us away from opening our minds by rational thinking and by adopting a scientific approach to life.

**Belief:** *Threatened or in danger, an ostrich buries its head in the sand*

This is one of the most common myths about ostriches that, when in danger, ostriches bury their head in the sand. Actually, when in danger or threatened, ostriches try to run away. They can also cause serious injury and even death with kicks from their powerful legs. Their legs can only kick forward. Contrary to popular belief, ostriches do not bury their heads in their sand. When an ostrich senses danger and cannot run away, it flops to the ground and remains quite still, with its head and neck flat on the ground in front of it. As the head and neck are light-coloured, they seem to blend in with the soil, which makes it look like the ostrich has buried its head in the sand.

**Belief:** *Cutting makes hair grow faster and coarser*

Hair is basically protein and keratin and has no blood supply or nervous system. Your body does not know whether your beard has been shaved off or is two inches long for that matter, because it has no way of communicating this information to your body. People often believe that shaving causes the beard to grow faster or thicker, but studies have shown that facial hair typically grows thicker and faster as you age and it does not matter whether you shave or not. A related misconception is that if the hair on a child's head is shaved

off when he/she is a year or less old, he/she will grow up with a luxuriant growth of hair on the head. There is no scientific evidence to support this claim.

**Belief:** *Hair and nails of a person keep on growing even after death*

It is a common misconception that nails and hair continue to grow even after death. Neither hair nor nails keep growing once the human being or animal has died. It is an optical illusion. What actually happens is that after a person dies; the body loses water and moisture and dehydrates, making the skin shrink around the skull and skeleton. As this happens, more hair and nails are exposed and it appears as though they are still growing.

**Belief:** *Snakes enjoy music and they dance or shake their hoods at the sound of music (been)*

Man uses everything in nature to his benefit. One of them is making use of animals to earn his livelihood, like capturing snakes and making them dance. Cobras are the most active snakes and have a fascinating appearance due to their hoods. So human beings started capturing them for public shows. However, just showing is not sufficient to attract the crowds, and therefore the myth that they dance to the tunes has been propagated. A snake charmer captures different snakes, but Cobras are a special attraction. Scientifically, it has been found that they don't 'dance' to his tunes, rather they respond to the movements of his hands or musical instrument (been) as a defence mechanism.

**Belief:** *Snakes drink milk. Offering milk to a snake will protect one from future harm from it*

Milk is not a part of the snake's natural diet. They do not have any special liking

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for milk, but in a crisis when severely dehydrated a snake might drink any suitable liquid that is readily available. So, offering milk to a snake does not mean appeasing the snake in any way. Snakes will attack humans only if they feel threatened in some way. Therefore, one should take care not to scare or irritate the snake, and there is no need to offer it milk.

**Belief:** *There is a species of snake called 'manidhar naag', which has a jewel or gem (mani) on its head that glows very brightly and has supernatural powers*

Scientifically, there is the possibility of something which glows in the body of a creature, as seen in the case of glow-worms, fireflies, electric eels and other fish which exhibit this kind of phenomenon. The glowing part in the head, in the case of some snakes, is a kind of membrane, a soft type of tissue. It glows only under certain conditions and cannot be separated from the body of the snake and still continue to glow. Rubies or diamonds are hard substances. The fact is that it is impossible for a snake to carry anything in its head, leave aside a gem having any supernatural powers. The poor Irula tribal snake-catcher has a good answer to the legend of the jewel or light in the head of the snake. When asked about this belief, an Irula would reply, "We catch all kinds of snakes, if it was so, we would be 'maharajas' and not snake-catchers."

**Belief:** *If a snake is killed, accidentally or otherwise, a picture of the killer is stored in its eyes. Later, its mate looks into the eyes of the dead snake and traces the killer. It then takes revenge by killing the killer of its dead mate with a poisonous sting*

This is one of the most popular myths, which has widely been put to use by the Indian film industry. Superstitions also

claim that snakes remember you if you hurt them. Once attacked, they become angry with the attacker and take revenge. The fact is that snakes are not vengeful animals and do not have the necessary intelligence to remember people or places. Snakes do not live in pairs, they usually pair up only to mate, and at other times they are loners. If you do find a snake in your garden, it is highly unlikely that you will find a second one close by. If you happen to kill a snake, you certainly do not need to fear that its mate will come to take revenge.

**Belief:** *An owl can rotate (turn) its head around by 360°*

An owl cannot turn its head around by 360°, it just looks to us as if it can, because an owl can turn its head really far in one direction, then snap its head around to the other direction faster than the human eye can follow its motion. An owl's neck has 14 vertebrae, which are twice as many as humans. This allows it to turn its head up to 270° left or right from the forward-facing position. An owl cannot turn its head full circle from a forward-facing position, as is the common belief.

**Belief:** *One can die (or commit suicide) by licking a diamond*

There is a widespread belief in our country, according to which the diamonds are poisonous and that licking a diamond will cause instant death. There is no truth in it. Licking a diamond is perfectly safe. The association of diamonds with poison might have been promoted to discourage the practice of stealing diamonds by swallowing them, particularly during mining. However, diamond powder administered internally was a legendary poison. Diamond powder when ingested orally is deadly, not because it is poisonous, but because in a pulverized form the extreme sharpness of



## General Article

the diamond's edges results in each particle tearing holes in the entire digestive tract, which proves fatal for the person.

**Belief:** *From a mixture of water and milk, a swan can drink up the milk leave the water*

Swans are revered in Hinduism. According to the Vedas, swans are believed to be able to drink milk and leave the water from a saucer of milk adulterated with water. A Sanskrit verse says that this test differentiates swans from ducks, and it further says that it is because of this ability that swans symbolize the discrimination between good and bad. But it is not correct that a swan can actually drink milk out of a mixture of water and milk. It is an impossible skill for a swan, and moreover the water content in milk is itself more than 85%.

**Belief:** *A horseshoe on the main door is auspicious. Finder of a horseshoe will be blessed with good fortune*

This is a classic myth, which even a nobel laureate scientist declined to reject totally!

A horseshoe is often used to protect a horse's hooves from breakage or wear and tear. The belief that the finder of a horseshoe, or a person who hangs it above his door, will be blessed with good fortune, has been a long-standing superstition for centuries. But there is no scientific basis for this belief. For example, many believe that to hang the horseshoe with the ends pointing upwards is good luck as it acts as a storage container of sorts for any good luck that happens to be floating by, whereas to hang it with the ends pointing down, is bad luck as all the good luck will fall out. Others believe that the shoe should be hung the other way, as it will then release its luck to the people around it. What is the rational basis for believing either school of thought?

The origin of the horseshoe as a symbol of luck is linked to myths and legends spanning numerous genres. The hoofed devil was said to have donned horseshoes and was told never to enter a home with a horseshoe above the door. Witches were believed to fear horses, so hanging a horseshoe warded them off. Those witches who were burned at the stake and then buried had horseshoes nailed to their coffins to prevent their resurrection.

The interesting thing about this superstitious belief is that the famous Nobel Prize winning physicist Neils Bohr (who proposed the Bohr model of the atom) accepted this as a superstition but decided to keep a horseshoe nailed to his front door. When asked why he continued to let it hang there, he is supposed to have said that people say it is a sign of good fortune, so there is no harm in letting it hang there, for maybe it may bring one good luck even if he is a non-believer!

## Conclusion

A small sample of prevalent superstitions and myths has been presented, along with their rational scientific explanations and clarifications. Unfortunately, myths and superstitions are widely prevalent in our society, even among educated and otherwise sensible and rational individuals. Moreover, especially over the past several years, all kinds of mythology, historical fiction, obscurantist beliefs, pseudo-scientific claims, etc., are being widely propagated as real science (including so-called achievements of ancient India : 'it's all in the Vedas') from the highest positions in government and scientific bodies. Thus, the debunking of superstitions and myths, which can have disastrous, and even fatal, consequences for gullible and faithful believers, is an urgent necessity of our times. □

# A biological scientist's view on the tenets of politicization of science

Debabrata Ghosh\*

**Abstract:** Politicization of science occurs when an actor, often in the form of a group of people, not necessarily with obvious political affiliation, for various reasons casts doubt on the existing and/or emerging scientific consensus and leads. The basic tenets on which the foundation of such doubt is built are the uncertainty of science and the vulnerability of scientists to moral abysses, both may emerge in the course of practicing science. Such politicization, especially the one pushed by a powerful advocacy group, may bring serious harm to society when it moves the citizens—knowingly or unknowingly—to dismiss credible scientific information, to undermine the positive role that science may play in the society, and to underestimate the fact that science can play a meaningful role in socio-political polemics. In this article, an attempt is made by a biological scientist to take a look into the principles and processes underlying the politicization of science.

FROM Mark Twain's time-travel fantasy, *A Connecticut Yankee in King Arthur's Court*, Hank, the main character in it, looks out over an embankment, wondering if he and his buddies are about to be attacked:

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*"[The] sound thickened and approached—from the north. Presently I heard it at my own level—the ridge-top of the opposite embankment, a hundred feet or more away. Then I seemed to see a row of black dots appear along that ridge—human heads? ... I couldn't tell; it mightn't be anything at all; you can't depend on your eyes when your imagination is out of focus. However, the question was soon settled. I heard that metallic noise descending into the great ditch. It augmented fast, it spread all along, and it unmistakably furnished me this fact: an armed host was taking up its quarters in the ditch."*

## The Science and a science

Henri Poincaré states, "A reality completely independent of the spirit that conceives it, sees it, or feels it, is an impossibility. A world so external as that, even if it existed, would be forever inaccessible to us". He seemingly does not re-visit the conflict between Hegelian and Marxian epistemological discourse on matter versus idea; he simply says that Science starts in the mind of scientists. Max Planck also expressed the same perception when he tells us that matter is in the mind.

As commonly stated, 'making the wick is an integral process before the *diya* is fired to give light'. Science as a pure human pursuit might have started more like *making the wick*, as if an abstract process which, however, bears the im-

PLICIT capacity to bring light only if other materials are provided from other human endeavours, namely, the culture and practice (*diya*), the energy and industry (*oil*), and the dream and political will (*fire*). Gautama Buddha says it differently, when he says that anything that is literally or figuratively living is held by five pillars: *roopa* (the Structure), *vedana* (the Senses), *sangya* (the Definition: the abstraction of functional coordinates for movers), *sanskar* (the Practice) and *vigyan* (the Science). *Vigyan*—the domain of specific knowledge, as Buddha perceived, is a pillar by its own property but it functions to hold the living process. Science, thus, can be viewed as a sublime pursuit of human beings, as if, *science is what the scientist does*, but in a strategic sense, it bears the capacity to be used for holding the manifestations of living processes, like for example, Society.

It is, however, fair to argue that Buddha's *vigyan* is not the science that we commonly mean today. This brings us to the perceived difference between “the Science and a science”. In *Chhandhogyanishad*, Chapter 6, Part 1, when sage Aaruni alerts his twelve-year-old son *Swetaketu* about the human zeal that is essential for listening to that which is otherwise inaudible, measuring that which appears to be immeasurable, acquiring knowledge which is uncertain and knowing the unknown, he speaks, in essence, of what the purist definition of Science is. Science is a human pursuit of seeking pleasure in finding the unknown. However, this journey eventually may yield trajectories sometimes impregnated with manifold probabilities and potentials for the real world; those real world scientific pursuits are considered as science.

Immanuel Kant distinguished between a science and the Science—*eine Wissenschaft, aber nicht Wissenschaft* (a science, but not Science), since the former,

albeit having practical worldly attributes, does not bear the endowment of the abstraction of the Science. As Henri Poincaré aptly pointed out, a scientist does not study nature because it is useful; (s)he studies it because (s)he delights in it, and (s)he delights in it because it is beautiful. Irving Rothchild puts it succinctly, “Science is a process of learning to know the nature of everything in the material world ... science deals only with those elements in the universe that can be shown, at least potentially, to exist ... Although its goal is knowledge, it is more than and different from knowledge itself, for knowledge is its product not its essence.” It is true that the process is as much science as its end-result and sometimes the former supersedes the results in terms of its impact on *Homo sapiens*.

#### **Uncertainty, constructive scepticism and educated guess: integral to scientific journey**

Science is never-ending and always changing. Scientists, therefore, acknowledge the inherent component of uncertainty in the scientific knowledge domain, irrespective of whether attained via inductive or deductive methods. Carl Sagan famously stated, “In science it often happens that scientists say, ‘You know that’s a really good argument; my position is mistaken,’ and then they would actually change their minds and you never hear that old view from them again. They really do it. It doesn’t happen as often as it should, because scientists are human and change is sometimes painful. But it happens every day. I cannot recall the last time something like that happened in politics or religion.”

It so happens because scientists generally appreciate the positive implication of uncertainty in science. An essence of science is to doubt a conclusion without

adequate and verifiable proof; and so, scientists practice science with duly constructive skepticism, guess and humility. In this connection, it is worth noting that the prefrontal cortex activity of the brain related to choice and reward is dynamically regulated by the volatility of the environment. It means that active exploration to assess the predictability of reward in the mind may be more enterprising while doing science, and be creative in results. Application of scientific procedures and methods, through testability, verifiability, and reproducibility, with due rigour while doing science, empowers the scientist with the ability to predict with an estimated power of prediction in a given specific and concrete domain: one of the important things that separates science from many other forms of learning. In effect, despite having a component of uncertainty, science, due to its systematic methodological and procedural approach, may yield materially meaningful information and knowledge which allows for objective predictions that are valid for the real world.

### **Underlying processes to politicizing science**

Thus, in doing science, there is an essential necessity of having access to testable, verifiable, reproducible and objectively quantifiable observations in well-characterized domain-specific manner, what is commonly referred to as 'scientific evidence'. While uncertainty is integral to science, scientific evidence typically reports a verifiable and reproducible observation stemming from the use of the scientific method. Based on scientific evidence, good decisions, which are factually competent and reflect our understanding of how the world works, are made and accepted. Thereby, the role of science in worldly affairs becomes obvious as science is taken to be a good

guide to developing a factual understanding regarding the objective world.

And this is where politicization may potentially enter. An agent or agents with some agenda in mind, irrespective of any predetermined reason, can call a scientific consensus or a scientific notion into question by directly or indirectly accentuating a finding's inherent uncertainty, or by magnifying the gap in the knowledge and suggesting alternative less probable possibilities. This is typically done not in an effort to avail scientific accuracy but rather in the pursuit of a particular agenda.

The agenda may simply be subjective elements like personal conviction and dogma as in the case of Francisco Lana (1631-1687), the Father of Aeronautics. He, despite being involved in the designing of the physical and engineering basis of making an airship, thought that there was no necessity of trying to really build one, for this would consume a huge amount of public money, and, in all likelihood, it might be used for anti-humanity purposes. In his own words, "God will never allow that such a machine be built ... no city would be safe from raids ... fireballs and bombs could be hurled from a great height."

There are many cases where right-conservatives and left-liberals have played obstructive roles in specific scientific research activities. A glaring example that comes to mind is that of research performed by Rene Spitz and Harry Harlow on the impact of deprivation of maternal affection on babies. During 1940-50, when Rene Spitz demonstrated the clinical impact of deprivation of maternal affection on the long-term wellbeing and health of human babies, he was castigated at a personal level by a group of left-liberals, many contemporary scientists included, based on the assumption that he was propping up Hitler's dictum for women, vide Hitler's

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Nurnberg speech in 1934, “The program of our National Socialist Women’s Movement has only one point; that point is called the child”.

Next to Rene Spitz, when Harry Harlow and his group demonstrated, based on an improvised scale for the measurement of the potential negative impact of deprivation of maternal affection on monkey babies, with the help of cotton-mother and wire-mother and several other experimental tools, he was rebuked by the right-wing intellectuals as if measuring maternal affection was blasphemy. Very recently, Semir Zeki had also faced similar humiliation when he reported his observation that the same brain areas of woman are actively involved during cuddling her baby and making love with her partner.

Scientific research on genetics and embryo development have also suffered upheavals, apostrophized and accosted by groups aligned with both right and left wings on differential presumptive contents. Also, it is factually correct that, in the past, scientists in many cases were faltering as well in their interfacing with the society and in applying appropriate ethical values required for the new science.

Furthermore, the agenda could also be the intent of holding authority and power, or not negotiating with the novel discoveries. The history of science had witnessed umpteen pieces of such events, like the one between Lord Kelvin and Charles Darwin regarding the age of the Earth, and the one between Gregor Mendel and Carl Nägeli about the factorial (genetic) mode of inheritance. Thomas Kuhn mentioned Planck’s experience from his struggle with the older views: “A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar

with it.”

These cases – though are quite simplistic – do reveal the serious impact of subjectivity in the method element in the interpretation of scientific technical facts despite the fact that a fact, by itself, is not inherently subjective information. This can, in turn, affect the public interpretation about the credibility of science. As a result of such uncertainty, the interests of vested groups frequently shape the presentation of scientific facts and hypotheses to fit their agenda.

It is also evident from some of the above-mentioned cases that two objectively conducted studies on the same topic, based on valid methods but answering slightly different questions, can lead to radically different conclusions regarding societal response to an issue. Thus, there could be subjective value-content to the differences in the answers, despite purely objective and unimpeachable analysis by the scientist. These value-contents are then used by the interested group to significantly mollify the interpretation favouring some premeditated socio-political agenda. The flag-bearers of Eugenics research in the past displayed such predetermined interpretation of human genetics to a gory end, exemplifying how the system of conducting scientific inquiry and the system of political maneuvering for power feed on each other.

Harmful politicization often takes place when governments and powerful agencies provide funding for science with a predetermined agenda in mind. Naomi Oreskes, from the Department of the History of Science, Harvard University, argues that a reason for the cultural persistence of doubt is what we may label the ‘fact of uncertainty’. Uncertainty, which is intrinsic to science, creates vulnerabilities that interested parties may, and commonly do, exploit, both by attempting to challenge

the specific conclusions of technical experts and by implying that those conclusions threaten other social values. Thus, governments or powerful advocacy groups often use science and scientists who share benefit from the politicization to drive science out of technical decisions and to promote a non-scientific agenda.

Hitler's science agenda, Eugenics agenda in USA and Europe, Lysenko's Euthenics agenda in Soviet Russia, et cetera, testify to the corrosive impact of harmful politicization of science. Recent US-led fiasco on breast milk campaign in World Health Assembly meeting is a glaring example of how deep-rooted vested interests may turn a piece of scientifically and technically substantial knowledge into a matter of nasty tug-of-war.

Deep, substantive and open discussions on each of such remarkable chapters of science history may be of great help to scientists in understanding the complexity of the process underlying the politicization of science. Indeed, various case studies do highlight the different layers of politicization emerging from different agenda, ranging from personal elements (with shades of egotism to greed in individuals in power blocs including scientific advisors) to the blatant form of politicization by the handiwork of powerful advocacy groups. There is sufficient evidence to support the notion that leading-edge scientists are also not necessarily immune to socio-political and moral pressures.

Extreme politicization of science often brings—though not by definition—serious harm to the society as it moves citizens (and many times, scientists too)—knowingly or unknowingly—to dismiss credible scientific information, to undermine the positive role that science may play in society, and to underestimate the fact that science can play meaningful roles in socio-political polemics.

Such undermining of the scientific basis of decision-making in people's mind is the core motive of the group campaigning with the goal of altering public policy to advance a favoured agenda.

In their 2010 book, 'Merchants of Doubt', Naomi Oreskes and Erik M. Conway argued that much of the conservative ideology has been shaped by large economic interests sowing fabricated doubts about science in people's mind, since the more the public believes that there is adequate reason to doubt scientific information and leads, the harder it is to take action on the given issue based on scientific evidence. A good example in recent times is the case of planned antagonism against the idea of biological evolution. Similar confusions are evidently palpable in many countries, including India.

### **In lieu of a conclusion**

In the end, I believe that practising scientists generally do understand the philosophy of science in their specific way, aligning with the interest of the personal selves, that of their own community and of the larger society. The kernel of scientific philosophy is integral to doing science. Scientists may however not be always good at and, in fact, may not be sufficiently trained in inculcating loftiest moral and ethical values at the disposition of their science while interfacing with different sections of human society. It is indeed a very important active duty of science philosophers to bring men of other walks of society into discussion on the spirit, the philosophy, and the value of science. Practising scientists are to take part in the conversation and in resultant symbiosis and integration with required contextuality and consilience.

As Robert Holt suggested, scientists should try communicating not only the right answer, also the right process, be-

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cause the change will not be done by asserting the facts alone, it will be done by empowering people to handle evidence for themselves, irrespective of their level of expertise. Science is in its doings—in value-added manner to the good for men and the society whenever the need arises, not in exhorting the philosophical principles of science alone.

In the end, let me quote from William Harper's paper on *Harmful Politicization of Science*, "One can go down the list of deadly sins of almost any religion, and most can be found in politicized science. This should come as no surprise, since scientists are as fallible as anyone else in their personal lives. We recall that the first biblical mention of 'science' (from 'knowing' in Latin) occurs in the story of Eve's temptation by the Serpent: *Eritis sicut Deus, scientes bonum et malum* (Thou shalt be as God, knowing good and evil). Science has always been associated with good and evil, and it will always be a struggle to be sure that the good prevails." □

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# On the unscientific claims by the HRD Minister 'Dr' Ramesh Pokhriyal Nishank

Amitava Datta\*

Our present Minister of Human Resource Development, 'Dr' Ramesh Pokhriyal 'Nishank', started his career as a teacher in the RSS affiliated school Saraswati Shishu Mandir. He claims to have a Ph D degree which looks like controversial. He served as the Chief Minister of Uttarakhand from 2009 to 2011 and was eventually forced to resign as his government faced several corruption charges. Apart from that, he has been in the news for his diligence in the field of propagating irrational and unscientific ideas. Here he beats many 'experts' in the field like Prime Minister Modi who saw, in the elephant-like head of Ganesha, proof of the practice of plastic surgery in ancient India; Biplab Deb, the Chief Minister of Tripura, who claimed that the Internet had existed in the age of the Mahabharata; and Dr Harsh Vardhan who would have us believe that some of the famous equations of Einstein had been there in the Vedas all along.

In the recent convocations of two of India's premier institutions – IIT Mumbai and IIT Kharagpur – Mr Pokhriyal has again indulged in his penchant for revising/interpreting accepted scientific facts! To put things in perspective, let us take a quick look into the background of this man.

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## **Mr Pokhriyal and Astrology**

In December 2014, Mr Pokhriyal captured the headlines of many major national dailies with an extraordinary claim. While participating in a debate on the School of Planning and Architecture Bill in the Parliament, he had said "Jyotish (astrology) is the science that could calculate (calculate what?) lakhs of years back. It must be promoted. That is why I want to say that astrology is the number one science for the entire world." With this single statement, the future Education Minister of our country exhibited his shocking ignorance of (i) science, (ii) the time scale of ancient history, (iii) calculating anything in any subject, and (iv) the many real achievements of ancient Indian Science.

He should have known that 'lakhs of years ago', human beings were nomadic hunters and food gatherers. There was no question of their being able to perform astrological or any other calculation.

In science we study natural phenomena, arrive at the laws of nature and explain the natural phenomena in terms of the laws of nature. More importantly, these laws enable scientists to predict new phenomena which can be tested experimentally. In an exact science like physics or mathematics, precise agreement between theory and experiment vindicates the underlying theoretical calculations. There is no room for ambiguity. For example, if we take a large body at a given position and time, and



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know all the forces acting on it, then all future positions of the body can be precisely predicted (in this article we do not consider microscopic particles like atoms, where things are a little more complicated). The science of a complicated system may not be exact. Here the predictions are statistical in nature, i.e., only the average outcome of a series of experiments can be predicted. For such cases an appropriate example could be the tossing of a perfect coin. The result of a single toss – which may be either a head or a tail – cannot be accurately predicted. However, if the number of tosses is large, the laws of statistics predict that 50% of the outcomes should be heads and 50% tails.

Next, one has to decide the accuracy of astrological predictions. Compared with the predictive power of the exact sciences as discussed above, it is easy to see that astrology can never be an exact science. Even the staunchest supporter of astrology cannot claim that all predictions based on astrological calculations would be always correct. The reason for claiming “Science is a dwarf in front of astrology” is known to Mr Pokhriyal alone.

The next step is to figure out whether statistically one can show that the predictions of astrology are mostly correct? Unfortunately, no astrologer keeps records of failures. They publicly boast of the stories of successes only. Therefore, it is simply not possible to statistically determine the acceptability of astrology as a science.

Some famous scientists and rationalists have conducted intelligently designed experiments to test the reliability of astrological predictions. Prof J V Narlikar, the famous cosmologist, and his collaborators are among them. Out of the many experiments on astrology performed by them, we report the one involving the Maharashtra Astrological Society. The president of that society claimed that, given a horoscope,

*“I fully agree with you concerning the pseudo-science of astrology. The interesting point is that this kind of superstition is so tenacious that it could persist through so many centuries.”*

— Einstein in a letter to Eugene Simon (1943)

they can determine, by astrological calculations, the sex and academic merit of the person to whom the horoscope belonged. Provided with 200 horoscopes by Prof Narlikar, they predicted sex correctly in 47% of the cases and merit in 50% of the cases. Almost the same result would have been obtained if each prediction was determined by tossing a coin instead of applying astrological ‘calculations’! Similar experiments have been carried out all over the globe by other rationalist groups. The astrological predictions never turned out to be reliable. So much for the claim “Jyotish (astrology) is the science that could calculate lakhs of years back”.

In the same lecture in Parliament, Mr Pokhriyal thundered that “We speak about nuclear science today. But Sage Kanad conducted nuclear test one lakh years ago.” He, like his fellow ideologues, did not bother to give the details of the nuclear test allegedly performed by Kanad one lakh years ago, when only hunter-gatherer nomads were the only people roaming on this globe. Further, the nucleus of an atom was discovered only in the first decade of the twentieth century. Nuclear tests came much later.

It is most regrettable that people like Mr Pokhriyal only make fictitious and exaggerated claims about ancient Indian science and make us a laughing stock before the whole civilized world. They, however,

remain silent about the real pinnacles of science and technology in ancient India. The progress in medical science, astronomy, mathematics, metallurgy in those long by-gone days is acknowledged universally and is a matter of pride indeed, even today.

### **Mr Pokhriyal in Action at Mumbai IIT**

The totally absurd public claims made by our Education Minister during the recent convocations of both IIT Mumbai and IIT Kharagpur expose the totally irrational and ignorant man who has been thrust upon our country as the Education Minister.

At IIT Mumbai, Mr Pokhriyal made several fantastic claims. Two of them will show he has not changed his spots.

1. "NASA has confirmed that, if at all a robot that is exactly like a human needs to be developed, there is no option rather than using Sanskrit, because it is a scientific language where you read exactly what you write."

Mr Pokhriyal's mentors have been propagating this false claim for quite some time. During the early days of the first Modi-led government, Smriti Irani, the then HRD Minister, enthusiastically advocated teaching computer science in Sanskrit. Gradually other leaders chipped in and the role of Sanskrit has been more and more glorified. Last year, President Ramnath Kovind claimed that Sanskrit is the most appropriate language for writing algorithms, and for machine learning and artificial intelligence. However, Mr Pokhriyal was more inventive and created a bigger noise by involving NASA in his game.

The origin of this prolonged attempt of promoting Sanskrit was a paper by Rick Briggs, a NASA scientist working on artificial intelligence (AI). The work published in 1985, was titled "Knowl-

edge Representation in Sanskrit and AI". Obviously his single-author paper had nothing to do with the official NASA policy. The content of his paper was on a language for AI. The paper concerned human languages, and the reason for making them accessible to computers as input – and not as program. Why was Mr Pokhriyal and friends so interested on a paper published approximately thirty years ago? I will come back to it very soon.

2. Another claim by Mr Pokhriyal was that Sage Charaka discovered the Atom. For the first time the Education minister speaks of a truly great ancient Indian Scientist but for the wrong reason. Charaka was one of the greatest exponents of Ayurveda in ancient India. He also knew a good deal of chemistry for preparing Ayurvedic medicines but there is no evidence whatsoever that the atomic basis of chemistry was known at that time. Atomic chemistry was discovered mainly by John Dalton and other contemporary European scientists in the early nineteenth century. As usual Mr Pokhriyal did not divulge any details of Charaka's experiments.

How did the IIT Mumbai audience react? The students of IIT Mumbai lambasted the authorities for inviting him to chair the convocation ceremony and branded his lecture as 'a mild form of scientific blasphemy'. Unfortunately, the authorities and faculty members, by and large, maintained silence. Is it due to the all pervading atmosphere of fear?

### **Repeat performance in IIT Kharagpur**

As though his performance at Mumbai was not enough, Mr Pokhriyal entertained the audience in another convocation at IIT Kharagpur just a few weeks later. This time

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*“Astrology and all these mystical things are generally signs of a weak mind; therefore as soon as they are becoming prominent in our minds, we should see a physician, take good food, and rest.”*

— Swami Vivekananda

the attendees had to learn from him that the Ram Setu is an irrefutable evidence of the existence of engineering of very high standard in ancient in India! As usual, he was silent about the technical details like an engineering drawing of the bridge, material and technique of construction, etc.

The historicity of the Ramayana has been questioned by eminent scholars time and again. As a result, the existence of such a bridge has always been in doubt. One of the main bones of contention is that there are multiple versions of Ramayana with significantly different texts. One point – important in the context of the Ram Setu – is the distance between Lanka and India. The currently measured shortest distance is about 21 miles. But in some versions of the epic the distance is claimed to be approximately 800 miles! As it is, one has to stretch one's imagination quite a bit to digest the claim that a 21 miles long bridge could be built with ancient technology. But if the length is 800 miles as claimed, then the whole Ramayana rightfully belongs to the realm of human fantasy!

Apparently there is a bridge like structure, part of which is under water, between India and Sri Lanka. Its existence was revealed by some satellite pictures. Since then certain ideologically motivated persons have been crying themselves hoarse claiming that this indeed is the clinching evidence of the Ram Setu and the historical authenticity of the Ramayana.

But such structures between the mainland and a nearby island are natural and quite common. They are called tombolo (see Wikipedia). Moreover, both NASA – who have taken many similar pictures – and the Archeological Survey of India have refused to accept it as an evidence for a man-made Ram Setu.

## Method in Madness

A question that obviously comes to mind is that why these unscientific claims are flourishing and ministers both in the State and Central Governments are directly participating in this “scientific blasphemy”? In earlier days, mainly the RSS education cell under the leadership of Mr Dinanath Batra carried out similar misinformation campaigns, which, however, were few and far between. One significant case that comes to mind is the petition in the Delhi High Court filed by Batra in 2011 on behalf of Shiksha Bachao Andolan Samiti backed by the RSS. They were demanding the removal of A.K. Ramanujan's essay, *Three Hundred Ramayanas: Five Examples and Three Thoughts on Translation*, from the Delhi University's History syllabus.

The reason for this legal adventurism is clear. The essay discusses the many versions and presentations of the Ramayana that appear across the globe. Its acceptance strongly indicates that with so many different versions, Ramayana can be a great epic but hardly a history book and evidence like Ram Setu becomes irrelevant. In response to the petition, the University set up a committee of experts to study the essay. The committee found nothing controversial about the work, and their opinion was supported by outside scholars. However, the University's Academic Council decided to remove the essay from the syllabus, in a move widely criticised by genuine scholars. Such decisions obviously encourage further

obscurantist and irrational demands.

In spite of this, it is hard to understand the mushrooming of the wholesale markets of superstitions patronized by the current political dispensation. Are they just crazy? Maybe. But a little thought would reveal that there is a method in this madness.

The methodology consists of propagating three messages.

- The ancient Indian practices like astrology or ayurveda were much superior to modern science and medical science.

This claim cannot be true since the germ theory of disease, one of the great modern discoveries, was not even known in the early days of Ayurveda. It was a great empirical tradition in the ancient times but calling it superior to modern medical science is a gross exaggeration.

- The current political dispensation is the only torch bearer of the fantastic scientific tradition of astrology etc.
- Hence support the saffron brigade wholeheartedly to bring back the glorious tradition!

We must raise a mass demand. All claims must be backed up by verifiable evidence. All genuine scientific work should be reproducible. Therefore the fringe groups as well as the mainstream politicians making such claims must provide evidence. Those who claim the correctness (or superiority) of ancient practices should reproduce the alleged ancient discoveries before claiming that they indeed happened. However, the methods prescribed in the ancient literature should be strictly followed without resorting to hind sight and modern equipment. You cannot make scientific claims which cannot be repeated experimentally. Until this is done all false propaganda polluting our country should be stopped.

## Epilogue

More than seventy years after independence we still do not have a satisfactory education system, let alone one of international standard. From primary schools to the highest levels of education and research, we find a rather dismal scenario, although some flagship programmes launched by certain government agencies like Chandrayan or some techno-military ventures, temporarily hide the gloom. One of the reasons behind this serious malady is certainly insufficient government support for education and research at all levels. Our spending on research and development has stagnated around a paltry 0.8-0.9% of the GDP for many years. If we compare these numbers, e.g, with that of Denmark, we will be ashamed to find that the corresponding figure is 3.08%! Likewise, for general education India's spending has hovered around 3% of the GDP, while that for Denmark is 8.7%.

At this juncture we need a strong, knowledgeable and well motivated education minister who can influence the pattern of government spending for an overall academic uplift. Moreover, the long neglected constitutional obligation of inculcating scientific temper and spirit of enquiry should be fulfilled with no further delay. Can an education minister, who places astrology above all science, meet our expectation? □

*"Astrology is an aesthetic affront. It cheapens astronomy, like using Beethoven for commercial jingles."*

— Richard Dawkins

# **Vitamin D – Panacea of Life: Understanding the need of the day**

S Bakhtiar Choudhary \*

## **Introduction**

It has been estimated that 1 billion people worldwide have Vitamin D deficiency or insufficiency [1]. As India lies between latitudes  $8.4^{\circ}N$  to  $37.6^{\circ}N$  with tropical weather conditions, which should ideally provide ample exposure to sunlight, it was believed that Indians would not suffer from Vitamin D deficiency. But Vitamin D deficiency is very common in India in all the age groups and both sexes across the country [2-4].

Vitamin D regulates calcium absorption in conjunction with the parathyroid hormone and bone mineralization. Biochemical studies have implicated Vitamin D deficiency in many chronic diseases including infectious diseases, autoimmune diseases, cardiovascular diseases, diabetes and cancer. Vitamin D insufficiency leads to reduced bone mass, which can be manifested as Osteoporosis and Osteomalacia in adults and rickets in children [5].

## **Prevalence of Vitamin D**

Vitamin D insufficiency is evident in half of adults in New Zealand [6], one-quarter of Australians [7], 14% of French [8], 36% of US young adults and 57% of US general medicine inpatients [9], and particularly in

the elderly, including up to 90% in UK [10] and 86% in Switzerland [11].

Vitamin D was once thought to help build bones and prevent diseases like rickets. But recent research has proved that Vitamin D plays a big role in preventing multi-system disorders. Examples are diabetes, thyroid dysfunction, pain, dementia, depression, PCOD (Polycystic ovary syndrome), and many other diseases. Unfortunately, all tropical countries in the southern hemisphere like Africa, Arabian countries and India, despite having sunshine throughout the year, have Vitamin D deficiency in most of the population. There are hardly 2.4% of Indian population who have Vitamin D intake of more than 30 ng/DL; the rest all have either insufficient or deficient intakes (Table -1).

## **Adequate Exposure to Sunlight**

Studies have proved that sunlight exposure for more than 30 mins at a time cannot increase absorption. Instead repeated bouts of exposure are needed.

Fair complexioned people are likely to make more Vitamin D in a shorter duration of exposure to the sun than darker people of the same age group. Darker complexioned people have thicker skin and do not absorb adequate ultra violet B rays (UVB) to make sufficient Vitamin D in the skin, in a short span of time.

For many years people feared skin cancers on exposure to sunlight and thus

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Blood levels (Vitamin D ng/DL)	People (Percent)
Less than 3	3.7
3 – 7.9	31.7
8 – 15	43.5
15.1 – 20.9	13
21 – 30	5.7
More than 30	2.4

Table 1: Prevalence of Vitamin D in general Indian population.

avoided going out in the sun or they applied sunscreen lotions and other protective measures. This has led to Vitamin D deficiency all over the world.

Elderly people are likely to make less Vitamin D through the skin, as absorption is poor. People who are on anti-cholesterol tablets for prolonged periods are likely to reduce 7-dehydro cholesterol, a type of cholesterol which is responsible for making Vitamin D under the skin with the help of UVB rays when exposed to the sun. Hence, they are likely to be deficient, which is a large chunk of elderly population.

### Direct and uninterrupted exposure to sunlight

We get 80% of Vitamin D from sunlight in the presence of uninterrupted UVB rays in the sunlight spectrum. These rays are very sensitive and cannot penetrate 1 mm glass hence they are unlikely to penetrate

Minimum of 30 ng/DL of Vitamin D required for absorption of Calcium. When Vitamin D is lower than 10 ng/DL, it is likely to damage Vitamin D Receptor (VDR) sites. Doctors fail to treat Vitamin D deficiency on a long term basis. Avoiding staple food is likely to cause chronic Vitamin D deficiency. Current Vitamin D recommendations are under estimates. Vitamin D deficiency begins as early as below 10 years of age.

normal clothing and make Vitamin D in the skin. Atmospheric pollution, dust, suspended particles, and chemical gases may seriously interfere with UVB reaching those sitting in offices, and in vehicles like cars and buses.

### Changing food habits and susceptibility to social media

People are susceptible to the information available through social media, and without consulting experts, they are making changes in their native staple food habits. For example, people in the Twin Cities (Hyderabad and Secunderabad) used to consume more of regional foods such as rice, locally available fruits, and nuts, like groundnut, sesame (till), coconut and cashew nut. Now an increased awareness of health has led people go on 'diets', and indoor exercise programs. Four decades ago, diabetes was prevalent in only 13% people in Hyderabad, but now it has jumped to 27%, countering our efforts to obtain better health. Change in food habits that has happened due to various reasons like body image issues, social media, etc, is not leading to better health.

Changing food habits from staple to modern diets leads to intolerance in the gut, gradual villous damage in the intestine and leads to serious chronic diseases, such as irritable bowel syndrome, ulcerative colitis, constipation, gas, etc. These changes further cause serious micro-nutrient deficiencies. Today we see large numbers of people suffering from these intestinal disorders, and doctors find it hard to treat them.

People who consume alcohol are likely to disturb their absorption of micro-nutrient along with Vitamin D.

### Vitamin D Rich Foods

Non vegetarian food sources like fatty fish (big and fat fish, not small fish), whole

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egg, and mutton are the best sources for Vitamin D. Whole milk, butter, cheese, mushrooms, lentils like lobia (black eyed white grams), okra, are reasonably rich in Vitamin D for vegetarians but must be eaten on regular basis.

Food intolerance – Persons having intolerance to milk and milk products such as lactose and most of Southern and coastal Indian population, who are largely sensitive to gluten in wheat and corn and other cereals, are likely to be seriously deficient in Vitamin D. Hence they need very frequent estimation of the Vitamin D and suitable supplementation.

### Diseases Affect Vitamin D Absorption

A healthy balanced diet provides 20% of Vitamin D requirements of the day. Vitamin D3 comes directly from the skin (with exposure to sunlight), while Vitamin D2 is from the dietary sources. Both are converted into an active form of Vitamin D called calcitriol by the liver and kidney. People with liver and kidney disease are most likely to become deficient and need a serious Vitamin D supplementation program by a physician.

### Socio-cultural Habits

Habits among Gujaratis, Marwadis and Muslims, such as wearing the burkha and purdah (veil) where women are covered mostly from head to toe, put them at high

- Early morning sunlight cannot make Vitamin D because the red colour sun that you see is only an image.
- UVB rays are available when the sun appears bright white.
- Ideally, exposure to sunlight should be between 9:00 AM – 3:00 PM (depending on the season).

risk of not getting adequate exposure to sunlight. In recent times, people have changed their dressing habits. For example, South Indian women wearing North Indian clothing such as salwar kameez, churidar kurta may lead to deficiency because of less exposure of sunlight to body parts. The sari, a more traditional India dress for women leaves more than 30% body exposed, which aids absorption of sunlight. Similarly, nowadays men no longer wear the dhoti as much, which used to allow more body exposure to sunlight than the today's pant and shirt of.

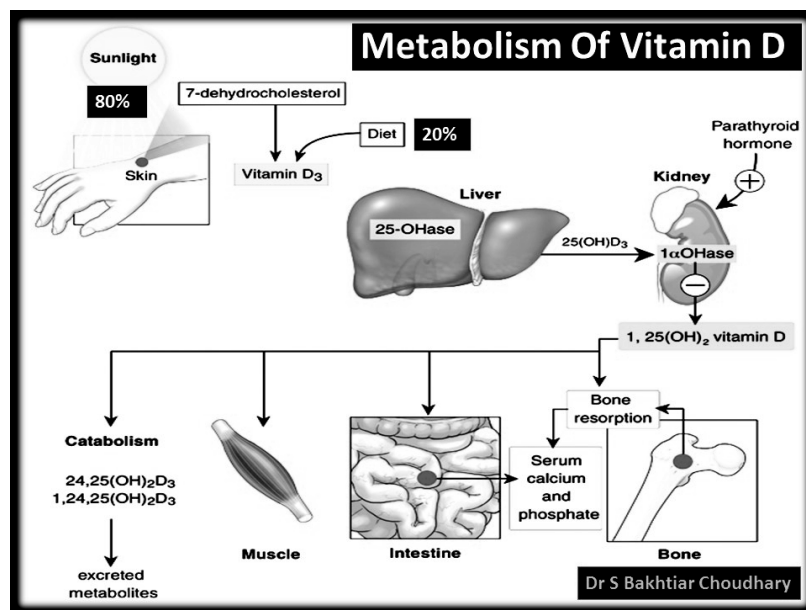
### Sports persons and Vitamin D Deficiency (Table-2)

It is unusual to note that many sports persons are found to be severely deficient in Vitamin D. This may be because of changes in dressing, and eating habits and due to subclinical malabsorption. Food intolerances among sports person need to be evaluated as they contribute to poor absorption of micronutrients. Players like cricketers, despite playing outdoors, are also found to be deficient in Vitamin D because of their dress – full pants, full sleeves, helmet, gloves. Players should wear shorts and t-shirts for some time before wearing full uniform.

Sunlight should fall on the skin for longer time. Especially in cities, badminton, table tennis and chess players often have Vitamin D deficiency, Hence they should have outdoor fitness programmes in the sun, 3 to 4 days a week. Vitamin D deficiency is very common among many players and this increases their risk for injuries due to abnormal joint stiffness.

### Rural population have slightly lesser Vitamin D deficiency

This may be due to better availability of UVB rays due to less pollution, and better



exposure due to clothing such as shorts and t-shirts instead of full pants and shirts.

### Insufficient Vitamin D intake among women

Women and young girls with severe Vitamin D deficiency have higher risk for schizophrenia, asthma, Type 1 diabetes, and rickets in childhood.

During pregnancy, Vitamin D deficiency can lead to diminished lactation, risk of gestational diabetes, pre-eclampsia, spontaneous pre-term birth, higher risk for C-section (Caesarean birth), lower birth weight, lower infant size, lesser bone density and health, reduced IVF (In vitro fertilization) success and repeated bacterial vaginal infection.

During adulthood, women without pregnancy are at risk for hypertension, obesity, Type 2 diabetes, abdominal cancer, multiple sclerosis etc. In older women, cognitive impairment, myopathy, osteoporosis, osteomalacia, frequent falls and fractures can occur. It is found that dietary intake of

Vitamin D during pregnancy is 80% below recommended levels. It is also found that good Vitamin D supplementation during pregnancy helps in regulating placental hormones and improves labor.

During lactation, it improves breast milk secretion and increases circulating calcitriol concentration in nursing infants. It also prevents infantile rickets.

### Managing Vitamin D by testing

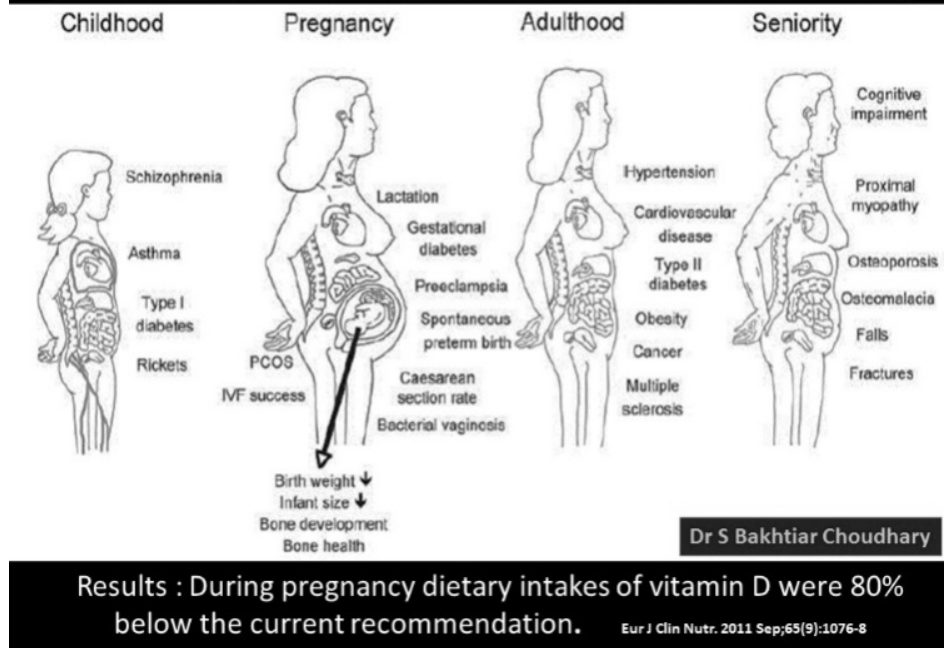
Vitamin D is tested by a simple blood test costing Rs 600-2500, cost varying in different labs. Although recommendations say 30 ng/dl of Vitamin D is sufficient but for

Table Tennis	60%
Badminton	46%
Shooting	41%
Tennis	26%
Cricket	23%
Athletics	17%

Table 2: Vitamin D Deficiency status of Indian Sports Persons.



## Insufficient vitamin D intakes among women



good health, the body needs 60 and above ng/dl for both sexes. Current recommendations underestimate the body's requirements. Healthy rural youth were found to have an intake of 60-70 ng/dl of Vitamin D without any supplementation (they eat well, get more exposure to sunlight). For pain relief, for better joint mobility and good proactive health management, one needs to maintain 60-70 ng/dl throughout the year and throughout life, which may be impossible. This is because 6 months to a year, exposure to sunlight is compromised due to the rainy season, winter season, summer heat and fear of going out in the sun. Modern youth are more inclined to exercise in gyms, and modern jobs involve long hours of indoor work. Commuting in cities takes away their valuable time, and exposure to the sun is neglected. One needs exposure to sunlight at least 3 days in a week, of 20 to 30 minutes duration, once

or twice a day, with sunlight coming into direct contact with 30% of the body.

### Extremely Low Levels of Vitamin D

People with less than 10 ng/dl Vitamin D in their blood are at the highest risk for pain disorders, thyroid dysfunction, diabetes; people with less than 5 ng/dl may be at risk for cancer. People get relief from most pain disorders when their levels are more than 50 ng/dl. Calcium is absorbed when Vitamin D is more than 30 ng/dl.

### Frequent Testing and Prolonged Supplementation

Most of us do not have 100% regulated digestion throughout the month. Minor disturbance in digestion can seriously impair absorption of needed nutrients. That means frequent checking of Vitamin D levels and supplementation are required. Vitamin D test should be done twice a year,

before monsoon in June and at the end of winter, in February or March. Oral supplementation is better than injections; this helps to encourage absorption in the gut. Vitamin D receptor sites become seriously damaged once a person becomes Vitamin D deficient, and may take months to years before becoming active again. That is why one needs prolonged supplementation. If deficiency is noted in children as young as 7-8 years, they are likely to become seriously deficient as adults as receptors get damaged, without any symptoms. Children need to be tested at least once every year.

### **Vitamin D Toxicity**

People often have a fear that excess Vitamin D supplementation will lead to toxicity but fortunately this is not likely. Only 4000 IU or more of Vitamin D taken every day for a couple of months may lead to toxicity.

### **Self-medication**

It is not advised to take commercial diet supplements off the shelf without a doctor's advice because they may not have adequate Vitamin D formulations. Most people need 1000 IU of Vitamin D3 tablets daily and pregnant women, lactating women, sports persons, and elderly persons and people who are diagnosed as deficient need higher supplementation under supervision. It is important to note that calcium tablets do not have adequate Vitamin D. Before you take any pharmaceutical supplements off the shelf, it is important to get advice from a doctor.

### **Management Advice**

Time management is essential and should begin with childhood so that children develop the habit of getting exposed to the sun and eating right. Eyes should be protected from UV rays by wearing UV protective

sunglasses. People who are sensitive to UV rays can safely expose themselves to sunlight for up to 10 minutes before applying protective cream. Changes should be made in clothing. Half shirts and shorts are advisable as school uniforms. Children should be taken for frequent outdoor recreational activities like trips to the zoo, rather than be allowed to spend time on cell phones and TV. Sudden pain, stiffness in joints, tiredness, feeling of bone pain, sudden increase in weight, disturbance in menstrual cycle are most likely due to being Vitamin D deficient. □

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# Reports of March for Science and Climate Strike

## Report of India March for Science – August 9, 2019

This year, the global March for Science took place on May 4, 2019. However, due to the general elections, we could participate only in a limited way on that day. Hence the Indian science community called for the 'INDIA MARCH FOR SCIENCE' on August 9, 2019, with the following demands:

1. Stop propagation of unscientific ideas, and develop scientific temper, human values, and spirit of inquiry in conformity with Article 51A of the Constitution.
2. Allocate at least 10% of the Central Budget and 30% of the State Budgets to Education.
3. Ensure that at least 3% of the country's GDP is used to support scientific and technological research.
4. Ensure that the education system does not impart ideas that are not based on or contradict scientific evidence.
5. Ensure that public policies are enacted based on scientific evidence.

The March took place in more than 60 cities and towns across India. Nearly 10,000 people participated in the marches across the country. In the run-up to the March, Indian students and researchers studying abroad organized solidarity demonstrations in nearly 65 places

across 23 countries. More than 350 research scholars participated in these programs.

We now present a brief report of the Marches in each city or town.

### New Delhi

The March organised by the India March for Science Delhi Organizing Committee began from Vishwavidyalaya Metro Station and marching via different colleges, it culminated at the Arts Faculty Gate, North Campus, Delhi University. Nearly 400 people including scientists, teachers, scholars and students of different institutions participated. Prof Soumitro Banerjee, IISER, Kolkata; Dr Amitabha Basu, former Principal Scientist, National Physical Laboratory; Dr Gargiya, Jansastha Aviyan and Dr Vinay Kumar, Coordinator of IMFS Delhi Organising Committee addressed the gathering.

### Kolkata

On 9th August at 3.30 pm the Calcutta University Rajabazar Campus was full of scientists, professors, research scholars and science-loving people wishing to join the India March for Science at the call of the Kolkata Organising Committee. Prof Amitava Dutta, Chairman of the Advisory Committee briefed the gathering about the aims and objectives of the India March for Science. Prof Nilesh Maiti read out the solidarity message from the Global March for Science. Mr Chandan Santra read out the memorandum addressed to the Prime

## Organizational News



India March for Science rally at Delhi

Minister of India. At the end of the meeting, renowned scientist of TIFR Prof Prabir Roy flagged off the rally and the marchers proceeded towards Esplanade. Scientists, professors, research scholars from different institutes and colleges and members of different science organisations numbering more than 1500 participated in the March.

### **Mumbai**

On 9th August 2019, about 250 marchers assembled at D G Ruparel College and proceeded to Shivaji Park at Dadar. Participants of the March were across the spectrum. Scientists from HBCSE, faculty of CBS, Mumbai University, Sophia College, PhD scholars from TIFR, IIT Bombay, TISS, students from Ruia College and ICT joined the march. School students from Navmirmiti, Asha Education Trust also joined.

### **Chennai**

The March began at 5 pm from the North end of Elliot's beach, Besant Nagar. The March was flagged off by Prof Ramu Mani-

vannan (Madras University). The rally proceeded to the South end before it turned back to the central point at the beach where a meeting was held. Prof R Ramanujam (IMSc), Prof V Sunder (IMSc), Dr Suresh Govindarajan (IIT-M), Mr Ilango Subramanian (Newton Science Club), Malarvathi (TNSF), Prof. Gandhi Raj (Vivekananda college), Prof Joseph Prabagar (Loyola college) and Dr Uma Ramachandran (Convener, IMFS Chennai Organising Committee) addressed the gathering.

### **Hyderabad**

The IMFS Organising committee of Hyderabad organized a huge rally and a seminar. The March began from Basheerbagh and moved via Liberty cross roads and culminated at the Press club Hall. The IMFS Hyderabad Convener Dr.K.Babu Rao flagged off the March. At the end of the March, a meeting was held at the Press club Hall. Prof Purushotham Reddy (Renowned Environmentalist, Retd. Professor Osmania University), was the chief guest. Jana

## Organizational News



India March for Science rally in Kolkata

Vignana Vedika state secretary Mr R Varaprasad and O.Y.S.T.E.R State president Mr. Rakesh also spoke. Nearly 600 students, teachers, professors, scientists and general public took part in the program.

### Bengaluru

The March was flagged off at 10 am on 10 August by Prof V Shivram (Registrar, Bengaluru Central University) from Banappa Park. At the culmination of the march Prof. S Japhet (VC, Bengaluru Central University) inaugurated a Convention at the Senate Hall. A panel discussion on water crisis in Bengaluru followed. The panelists were Prof T.V.Ramachandra (Energy and Wetlands Research group, Centre for Ecological Sciences, IISc), Prof Bhakti Devi (Visiting Professor, Bengaluru Central University) and Shri Vishwanath S (Water Conservation Expert). Shri Anil Jagalur moderated the discussion. Scientists, professors, researchers, students numbering more than 200 participated in the program.

### Chandigarh

In Chandigarh, the March was organized by the March for Science, Chandigarh Or-

ganizing Committee. Researchers and students from IISER Mohali, Punjab University and NIPER participated in a silent march in Sector-17 Market Plaza, Chandigarh, at 6 pm. Ms Nishat Fiza, a Ph.D student of IISER Mohali and convener, spoke about the objectives of the March. Other speakers were Aman from Punjab University, Kala Pradeep an MS student of IISER Mohali and Subhadip Ghosh a postdoctoral fellow of IISER Mohali. The program was coordinated by Amartyajyoti Basu a PG student from Ambedkar University, Delhi.

Brief reports from various towns spread across the states follow.

### Kerala

Extensive campaign and preparations were done in 12 districts of Kerala. But the March programs had to be cancelled due to the flood in the state.

### Andhra Pradesh

**Visakhapatnam:** The March was taken out from Andhra University to Gandhi Statue. Prof V Veeraiah, Former Vice Chancellor of Vikrama Simhapuri University, flagged off the March.

### Organizational News

**Anantapur:** The March was from Krishnakala Mandir to Sapthagiri circle. Sri Satyanarayana, lecturer in chemistry, Govt. Arts College, Anantapur inaugurated the March in which 200 students participated.

**Hindupur:** The March was inaugurated by Sri Raja Reddy at Church grounds and proceeded to Ambedkar Circle. After the march, a seminar was held at Enlight Degree College, Kodigenahalli on 'Science and scientific method'. Mr. Mallikdath was the main speaker.

**Kurnool:** Seminars on 'India March for Science – the call of the scientists' were held in BITS Engineering College and in Sri Lakshmi High School.

**Nellore:** Mr Basavaraju inaugurated the March at 10 am in front of DKV College. Professors, teachers and students numbering more than 300 participated.

**Tirupati:** Ms Mani, Principal, S V Arts College, flagged off the March from Einstein Statue, S.V. Arts College to Gandhi Road. More than 300 students participated.

#### Assam

**Guwahati:** The March began at 3.30 pm and, covering University campus and a part of main city, reached Dighulipukhuri where Mr Pintu Debnath, Convenor, Assam Organizing Committee addressed the gathering.

**Silchar:** The march was flagged off by Mr Nirmal Kumar Das from Rangirkhari point at around 4 pm. Mr Partha Sarathi Deb, Research scholar, NIT Silchar, Urbashi Sarkar, Faculty of Earth Science, Dept of Assam University, Samyodeep Roychoudhury, Islam Haque Laskar and Krishanu Bhattacharjee addressed the gathering.

#### Chattisgarh

**Bilaspur:** A rally was organized from Gandhi Chowk to Old bus stand at 4.30 pm. Prof Kaladhar, HOD Microbiology,

Bilaspur University and Dr Prakash, CIMS hospital addressed the participants. Students from GGU, Maulana Azad College of education and DP College Bilaspur participated in the March program.

**Dhamtari:** With placards in their hands, students from Kurud College, ITI college and Higher secondary school Bhatagaon expressed their solidarity with the India March for Science.

**Durg:** A rally was organized from the Science College to Polytechnic College at 12.00 noon. Students from Shankaracharya College, Science College, Tularam College, Vidyapeeth School, Saraswati Vidyapeeth School, Nehru school and Mahatma Gandhi School participated.

**Korea:** A rally was held from Gandhi Chowk to Central bank at 6 pm. Mr Ravi Kaushik, teacher, St Joseph School addressed the gathering. Teachers and students from St Joseph school, KV, St Peter's school and from Oxford school participated in the program.

**Raipur:** A rally was organized from Ambedkar Chowk to Marine drive at 4.30 pm. The gathering at Marine drive was addressed by CG Vigyan Sabha members Dr P C Rath and Mrs Manju Meshram. BSS members Vishwajit Harode and Pooja Sharma also spoke. Students from Radhabai College, Pt Ravishankar University, DB Girls College and CG College participated in the March.

**Rajim:** A demonstration was organised near the bus stand at Rajim by students from Phoolchand and Rajiv Lochan college. About 40 students enthusiastically participated in the event.

#### Gujarat

**Ahmedabad:** In Ahmedabad, amid heavy rains, a Human Chain was organized in support of the India March for Science near Gujarat University. Dr. Raghavan Rangarajan, eminent scientist and professor of

## Organizational News



India March for Science rally at Hyderabad

Ahmedabad University, research scholars from Physical Research Laboratory, students, teachers and professors from various colleges participated in the Human Chain.

### Jharkhand

**Jamshedpur:** The March began from Graduate College, Sakchi. Principal of Graduate College, Dr. D K Dhinjal inaugurated the March. Dr. Amitabh Bose, Dr. Arundhati Dey, Dr. Kiran Sukhla, Jawaharlal Shama, Human rights activists, Ashok Subhadarshani, President of Janbadi Kekkha along with 200 science loving people participated.

**Bokaro:** The March began from sector 4 Majdur Maidan and passing through City Centre ended at Naya More. Mr Vijay Kumar, Mr Rakash Kumar (Damodar Hill Public school), Ms Gita Kumari, Mr Sanjay Kumar, Ms Puja madam, Ms Priti and Mr Chandi addressed the participants.

**Godda:** The march was organised at two places. In Nahar, the participants were mainly students. Mr Tribeni and Mr Rajku-

mar addressed the gathering of nearly 100 participants. The other march started from Godda Bhagalpur road. Mr Sudhansu, Mr Ramakant Yadav and Mr Vijay Yadav addressed the gathering of about 50 participants

**Hazaribag:** The March was organized from Ananda High school. Mr Debasis Mahato, Principal of Ananda School, Mr Rajesh Kumar and Mr. Fazal Kumar addressed the participants.

Marches were also held at Ranchi and Gharwa.

### Madhya Pradesh

**Bhopal:** A convention on 'Scientific temper and science movements in society' was held at Gandhi Bhawan from 11 am to 1pm. The speakers were Dr Parimal Mishra, Mr. R R Gupta (Rtd. Eng) and Mr. Sunil Gopal. After the convention a march was taken out from Gandhi Bhawan to Polytechnic Square. Around 100 people participated.

**Sagar:** A seminar on 'Scientific temper'

## Organizational News



India March for Science rally in Mumbai

was held. The speakers were Dr. Parimal Mishra and Mr. Sunil Gopal. Dr. Ramavtar sharma (former professor, Sagar University) presided. More than 50 people participated.

### **Mahrastra**

Marches were organized in Nagpur and Yavatmal on August 9.

### **Rajasthan**

**Jaipur:** In Jaipur, the March started from Maharaja College and culminated at SMS Medical College. Students from Maharaja College, PG students and PhD Scholars of Rajasthan University participated in the March.

### **Sikkim**

**Gangtok:** More than 60 students from various colleges and Sikkim University marched from Krishi Bhawan to Gairi Gaon amidst continuous rain. The march was followed by a hall meeting in Gairi Gaon, Tadong, where students, research scholars and lecturers spoke on various aspects of

science and scientific temper. Dr. Salvin Paul, Assistant Professor at Sikkim University, Mr. Sourabh Koushik, Rupen Karki (students of Sikkim University) and Bhanu Bhakta Sharma spoke in the meeting. Students of B.Ed College at Spring also extended their support to the march.

### **Tripura**

**Agartala:** The March began from Rabindra Shatabarshiki Bhawan and proceeded to the City Centre. The March program was inaugurated by Prof. Jyotiprakash Roy Chowdhuri. Prof. Alope Satpathi, Prof. Swapna Das, Dr. Rabi Sarkar (Agriculture scientist), Mr. Dipankar Deb Barma (Civil Engineer) and Mr Mihir Debnath (President, BSS, Tripura) led the March. Teachers and students from Tripura University, Govt. Colleges and Schools numbering 120 took part in the March. At the conclusion of the march at the City Centre, Dr. Alope Satpathi delivered a short speech on the need and objectives of the India March for Science.



## Organizational News

### Uttar Pradesh

**Lucknow:** A symbolic demonstration was held at Aminabad Mahila P G College at on August 9. Addressing the gathering, Dr. Rama Jain gave an introduction about the objectives of the India March for Science. Dr. Nisha Gupta (Principal) and Er. Jai Prakash spoke on the need for increasing the fund allocation for education and the need for improvement of science education in the country.

### Uttaranchal

**Dehradun:** A March program was organised in SGRR Inter College, Mothrawala. Prof Lal Bahadur Verma spoke on the objectives of the India March for Science. Mr Vijay Bhatt, S S Rawat, Satish and Indresh Nautiyal also addressed. More than 200 students participated.

### Bihar

**Patna:** The March started from Patna Science College and ended at Bhagat Singh Chowk (Kargil Chowk). Professor Santosh Kumar, former professor of NIT Patna, Professor R S Arya, Principal, Patna college and former vice chancellor Veer Kunwar Singh University, Dr P N P Pal, (PMCH, Patna), Dr Diwakar Tejaswi, Dr Satrudhan Kishore, Mr Joseph John (Director St. Mary's High School), Mr Manikant Pathak, Er. Sunil Kumar Singh, Mr Umesh Pandit representing 'Science for Society' and hundreds of students took part in the March.

**Darbhanga:** March started from M L S M College and ended at CM Science College Darbhanga. A good number of students, teachers and science loving people participated in the march.

### Karnataka

**Davanagere:** A demonstration was held at Davanagere on August 9. Nearly 175 stu-

dents, teachers and science scholars from MV College & Siddeshwara PU College participated. Prof S Shishupala, Department of Microbiology, Davangere University, Dr B. E. Rangaswamy, Dean and H.O.D, Department of Biotechnology, B.I.E.T College of Engineering, Davangere were present.

**Dharwad:** A demonstration was organized in the Indian Institute of Technology (IIT), Dharwad on August 9. There were nearly 150 participants in the program. The district convener of IMFS, V. Deepa addressed the gathering and highlighted the objectives of the march.

**Kalaburagi:** A March was taken out in Kalaburagi on August 9 from Mini Vidhan-soudha to District Science Centre. Prof S P Melkere, Acting Vice Chancellor, Gulbarga University, Kalaburagi, flagged off the march. The march concluded at District Science Centre followed by a symposium. Dr. Baburao N Sherikar, Lecturer, PDA Engineering college, Dr. Ashok Jivanagi, Principal, Proudha Devaraya PU College and Sri. C N Lakshminarayana, District Science Officer, Kalaburagi spoke on the occasion. A presentation on Scientific Solutions to Water Crisis in India was made by Dr. Ramesh Londonkar, Professor, Biotechnology Department, Gulbarga University.

**Koppala:** A March was organized from Ashoka Circle to Government Degree College. Prof. Dwarakaswamy, Physics HoD GFGC Koppala, flagged off the March. The main speaker of the program was Mr Prashanth, Asst. Professor, Sri Gavisiddeshwara College Koppala. Dr. C B Chilakaragi, principal, Degree College also addressed the gathering. Nearly 350 people participated in the march.

**Mysore:** A March program was organized in Sharada Vilas College, Mysore. Mr Prashanth, Assistant Professor, Vidyavardhaka College, Dr Suresh, Principal of Sharada Vilas BEd College and Nileena

## Organizational News



Demonstration in support of India March for Science at Barcelona, Spain

Thomas, BSS, addressed the gathering. This was followed by a miracle busting program by Sunil and Puttaraju leaving the audience captivated and amazed on realizing the science behind the fake black magic tricks.

**Raichur:** A March was taken out from Karnataka Sangha to Bhagath Singh circle. Nearly 500 people participated in the March. The March was flagged off by Prof. B. V. Patil, former Vice Chancellor of Agriculture University, Raichur. The gathering was addressed by B. V. Patil, Prof Chandra Mouli and Murulidhar Reddy.

### Tamilnadu

**Madurai:** A rally was taken out from Thallakulam to Gandhi Museum, Madurai. It was flagged off by Dr Abdulkhadir, former Principal of Wakf Board College. At the conclusion of the rally at Gandhi Museum, a meeting was held. It was presided over by Ms. Hilda Mary. Prof Yogarajan, Dr. Abdul Kadar, Dr. Jayapal and Dr Nimrodh Ananth

spoke in meeting. Students, teachers and general public numbering more than 100 participated in the program

**Pondicherry:** A hall meeting was organized on August 10 in the morning. Smt R. Hemavathi (retired Head Mistress and Vice President, Puducherry Science Forum), Dr R Venkatesan (BSS, Tamilnadu), Dr.Vaikkamathi, Mr Ravindar Singh Bella, Mr P.Visakan and Mr.Elumalai BSS, Puducherry) spoke in the meeting. Teachers, students and general public numbering 80 from Pondicherry town participated in the program.

### Odisha

**Bhubaneswar:** A March was organised from Ram Mandir to Sangeet Mahavidyalaya. Scientists, Professors, researchers from IOP Bhubaneswar, NISER, IIT Bhubaneswar, Utkal University and Ravenshaw University numbering more than 150 participated in the march along with school children. At end of the march,

## Organizational News



Meeting in support of the Climate Strike at Kendriya Vidyalaya, Kottayam, Kerala. Prof P N Thankachan addressing the students.

a street corner meeting was held. Prof. Swadhin Pattanaik, Prof. Ajit Srivastav, Prof. Birendra Nayak, Dr. K S K Varadwaj, Prof. Biju Rajsekhar, Dr. J. P. Das, Dr Braja Narayan Patra addressed the gathering.

**Cuttack:** The march took place from Ravenshaw University to Ranihat. Mahendra Kumar Kayasta, Prasanta Senapati, Pradipta Kumar Swain, Puspita Nayak, Chitaranjan Mohanty addressed the marchers.

**Balasore:** A march was organised at Balasore town. Dr. Pankaj Jena, Mr. Nanda Raychoudhury, Mr. Swapan Mohapatra addressed a gathering of more than 150 people who participated in the march.

**Dhenkanal:** The March was organised from Stadium to Rathagada. A seminar was held on 'Prospects and challenges in the field of science and critical thinking' at DIET Dhenkanal after the march. Dr. Purna Chandra Ratha, Prof. Prasanta Pattanaik, Dr. Susandhya Mohanty, Dr. Sachidananda Mishra, Dr. Debiprasad Mishra, Dr. Suresh Mishra, Dr. Sunil Mohanty, Mr. Pradyumna Satapathy and Mr. Srikant Chinnara spoke.

**Jagatsinghpur:** The march was from College Square to Bangala Chhaka. Prof. Sashi Kanta Acharya, Advocate Ranjit Mohanty and Manoj Lenka addressed.

**Karanjia:** The march took place from Karanjia College to Market. Prof. K C Mishra, Dr. Bhagirathi Prusty, Dr. Jogeswar Mohanta, A K Das, Bhagyarabi Das, and Avipsa Mohanty addressed the gathering of more than 250 participants. The March programs were also organised in Baranga, Khordha, Balangir and Sambalpur towns.

### **Solidarity from Indian Students Abroad**

Indian students and researchers studying abroad organized solidarity demonstrations in nearly 65 places across 23 countries. More than 350 research scholars participated in these programs. The list of the countries (city/place) follows.

**Australia:** Canberra, Hobart, Melbourne, Perth, Sydney, Uni Queensland, **Belgium:** Brussels, **Brazil:** Santa Maria, **Canada:** Alberta, Montreal, Waterloo, **Denmark:** Copenhagen, **Finland:** Aalto, **France:** Paris, **Germany:** Achen, Berlin, Dres-

## Organizational News

den, Jena, Munich, Potsdam, Rostock, Siegen, Stuttgart, Ulm, **Hungary:** Szeged, **Israel:** Ariel Uni, Bar Ilan Uni, Ben Gurion Uni, Haifa, Jerusalem, Tel Aviv, **Italy:** Cagliari, Trieste, **Japan:** Tokyo, Yokosuka, **Netherlands:** Nijmegen, **Norway:** Trondheim, **Poland:** Warsaw, **China:** Shanghai (Fudan Uni), **South Korea:** Seoul, **Spain:** Barcelona, Tarragona, Valencia, **Sweden:** Gothenburg, **Switzerland:** Basel, **Taiwan:** Hsinchu, Kaohsiung, Taipei, **UK:** Durham, Egham, London, Sheffield, **USA:** Arizona State University, Buffalo, Bloomington, Iowa State University, University of California-Irvine, John Hopkins University, University of Rochester, San Diego, Tallahassee, Texas A&M University, University of Texas at Austin, University of Pittsburgh, Yale University, University of California Berkeley, University North Carolina.

### Programmes in Solidarity with Global Climate Strike

#### Statement issued by Breakthrough Science Society

Friends,

People of the whole world are worried about the future of this planet. Industries are releasing toxic material into the environment; plastics and other non-biodegradable material are choking the drainage systems, canals, rivers, and even the oceans; forests are being cut or burnt down at an accelerated rate. The concentration of greenhouse gases in the atmosphere has reached alarming proportions, causing global warming and climate change. Floods, droughts, and heat-waves are becoming frequent and more severe. All these are symptoms of a diseased economic system driven by profit motive, that sees nature and people as just expendable resources, to be mindlessly exploited for earning maximum profit.



Shri D Krishna Varier, President, IMFS Trivandrum Organising Committee, speaking at the seminar on climate problem at Trivandrum on 28 September.

Scientists fear that unless appropriate action is initiated without delay, the only habitable planet may not remain so. And that future is not very distant. By remaining mute spectators to the wanton destruction, our generation is ruining the conditions of life for future generations.

In this situation it is heartening to note that young students all over the world have come together to demand initiation of such measures, so that their lives and that of their children can be spent in a liveable planet. They have called for a Global Climate Strike on 20 September 2019, to highlight the demand. The world scientific community has extended its support for this call (see <https://marchforscience.com/events/scientists-join-the-global-climate-strike>). On that day students, teachers, and scientists will come out of schools, colleges, and laboratories to press for the demand that effective steps be initiated forthwith by the leaders of all countries of the world.

The Breakthrough Science Society extends its wholehearted support for the strike and appeals to the people to participate in it and to organize various pro-

## Organizational News



Prof Debashis Aich addressing the students participating in the Climate Strike at Kharagpur College, West Bengal

grammes to promote awareness about the dangers of environmental degradation and climate change.

### Programmes organized

#### Kerala

**Sept. 20 to 27:** In Kottayam district solidarity programs were organized in Kendriya Vidyalaya Vadavathur, Rajiv Gandhi Institute of Technology, Pampady, Marian Senior Secondary School Kalathipady, BCM College, Govt UPS, Thiruvappu, Govt UPS, Muppaikkad, Amrutha Vidyalaya, Moolavattom, Govt UPS, Chingavanom, DB College Thalayaparambu and A J John HSS, Thalayolaparmbu.

**Sept 25:** In Ernakulam district, a seminar on Climate change and its impact on Kerala was jointly organized by the Botany Dept of St. Albert's College and India March for Science Kochi organizing committee. Dr. Ajith K, scientist, Kerala Agricultural Uni-

versity spoke on 'Impact of floods on Agriculture'. Dr. Shyamkumar, Dept of Botany, Maharajas college made a presentation on "Effect of Climate change on harmful Algal blooms". Dr. J. Jameson, Dr. Siju M V and Mr K.S. Harikumar also spoke.

**Sept 27:** A Seminar on environmental problems of Kerala was organized by IMFS, Kottayam organizing committee. Dr. V S Vijayan, member Gadgil committee spoke on "Post flood Kerala and Gadgil committee report" and Dr. K R Baiju, School of Environmental Sciences, M G University made a presentation on Landslides in Kerala. Dr. A P Thomas, president of the organizing committee presided.

**Sept 27:** Solidarity meeting at K R Gowriamma College of Engineering, Thiruvavoor, Alleppey. Dr K Hariprasrad spoke.

**Sept 27:** Solidarity rally held at Masters Academy, Kollam. Mr N. Tennyson, President, BSS Chapter spoke.

## Organizational News



Students participating in the Climate Strike at Raja Narendralal Khan Women's College, Medinipur, West Bengal

**Sept 28:** March for Science Trivandrum organising committee organised a seminar at the Institution of Engineers hall, Thiruvananthapuram. A 'Climate Strike Cycle Rally' was organised prior to the event. Shri. D Krishna Warriar, president, March for Science Trivandrum organising committee inaugurated the seminar. Prof. C P Aravindakshan, presided.

Prof. M C Arunan, Homi Bhabha Center for Science Education, Mumbai delivered a talk titled 'March for Science – Populating India with Spectators for science'. Mr. Jasper Lal, former Group Head, VSSC, ISRO, Trivandrum spoke on 'The Earth in Peril'. Dr. Abhilash. S, Associate Director, Advanced Centre for Atmospheric Radar Research, CUSAT, Kochi spoke on 'Climate Change and Climate Extremes over Kerala'. A demonstration titled 'The Reality of Sixth Sense' exposing the claims of supernatural powers was performed by Mr. Preeth

Azhikode. A balloon art show with the theme 'Save Earth' was performed by Ms. Shijina Preeth.

**Sept 29:** Seminar organized by IMFS Kollam organizing committee at Public Library Hall. Dr V Sasikumar, Scientist, CESS, Thiruvananthapuram presented a paper on 'Climate change and our future'. Mr Ajith S R spoke on Science and Society. N Tennyson and P P Prasanth spoke.

**Sept 29:** Solidarity Meeting held at Netaji Cultural Centre, Muttom, Alleppey. Dr. K Hraiprasd spoke.

## Delhi

**Sept 20:** Breakthrough Science Society Delhi chapter organised a discussion at Convent School, Palam, New Delhi. Smt Sharda Dixit, former principal was the speaker. More than 200 Students and teachers participated.

## Organizational News

**Sept 21:** BSS Delhi Chapter organised meetings at New Age Public School, Holy Child School and Navya Balvikas Vidyalaya, New Delhi. Smt Sharda Dixit was the speaker.

### Telengana

**Sept 22:** Breakthrough science society, Hyderabad chapter organized a meeting. Dr. Baburao, Senior Principal scientist IICT addressed the meeting.

### Tripura

**Sept 20:** BSS Tripura Chapter organised a meeting in front of City Centre Agar-tala. Science writer Pallab Kanti Das and Prof. Alok Satpathi spoke. Students from Schools, Colleges and Tripura University attended the program.

### Tamilnadu

**Sept 27:** As part of observation of the Global Climate Strike an awareness program on Global warming and Climate Change was held at Madura college, Madurai. Ms Selvi, Coordinator, BSS, Madurai presided. Prof. Dinakaran, Dept of Zoology, Madura College and Prof. Krishnakumar, Dept of Physics, Thiagarajar college addressed. They gave a call to the students to save our earth for future generations.

### Mohali

**Sept 20:** In solidarity with the Global Climate Strike and in association with the March for Science Chandigarh Chapter, a discussion was organized in IISER Mohali, Punjab. Dr. Manabendra Nath Bera and Dr. Ritajyoti Bandyopadhyay touched upon the environmental and social effects of climate change.

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### West Bengal

In support of the Global Climate Strike on 20th September, programmes like rallies, demonstrations, poster campaigns, and meetings were organized by the several science clubs of west Bengal. Responding to our campaign, students came out of colleges and schools, and demonstrated in support of the Global Climate Strike. Such programmes were taken at Calcutta University (Rajabazar Science College), Vidyasagar University, Kharagpur College, Contai College, Probhat Kumar College, Panskura College, Midnapore City College, N.L. Khan Women's College, Midnapore College, Midnapore Girl's College, Badhukula F.P. School (Canning), Behrampur J.N. Academy, Behala Girl's High School.

Local street programmes were organised at Hatibagan (Copernicus Bigyan Swastha), Behala (Curious Mind & Madame Curie Science Society), Midnapore Town (Beacon Science Club), Gopiballavpur, Midnapore West (Belda Science Era), Behrampur (Bigyan Bhavna).

**Sept 24:** A workshop was organized by Jenkapur A P C ray Science & Cultural Society

**Sept 23:** An awareness programme was organized at the Radhaballabhchak Vidyalay of the Sabang subdivision of West Midnapur district.

**Sept 29:** A one-day seminar was organized at Siliguri B Ed College. Dr Nirmal Duari was the main speaker.

### Other states

Climate Strike solidarity programs were also held at Einstein Science Club, Ghatshila (Jharkhand), Gangtok (Sikkim) and Silchar (Assam).