

# EVERYMAN'S SCIENCE

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*A per decision of Council meeting held on May 03, 2014, Presidential Address will not be printed henceforth in Everyman's Science as they are already printed in the above mentioned book.*

**EDITORIAL***Growing Obesity in Children*

Obesity is unquestionably undesirable response to a massive self imposed change in mankind's external environment, involving easy availability of energy-dense foods and susceptibility to sedentary lifestyles. It is a life-long progressive, life-threatening, expensive, genetically-related, multi-factorial disease of excess fat storage with multiple co-morbidities. Though, the mechanism of obesity development is not fully understood, it is established that the most simplistic way of understanding its occurrence is when energy intake exceeds energy expenditure. It is not that a single factor is predisposed to obesity rather there are multiple determinants and the interaction of these major determinants of obesity has important implications for the action needed to reverse the outburst. What makes the problems even more devastating is the fact that it influences human life at all growth phases irrespective of age but obesity in childhood is known to be far more precarious issue and has a striking and unacceptable impact on children.

It is evident that children's obesity is the clearest expression of the potency of environmental influences and the breakdown of the traditional prevention strategies based only on health promotion; children are far more receptive to commercial messages than advice from their teachers or health care providers. Obese children endure longer years of exposure to the metabolic syndrome showing health effects such early onset of diabetes, are strongly linked with risk factors for cardiovascular diseases, orthopedic problems, mental disorders, are linked to underachievement in school, to lower self-esteem and more likely to experience higher degrees of social exclusion. Given the significance of the phase and degree of obesity, it is not surprising to envisage the link with additional

reductions in life expectancy and huge increases in the number of unhealthy life-years. The present scenario is not as bright as existing escalated increase in the number of obese children is expected to lead to a considerable increase in the burden of non-communicable disease experienced virtually globally.

Obesity is new in human evolutionary history, and has become achievable at the population level with greater than before due to food security and reduced opportunities to use physical energy. Infact, food has never been so affordable, and calorie dense products are the cheapest. Physiological research gives support to the powerful interaction between inactivity and energy-dense diets that result in gain in body weight. Growing global rates of obesity are largely ascribed to environments that are obesogenic, against an evolutionary heritage that is maladaptive in these new contexts. Now, identifying which precise physical activity and diet patterns add to the risk of weight gain and subsequent overweight and obesity in the population is quite a challenge. More so, the socially vulnerable groups also do not remain unharmed with menace as they have less access to education and information about lifestyles and health, and available cheaper food options are nutrient poor and calorie dense. Thus, it becomes imperative and crucial to monitor the prevalence and trends and to review the determinants of obesity in order to design effective strategies and interventions. Therefore, after examining the biologic, social and environmental prognostic factors, and distinguishing them on scale of modifiability, the need of hour is to identify the critical time in life-course where most strategies can be targeted to harness maximum impact.

An anthropological approach to human obesity involves both evolutionary and cross cultural dimensions. It endeavors to perceive how the human predisposition to obesity so apparent in modern well-off societies may have been determined during our species' long evolutionary history as hunters and gatherer; and addresses the variation in obesity prevalence in different societies, social class and ethnic groups. Anthropological perspective, in fact explains three basic facts about obesity: gender dimorphism, an increase with modernization, and a positive association with socioeconomic status. An evidence based research on the cross-cultural and evolutionary dimensions of nutritional status from a life-course perspective is of utmost significance for our understanding of the emergence of obesity among children. The brighter side of the scenario is that due to extensive work on obesity, our understanding of the linkages between maternal and

household nutrition, childhood growth and development, micronutrient deficiencies, health disparities, nutritional epigenetic and dietary biodiversity of the global food system are responsible for reshaping insights on the biocultural paradox of hunger and obesity.

A global approach involving public and private sector at all levels of society is necessary to combat obesity. It is of utmost significance to educate children to keep fit and impress upon them the significance of keeping fit, as they are the ones who are most likely to grow up as an obese adult. Assuming it is possible to arrest obesity at this stage itself, one can hope to have healthy adults. The usefulness of nutritive diet and physical activity should be highlighted and focus should be on bringing greater understanding towards improving the health and well-being of the children.

***Dr. Rashmi Sinha***  
**Indira Gandhi National**  
**Open University, New Delhi**

*Science is simply common sense at its best.*  
*-Thomas Huxley*

## GREEN TEA OR BLACK TEA! ARE YOU CONFUSED?

Sirshendu Chatterjee, Aananya Chatterjee, Surmi Roy,  
Arpita Saha and Sandip K Bandyopadhyay\*

Tea (*Camellia sinensis*) is widely grown in the tropical humid climate of South East Asia. Infusion of its leaves (tea), nature's low calorie wonder drink, is the most popular ancient non-alcoholic beverage worldwide, besides water. Tea had its genesis in China and its legendary origin can be traced back to around B.C. 2737. Trade of tea by the Chinese to Western nations in the 19th century spread tea plant to numerous locations around the world. Presently several countries like China, India, Sri Lanka, Kenya, Japan, Vietnam, Indonesia, and Turkey etc. in the world map produce tea. Among them India and China, two major tea producers, combinedly produce more than half of the tea leaves. A common belief among the people of Japan, China and major part of Europe is that Green tea is better than Black tea in health respect. These have raised a controversy among the Black tea drinkers.

### INTRODUCTION

India is the second largest tea producer in the world and largest producer and consumer of black tea. There are several places in India like Darjeeling, Assam, Nilgiri; Munnar etc. producing good quality of tea. But in India tea was first planted in Darjeeling or Assam in the early 1800s. The incomparable qualities, the rare fragrance of the Darjeeling tea are the result of its local climate, soil condition, altitude and meticulous processing. There are 87 gardens that have been producing the highly prized teas of Darjeeling. In contrast Assam is the largest tea producer in India. Assam variety tea is mainly famous for its liquor and color. Most of the report available on health benefit is with green tea but recently numerous reports are also available on black tea, thus an overall comparison between the black tea and green tea is inevitable.

### DIFFERENT TYPES OF TEA

The commercially traded tea by definition is derived from *Camellia sinensis* (L.) O. Kuntze, *C. assamica* spp *assamica* (Masters) Wight and *C. assamica* spp *lasioclayx* Wight or hybrids thereof<sup>1</sup>.

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Even though all varieties of tea originate from the hybrids of the same species, i.e., *Camellia sinensis*<sup>2</sup>, and therefore, of a common lineage, the resultant manufactured tea is classified as white, green, oolong, black, and post-fermented teas depending on plucking, degree of maceration of tea leaves and method of processing. Among the different types, the most commonly found on the market are white, green, oolong, and black tea. People in Asian countries more commonly consume green and oolong tea while black tea is most popular in the India and other western countries. Among them green and black tea have most popularity over others.

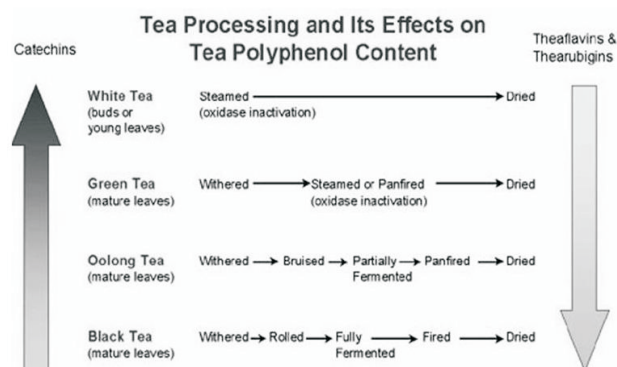


Fig.1 Processing of Tea<sup>3</sup>.

### WHAT ARE MEANT BY GREEN AND BLACK TEA?

It is only the variation in the method of processing that makes the color of the tea leaves either black or green.

**Green Tea:** The fresh green leaves undergo least processing. After plucking, the leaves are quickly heated with steam and dried. Therefore they retain green color.

**Black Tea:** If at harvest the tea leaves (two leaves and a bud) collected are rolled for breaking the cell wall to release the cell contents, and incubated at about 37°C, the polyphenol oxidase present converts the polyphenols typical of green tea to other oxidized forms. On fermentation for 60-90 minutes, the green leaf polyphenols, mainly catechins are converted into theaflavins and thearubigins which are typical of black tea.

#### Differences between Green and Black Tea:

**Color:** Black tea has been fully fermented during processing and hence dark brown or black in color whereas green tea has not been fermented at all and retains green color.

**Taste:** Most green teas have a distinctive 'grassy' taste to them, they are astringent (a dry mouth feeling) tasting but black tea does not.

**Polyphenols and Flavonoids:** There is a noticeable difference in types as well as quantity of Polyphenols and flavonoids. While green tea is loaded with mainly different catechins derivatives e.g. epigallocatechin (EGC), epigallocatechin gallate (EGCg), galliccatechin (GC) etc., black tea contains oxidized and polymerized form of the simple flavonoids e.g. Theaflavins and Thearubigins etc. Otherwise black tea contains more or less similar phytochemicals in addition to oxidized and polymeric form of them.

Overall phytochemical compositions of green tea are given in the Table 1

**Table:1 Chemical Composition of Green Tea.**

Compounds %	Dry weight
Total Polyphenols	25 – 30
Flavanols	
(-) Epigallocatechin gallate	8 – 12
(-) Epicatechin gallate	3 – 6
(-) Epigallo catechins	3 – 6
(-) Epicatechin	1 – 3
(+) Catechin	1 – 2
(+) Galliccatechin	3 – 4
Flavanols and flavonol glycosides	3 – 4
Leuco anthocyanins	2 – 3
Polyphenolic acids and depsides	3 – 4
Caffeine	3 – 4
Theobromine	0.2
Theophylline	0.5
Amino acids	4 – 5
Organic acids	0.5 – 0.6
Monosaccharides	4 – 5
Polysaccharides	14 – 22
Cellulose and Hemicellulose	4 – 7
Pectins	5 – 6
Lignin	5 – 6
Protein	14 – 17
Lipids	3 – 5
Chlorophylls and other pigments	0.5 - 0.6
Ash (minerals)	5 – 6
Volatiles	0.01 – 0.02

Black teas are processed in either of two ways, *CTC* (*Crush, Tear, Curl*) or *orthodox*. The *CTC* method produces leaves of fannings or dust grades that are commonly used in tea bags and are processed by machines. This method is efficient and effective for producing a better quality product from medium and lower quality leaves of consistently dark color. *Orthodox* processing is done either by machines or by hand. Average chemical composition of *Orthodox* and *CTC* teas made from Assam clones shown in Table 2:



**Table:2**

Composition	Orthodox teas	CTC teas
Water soluble solids %	39.52	41.12
Theaflavins %	0.59	13
Thearubigin %	6.5	18.00
Total Lipid	3.11	3.68
Carotenoids (mg/g)	215	176
Flavour volatilesd	18.40	8.20
Total fibre %	19.35	18.93
Crude fibre%	11.70	11.12
Chlorophyll a (mg/g)	1.38	0.48
Chlorophyll b (mg/g)	0.77	0.58

### BREWING TEMPERATURE AND TIME REQUIRED FOR PREPARATION OF INFUSION

The best temperature for brewing tea depends on its type. Teas that have little or no oxidation period, such as a green or white tea, are best brewed at lower temperatures, between 65 and 85 °C (149 and 185 °F), while teas with longer oxidation periods should be brewed at higher temperatures around 100 °C (212 °F). The higher temperatures are required to extract the large, complex, flavoring phenolic molecules found in fermented tea, although boiling the water reduces the amount of dissolved oxygen in the water (Table 3).

**Table: 3**

Type	Water Temp.	Steep Time	Infusion*
Green Tea	-65 to 85°C (149 to 185°F)	1-3 mins	4-6 mins
Black Tea	-100°C (212°F)	2-3 mins	3-4 mins

\*Infusion: Infusion is the time when the tea leaves to be added and covered but not in boiling condition.

A comparative study which shows that the presence of one of the main constituent L-Theanine in Green and Black tea respectively 475±25mg/100gm and 650±50 mg/100gm<sup>17</sup>. A possible reason for higher amount of L-theanine content in black tea is that, during fermentation theanine synthase may be activated and thereof

more L-theanine is formed having numerous health benefit effects.

### ANTIOXIDANT POTENTIAL

According to Leung *et al.* (2001), drinking black tea is equally beneficial to drinking green tea in terms of their antioxidant capacities because theaflavins present in black tea possess at least the same antioxidant potency as catechins present in green tea. But according to Lee *et al.* (2002) black and green teas contained total phenols equal to 124 and 165 mg gallic acid and the antioxidant capacity per serving of green tea and black tea is equals to 436 mg vitamin C equivalents and 239 mg vitamin C equivalents respectively<sup>4</sup>. So they concluded antioxidant potential of green tea is higher than black tea. However, Leung *et al.* (2001) had shown that Theaflavins in black and catechins in green tea are equally effective antioxidants<sup>5</sup>.

### GREENTEA, BLACK TEA AND HEALTH

Since black tea is prepared by prolonged fermentation of green tea, so many of us still believe good health promoting activities are lost during processing. Another reason behind the notion is that while the color 'green' denotes fresh, 'black' color is not. In our increasingly health-conscious society, green tea is becoming much more popular even in countries like Great Britain and America, and debates are springing up between tea drinkers from all over: which tea is better, green tea or black tea? Phytochemical analysis between green and black tea shows both contains some basic common ingredients along with some of their specific characteristic components. Green tea is loaded with different types of catechins e.g. EGC, EGCG, GC, GCG etc. while black tea contains their oxidized and polymerized derivatives such as Theaflavins and Thearubigins. Although teas of all varieties are often a healthy diet choice, green tea is generally opted for more antioxidants and lower caffeine levels than black tea. However, a recent study demonstrated that generally market available green teas which are not stored properly became dark in appearance. Aerial oxidation converts the catechins into partially black polymerized compounds, specific for black teas.



Antioxidative potential were also checked for the two varieties of tea but they are not drastically different from each other.

There is increasing evidence to show that EGCG, the main component of green tea, along with other flavonoids can be advantageous in treating brain, prostate<sup>6,7</sup> cervical<sup>8</sup> and bladder cancers<sup>9,10</sup>. EGCG has been shown to bind and hinder the anti-apoptotic protein Bcl-2<sup>11</sup>, which has been implicated in both cancer cell and normal cell survival<sup>12</sup>. Green tea consumption in Japan reduces the mortality due to cardiovascular disease and cancer<sup>13</sup>.

However, recent studies indicate the compounds contained in black tea - theaflavins and thearubigins - do more than contribute to its dark color and distinctive flavor. Black tea, contains flavonoids which are also found in apples. Black tea not only helps to fight bacteria but also strengthens the immune system<sup>14</sup>, stomach ulcer<sup>14,15</sup>. As one knows, drinking tea, hydrates the body, thus a cup of black tea helps moisturize the skin. Black tea also balances the hormone levels, which fends off stress. Not only does black tea have anti-inflammatory qualities, it also keeps a check on the digestive tracts functioning. It can help reduce stroke risks as it balances the cholesterol level<sup>16</sup>. Fluoride is another content of black tea and thus maintains oral and bone health. Another component L-Theanine, present in slightly higher amount in black tea than green tea, has a wide range of health related activities. Recently it has been shown that L-theanine, a constituent of tea acts as gastric cytoprotectant as well as neuroprotectant<sup>17</sup>. L-theanine also down regulates the proinflammatory cytokine in case of insulin resistant diabetes mellitus<sup>18</sup>. Besides several health promoting activities, there are some precaution for using green tea. People with heart problems, kidney disorders, stomach ulcers<sup>19,20</sup> and psychological disorders (particularly anxiety) should not take green tea. Pregnant and breastfeeding women should also avoid green tea (<http://www.umm.edu/altmed/articles/green-tea-000255.htm>). It is also found that EGCG reduces the bioavailability of anti-cancer drugs Velcade, Sunitinib and thereby

rendering it therapeutically useless. Since high intake of polyphenolic compounds during pregnancy is suspected to increase risk of neonatal leukemia, hence green tea should not be taken during this period<sup>21,22</sup>.

However any adverse effects, if present, till now has not been documented for black tea. So there is prime need for a comparative evaluation of phytochemicals present in green and black tea and deciphering their health promoting as well as hazardous activities in this backdrop to comment which is better, green or black tea. But we may conclude that black tea is better or equal in conferring health benefit as green tea.

## REFERENCES

1. D.J. Wood, P.K Barua, *Nature*, **181**,1674-1675,1958.
2. B. Banerjee, *Assam Review*, **81**,5 14-15,1992
3. <http://chinesefood.about.com/library/weekly/aa021103a.htm>
4. K.W. Lee, H.J Lee, C.Y. Lee, *J Nutr*, **132**,4, 785,2002.
5. L.K. Leung, Y. Su, R.Chen, Z. Zang, Y. Huang, Z. Y. Chen, *JNutr*, **131**, 2248-2251,2001.
6. S.Bettuzzi, M.Brausi, F.Rizzi, G.Castagnetti, G. Peracchia, A. Corti, *Cancer Res*, **66**,2, 1234-40,2006.
7. T.C. Hsieh, J.M. Wu, *Anticancer Res*, **29** 10, 4025-32,2009
8. Y.Qiao, J.Cao, L.Xie, X.Shi, *Arch Pharmacol Res*, **32**,9,1309-15,2009.
9. F. Borrelli, R. Capasso, A. Russo, E. Ernst, *Aliment Pharmacol Ther*, **19**,5,497-510,2004.
10. B.J. Philips, CH. Coyle, SN. Morrisroe, MB.Chancellor, N.Yoshimura, *Biomedical Research*, **30**,4,207-15,2009.
11. M. Leone, D. Zhai, S. Sareth, S. Kitada, JC. Reed, M. Pellecchia, *Cancer Res*, **63**, 23, 8118-21,2003.

12. J. Ge, BX. Tan, Y. Chen, L. Yang, XC. Peng, HZ. Li, HJ. Lin, Y. Zhao, M. Wei, K. Cheng, LH. Li, H. Dong, F. Gao, JP. He, Y. Wu, M. Qiu, YL. Zhao, JM. Su, JM. Hou, JY. Liu, *J Mol Med (Berl)*, **89**,6, 595-602,2011.
13. S. Kuriyama, T. Shimazu, K. Ohmori, N. Kikuchi, N. Nakaya, Y. Nishino, Y. Tsubono, I. Tsuji, *JAMA*, **296**, 10, 1255-65, 2006.
14. B.Adhikari, S. Yadav, SK. Bandyopadhyay, S.Chattopadhyay, *Pharmacological Reports*, **69**, 527-536, 2011.
15. S. Chattopadhyay, S. Yadav, B. Adhikary, S K. Bandyopadhyay, Black tea theaflavins & gastric ulcer prevention. In: Tea in Health and Disease Prevention. Preedy. Chapter 74.doi:10.1016/B978-0-12-384937-3.00074-4
16. A V. Mario, PJM. Theo, OFM. Henri, *J Agric Food Chem*, **56**,24, 12031-12036, 2008.
17. S. Chatterjee, A. Chatterjee, S. Roy, B. Bera, SK. Bandyopadhyay *J Nat Med*, **68**, 4, 699-708, 2014.
18. S. Chatterjee, N. Roy, A. Saha, S. Roy, A. Chatterjee, N. Hazra, S. Lahiri, CR. Maity, SK. Bandyopadhyay, *Int J Pharm Sci Rev and Res*, **28**, 2, 278-283, 2014.
19. LR. Juneja, DC. Chu, T. Okubo, Y. Nagato, H. Yokogoshi, *Trends in Food Science & Technology*, **10**, 2, 199-204, 1999.
20. K. Kimura, M. Ozeki, LR. Juneja, H. Ohira, *Biol Psychol*, **74**, 1, 39-45, 2007.
21. R. Strick, PL. Strissel, S. Borgers, SL. Smith, JD. Rowley, *Proc Natl Acad Sci U S A*, **97**, 9, 4790-5, 2000.
22. M. Paolini, A. Sapone, L. Valgimigli, *Mutat Res*, **527**,1-2, 99-101, 2003.

## COMPLETE FEED BLOCK TECHNOLOGY FOR FEEDING IN SCARCITY PERIOD FOR LIVESTOCK

Sanjay Kumar\* and Rajni Kumari

The compressed feed block technology has the potential to provide ready to eat complete ruminant diet during scarcity period, which are further aggravated by natural calamities like recurrent drought and floods in India. Crop residues such as straws (wheat/ paddy), stovers (maize, sorghum etc.) and bagasse (sugarcane) are the major component of ruminant's diet in developing countries. Economic and balanced feeding is extremely important for optimum livestock production.

### INTRODUCTION

In India, lower livestock productivity is mainly due to the scarcity of feeds and unbalanced feeding practices. With the changing scenario of land use for non-agricultural uses community grazing lands are shrinking day by day. Owing to low bulk density ( $65 - 70 \text{ kg/m}^3$ ) of most of the crop residues<sup>1</sup>, handling, transportation and storage becomes a major problem in feeding of livestock.

Complete feed block technology may play an important role in maintaining an optimum nutritional status of animals by providing proportionate concentrate and roughage dry matter intake, which promote rumen function thereby better nutrient utilization. Complete feed block supplementation will reduce the concentrate wastage and will increase concentrate consumption time, which will be beneficial for rumen microbial ecosystem. High quality feed block was also recommended<sup>2</sup> as a strategic supplement in lactating dairy cows especially those fed on low quality roughages or crop residues. Poor quality roughage based complete feed block feeding improved milk production in native animals over concentrate supplementation based feeding system. Also feeding of concentrate feed block with comparable nutrient density to grazing plus concentrate supplementation improved intake

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and nutrient digestibility, increased fibrolytic enzymes activity in rumen resulting in a better energy availability and growth<sup>3</sup>.

The effect of complete feed block on feed intake in ruminants is inconclusive on the basis of available data. An increase in straw intake by sheep supplemented with molasses containing feed blocks and higher dry matter intake in sheep fed roughage based complete feed blocks. The complete feed blocks contained crude protein (12.41%), ether extract (3.33%) and nitrogen-free extractives (44.65%), and also contributed towards higher proportion of dry matter (91.41%). Thus complete feed blocks supplied higher level of nitrogen as well as readily available energy to the the cattle and buffaloes for rapid growth and milk production.

### BENEFITS OF COMPLETE FEED BLOCK TECHNOLOGY

- | Simple and efficient technique for long term conservation of crop residues and agricultural by product.
- | Easy in transport.
- | Reduced use of conventional concentrate feed, thereby feeding cost would be alleviated.
- | Allow a synchronous and fractionated supply of essential nutrients for ruminants fed on low quality roughages.
- | Used as carrier of several chemicals.
- | May reduce environment pollution

## **COMPLETE FEED BLOCK TECHNOLOGY DURING FEED SCARCITY IN ARID REGION**

Arid ecology has the harshest conditions for animal production due to lack of feed and fodders during all seasons of the year except monsoon. Dry matter availability to animals is also not adequate even during monsoon. Availability and nutritional values of grazing pasture and top feeds varies due to there harvesting time etc. These feed resources can be harvested at an optimum nutritional stage. Various combinations can be made to prepare a balance or required diet types. After comparing in the block form these can be stored and/ or can be fed as and when required. The block making process will facilitate to reduce wastage of feed resources and nutrient because a few top feeds and grasses possess very higher nutritive value, and by using block technology nutrient losses due to imbalance of nutrient in a diet can be minimized. Blocks can be prepared when availability of feed is adequate and can also be stored for scarcity feeding. Scarcity of feed and fodders will continue because of shrinkage in grazing lands. Over stocking density of animals on grazing lands will further degrade the quality and quantity available for grazing whereas some of the feed resources are available only in limited quantity and a short period of time.

## **ROLE OF COMPLETE FEED BLOCK TECHNOLOGY FOR DROUGHT MANAGEMENT**

Various unconventional feed resources that have reasonable nutritional value are either under utilized or goes as a waste. Improper feeding practices also results in under utilization of available feed resources. In hot arid regions of India particularly in Rajasthan dry fodders such as Jawar, Bajra, Kadbi etc. are being fed to animals with out chaffing, and this practice loses about 20% feed as wastage which is mainly the stem portion. Using complete feed block technology, experimental results suggested that mustard straw and fallen tree leaves can be used in ruminants feeding after

blending with other feeds. These can be used as high as 70% of the total diet to sustain the adult stock. Using the block technology fallen tree leaves and forest grasses, which are available approximately 300-350 million tons annually can be added to the feed resource of the country<sup>4</sup>.

Complete feed block technology could be an effective way of feeding livestock to improve and sustain animal productivity. It helps in developing low cost feed formulations, better nutrient utilization due to proportionate intake of roughage and concentrate, avoiding refusal of unpalatable portion of plant residues, improves utilization of NPN compounds that enables use of locally available ingredients in an efficient manner<sup>4</sup>.

## **EFFECT OF COMPLETE FEED BLOCK FEEDING ON LIVESTOCK PRODUCTION**

Buffalo calves showed significantly higher average daily gain per day with berseem and wheat straw based complete feed blocks as compared to mash form<sup>5</sup>. The higher growth rate in block fed animals might be due to higher dry matter intake and increased TDN value of the ration. Camels calves fed chane ki khar, groundnut, chana based complete feed block also had better growth rate than the mash fed groups. Similarly higher growth rate also has been reported<sup>5</sup> in crossbred calves fed grass based complete feed block. On farm trial study indicated 14% higher milk yield in lactating buffaloes fed grass based complete feed block as compared to the conventional feeding adopted by the farmers of Simardha village of Uttar Pradesh<sup>6</sup>. Trial conducted in villages of Haryana also shared 0.85 to 1.2 lit increase in milk yield in lactating animals with complete feed block in comparison to conventional feeding system<sup>7</sup>. In cross bred cows, feeding of complete feed block resulted in 0.84 kg/ d higher milk yield than its mash form<sup>8</sup>. As the complete feed blocks are consisted of mainly low grade roughage; some concentrate mixture, urea and molasses. It will be beneficial to develop value added complete feed blocks with the incorporation of elite ruminal anaerobic fungal zoospores, those can proliferates in

the rumen to fungi. These anaerobic fungi may break down the lingo-cellulose bonds and bonds between the lignin and hemicellulose to provide more digestible energy from the low grade roughages of these blocks for higher productivity. It has been reported that feeding of the densified complete feed blocks is beneficial in terms of feed intake, body weight gain, nutrients utilization and feed conversion efficiency with normal values of blood biochemical constituents in growing crossbred calves as compared to feeding complete feed in mash form.

#### REFERENCES

1. K.K. Yadav, C.S. Rathee, and O.P. Lohan, *Indian Journal of Animal Nutrition*, **7**, 27-30, 1990.
2. M. Wanapat, A. Petlum and O. Pimpa, *Asian-Australian Journal of Animal Science*, **12**, 901-903, 1999.
3. S.K.S. Raghuvansi, *Udai Pratap Autonomous College, Varanasi, UP, India*, 115, 2004.
4. R.C Jakhmola, and A.K Misra, In: Proceeding III Biennial Conference of Animal Nutrition Association on "Feeding strategy using unconventional feeds". Hisar, 83-98, November, 2000.
5. K.K. Singh, M.M. Das, A.K. Samanta, S.S. Kundu, and S.D. Sharma, In: Proceedings of XI Animal Nutrition Conference "On farm trial: Effect of complete feed block on milk yield and its composition in buffaloes". JNKVV, Jabalpur, 78, January, 2004.
6. M.M. Das, K.K Singh, A.K. Samanta, S.S. Kundu, and S.D. Sharma, In: Proceedings of XI Animal Nutrition Conference "On farm trial: Effect of complete feed block on milk yield and its composition in buffaloes". JNKVV, Jabalpur, 78, January, 2004.
7. O.P. Lohan, Nand Kishore, and S.K. Sunda, In: Proceedings of XI Animal Nutrition Conference "Farmers perception for the feeding of complete balanced feed blocks". JNKVV, Jabalpur, January, 2004.
8. R.S Berwal, O.P. Lohan, and K.K Yadav, *Indian J. Dairy Sci.* **50**, 246-249, 1997.



## SOLAR ENERGY IN FUTURE: ENERGY OF NEXT GENERATION

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On account of growing energy needs and increasing environmental concern, alternatives of polluting fossil fuels have to be investigated. The most promising alternative is use of solar energy. This includes solar heating, solar photovoltaics, solar thermal electricity and solar architecture. This form of energy holds out a major promise to overcome energy crisis in the country. To promote, further research over solar energy, a review article is presented in which growing concern on upgrading technology for the capture and conversion of solar energy is emphasised. In this article different means of utilization of solar energy is explained briefly. The review explains a brief idea about the photovoltaic cells and solar thermal power system. Solar technologies are broadly characterized as passive or active depending on the way they are captured, converted and distributed. Active solar techniques include the use of photovoltaic panels and solar thermal collectors to harness the energy. Passive solar techniques include orienting a building to the sun, selecting materials with favourable thermal mass or light dispersing properties, and designing spaces that naturally circulate air. The different types of solar power system have also been reviewed. Further the advantages of solar power are outlined.

### INTRODUCTION

Energy is one of the most important factors for the development of a country<sup>1-3</sup>. There is a direct and close relation between the availability of energy and the growth of a country. Energy is consumed by all sectors of economy and all sections of society in India. The demand for energy is increasing day by day, but production of electricity is not adequate. In spite of 42-fold increase in generation of electricity, 6-fold increase in coal-production and 130-fold increase in production of crude in India during the last four decades, there is a major shortage of energy. The gap between availability and demand is widening. Thus, at present the power crisis has become an acute problem throughout the country. Some of the area receives only an hour of electricity every day. The peak power deficit, that is, the gap between demand and supply in the summer is about 10.8%. Losses in distribution average over 30% across India. Energy crisis is not confined to India alone. Even the developed countries like the U.S., Russia, Germany, and Japan,

etc. are facing this problem. There are a number of sources of energy available in India, such as fossil fuel, wind, water and the sun<sup>4</sup>. Fossil fuel has been the conventional source of our energy needs and it includes coal, lignite, petroleum and natural gas. Another source of traditional energy is fuel wood, animal waste and agricultural residues. These are known as non-commercial fuels.

The Central Electricity Authority (CEA) has set a target of 100,000 MW of additional power generation till 2020. This target may be achieved through the fossil fuel based power plants but it would be ecologically unsustainable<sup>4-6</sup>. The atmosphere will be so polluted that the life will become difficult. Although adverse effect of coal-based thermal power on climate change is known; currently seventy percent of capacity is being added through this source. Another serious bottleneck of this way of generation of electricity is the shortage of coal. By next year, the shortage of coal is forecasted to be 200 million tonnes. The shortage of domestic or imported coal greatly affected the generation of electricity by thermal power plants. To overcome all

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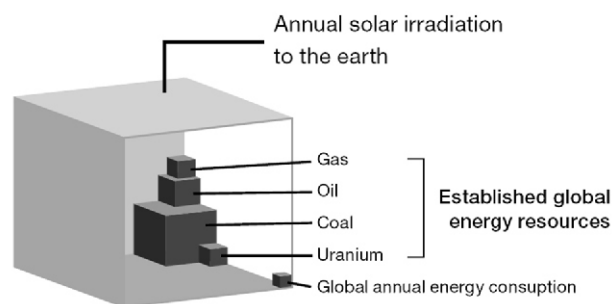


these problems the renewable energy sources were thought to be more reliable. But the fallout of the nuclear accident in Japan means that thermal power is back at the forefront. Hydropower continues to flounder because of concerns over rehabilitation and resettlement<sup>7,8</sup>. Thus solar energy is the ultimate solution to power crisis either in the form of solar thermal power or solar photovoltaic. India has an ideal location for solar energy utilization. In a recent study conducted by Renewable Energy Research Centre, it is found that average solar radiation in the country varies between 4 to 6.5 kWh per day<sup>9</sup>. Maximum amount of radiation are available in the month of March to April and minimum in December to January. Moreover, in the rural areas where still there is no electricity connection, photovoltaic technology can be a blessing<sup>10-12</sup>. Further in the area where solar intensity is very high, solar thermal power plant can be installed<sup>13-15</sup>. It is already well accepted in the country. Solar dryers, water heaters have directly contributed in conservation of electricity. It is needed that newly built apartment buildings use solar panels along with the grid connection to get support during the load shedding period. But the electricity generated by solar cells is much costlier than the conventional electricity. Thus brisk research is required to improve the technology which allows us to develop efficient storage devices which are cost effective too so that solar photovoltaic is not remain confined in limited domain.

## DISCUSSION

Solar radiation on earth is the indirect source of nearly every type of energy used by us. The exceptions are geothermal energy, nuclear fission and fusion. Even fossil fuels owe their origins to the sun; they were once living plants and animals whose life was dependent upon the sun energy is the energy produced directly by the sun. The sun creates its energy through a thermonuclear process that converts about 650 million tone of hydrogen to helium every second. The process creates heat and electromagnetic radiation of spectral range of 2000 – 20000Å<sup>0</sup>. The electromagnetic radiation includes

45% in visible light, 52% in the near infra red rest in ultra violet and far infra red radiation. The radiation streams out into space in all directions. However this spectral distribution of sunlight reaching the earth surface is modified due to atmospheric extinction and selective absorption by CO<sub>2</sub>, O<sub>3</sub>, water vapour and scattering due to clouds dust and water droplets. Although only a very small fraction of the total radiation produced in the Sun, reaches the earth but this much radiation is much larger than the global need of energy<sup>16</sup>. A comparison of the annual solar irradiation on the earth and other energy resources deposited on earth is represented graphically in Fig.1. Much of world's required energy can be supplied directly by solar power. More still can be provided indirectly.



**Fig. 1. Comparison of the annual solar irradiation on the earth and global energy resources deposited.**

Due to the nature of solar energy, two components are required to have a functional solar energy generator<sup>17</sup>. These are a collector and a storage unit. The collector simply collects the radiation that falls on it and converts a fraction of it to other form of energy. This form of energy is either electricity and heat or heat alone. The storage unit is required because of the non-constant nature of solar energy; at certain time only a very small amount of radiation will be received. At night, or during heavy cloud over, the amount of energy produced by the collector will be quite small. The storage unit, store the excess energy produced during the periods of maximum productivity, and release it when the productivity drops. In practice, a backup power supply is usually

added, too, for the situations when the amount of energy required is greater than both what is being produced and what is stored in the container.

### TYPES OF SOLAR ENERGY

Solar energy can be classified into following categories.

#### a) Passive Solar Energy

Passive solar energy is a method in which solar energy is harnessed in its direct form without using any mechanical devices<sup>18</sup>. Drying clothes in daylight is an example of using solar energy passively. Passive solar energy has a few applications like; day lighting, passive solar heating and passive solar cooking.

#### b) Active Solar Energy

The active solar energy employs mechanical or electrical equipment for functioning and increase system efficiency. As an example water pumps are used to circulate water through the active solar energy water heating system. Some important applications of active solar energy are active solar water heating, active solar pool heating and active solar space heating.

### TYPES OF SOLAR POWER SYSTEM

Solar power is the conversion of sunlight into electricity. Sunlight can be converted directly into electricity using photovoltaics (PV), or indirectly with concentrated solar power (CSP), which normally focuses the sun's energy to boil water which is then used to provide power. Other technologies also exist, such as Stirling engine dishes which use a Stirling cycle engine to power a generator. Photovoltaic was initially used to power small and medium sized applications, from the calculator powered by a single solar cell to off-grid homes powered by a photovoltaic array. Solar energy is being utilized in the following three means.

#### 1. Concentrated Solar Power

Concentrated solar power (CSP) is a branch of solar thermal energy which is used to generate solar power electricity. Electricity is produced on a large

scale by using this technology<sup>19</sup>.

CSP systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. The concentrated heat is then used as a heat source for a conventional power plant. A wide range of concentrating technologies exists; the most developed are the parabolic trough, the concentrating linear Fresnel reflector, the Stirling dish and the solar power tower. Various techniques are used to track the Sun and focus light. In all of these systems a working fluid is heated by the concentrated sunlight, and is then used for power generation or energy storage. Thermal storage efficiently allows up to 24 hour electricity generation. A parabolic trough consists of a linear parabolic reflector that concentrates light onto a receiver positioned along the reflector's focal line. The receiver is a tube positioned right above the middle of the parabolic mirror and is filled with a working fluid. The reflector is made to follow the sun during the daylight hours by tracking align a single axis. Parabolic trough systems provide the best land-use factor of any solar technology. Compact Linear Fresnel Reflectors are CSP- plants which use many thin mirror strips instead of parabolic mirrors to concentrate sunlight onto two tubes with working fluid. This has the advantage that flat mirrors can be used which is much cheaper than parabolic mirrors, and that more reflectors can be placed in the same amount of space, allowing more of the available sunlight to be used. Concentrating linear Fresnel reflectors can be used in either large or more compact plants. The Stirling solar dish combines a parabolic concentrating dish with a Stirling engine which normally drives an electric generator. The advantages of Stirling solar power over photovoltaic cells are high efficiency of converting sunlight into electricity and longer lifetime. Parabolic dish systems give the highest efficiency among CSP technologies. A solar power tower uses an array of tracking reflectors (heliostats) to concentrate light on a central receiver atop a tower. Power towers are more cost effective, offer higher efficiency and better energy storage capability among CSP technologies.

## 2. Solar Thermal Energy

Solar Thermal Energy is the heat energy derived from the incident solar energy. This is used by solar heating panels. Solar thermal energy does have advantages like other forms of solar energy. It is used for solar water heating, solar pool heating, solar space heating etc. Solar Thermal Energy is the heat energy derived from the incident solar energy. This is used by solar heating panels. Solar thermal energy does have advantages like other forms of solar energy. It is used for solar water heating, solar pool heating, solar space heating etc.

A solar thermal power plant in principle works same as conventional steam power plant. However, there is one important difference; it is produced solely by the energy that comes from the sun. In order to achieve the high temperatures required, solar radiation must be concentrated. Parabolic trough collectors represent the most advanced technology for use in doing this. These troughs are more than 1300 feet (400 meters) in length and are made up of parabolic shaped mirror segments. The troughs track the sun over the course of the day and focus the resulting radiation along the caustic line of the mirrors onto specially coated, evacuated absorber tube receivers.

Solar radiation heats up the thermo-coil that flows through the receiver to a temperature of 400<sup>0</sup>C so that a downstream heat exchanger is able to generate steam. As in a conventional power plant, the steam is pressurized inside the turbine that drives the generator. Heat storage systems can allow electricity output even if the sun is not shining. Solar power systems are of the following types.

### a) Grid tied (on Grid) type Solar Power Systems

This is most common power system used often in cities<sup>20</sup>, suburbs and industrial areas where access to utility generated power is available. Solar powered electricity can be supplemented with utility generated energy if one uses more electricity than the solar power system supplies.

### b) Grid tied with battery backup type Solar Power Systems

Solar energy panels combined with batteries and generators for grid-tie applications couple the clean power supplied by solar panels with the assurance that one will have electricity even during power outages that last for extended periods. During the day, the solar panels generate as needed and charge batteries. If more power is required, or the batteries begin to run low, the natural gas or propane generator kicks in to recharge the batteries. It automatically shuts off when the batteries are fully charged.

### c) Off grid type Solar Power Systems

Standalone, or off-grid, solar power systems consist of solar panels and a battery bank. They are typically used in rural areas and regions where there is no access to the utility grid. They may also be appropriate where the grid is somewhat close to the site, but expensive to bring in. When off-grid solar power systems produce excess electricity during the day, it is used to charge the batteries. When the sun is not shining, electricity is drawn from the batteries. The advantage is greater independence but the disadvantage is its greater complexity and cost.

### d) Direct DC type Solar Power Systems

Simple, direct DC solar power systems produce energy where and when it is needed. Common uses include powering water pumps and fans. There is no complex wiring, so storage and control systems are not required. Small systems are easy to transport and install.

### e) Hybrid Solar Power Systems

Hybrid power systems combine various sources of electrical generation, and are well suited for electrification. Solar and wind technologies are modular, and seasonal variation of sun and wind often complement each other.

## 2. Photovoltaic Power Systems

The Solar photovoltaic system also called solar cells, are electronic devices that convert sunlight

directly into electricity. The modern form of the solar cell was invented in 1954 at Bell Telephone Laboratories. Today, PV is one of the fastest growing renewable energy technologies and it is expected that it will play a major role in the future global electricity generation mix. Solar PV systems are also one of the most "democratic" renewable technologies, in that their modular size means that they are within the reach of individuals, co-operatives and small-businesses who want to access their own generation and lock-in electricity prices. The conversion of incident solar energy into electricity is done using photovoltaic solar cells. The applications of photovoltaic solar power are solar electricity photovoltaic solar lighting and photovoltaic cooking.

A photovoltaic cell or solar cell is an electrical device that converts the light energy directly into electricity by the photovoltaic effect. It is a form of photoelectric cell which when exposed to light can generate and support an electric current without being attached to any external voltage source. In such cases the cell is sometimes used as a . It is used for detecting light or other electromagnetic radiation near the visible range, or measuring light intensity. The operation of a photovoltaic (PV) cell requires three basic attributes:

- a) The absorption of light, generating electron-hole pairs or extractions.
- b) The separation of charge carriers of opposite types.
- c) The separate extraction of those carriers to an external circuit.

Solar cells produce direct current (DC) power which fluctuates with sunlight's intensity. For practical use this usually requires conversion of certain desired voltages or alternating current (AC), through the use of inverters. Multiple solar cells are connected inside modules. Modules are wired together to form arrays, then tied to an inverter, which produces power at the desired voltage, and for AC, the desired frequency. In these grid-connected

PV systems, use of energy storage is optional. In certain applications such as satellites, lighthouses, or in developing countries, batteries or additional power generators are often added as back-ups. Such stand-alone power systems permit operations at night or at other times of limited sunlight.

### **BUILDING BLOCK OF A SOLAR PANEL**

Assemblies of photovoltaic cells are used to make solar modules which generate electrical power from sunlight. Multiple cells in an integrated group, all oriented in one plane, constitute a solar photovoltaic panel or solar photovoltaic module, as distinguished from a solar thermal module or solar hot water panel. A group of connected solar modules is called an array. Photovoltaic cells electrically connected and encapsulated as a module often have a sheet of glass on the front (sun up) side, allowing light to pass while protecting the semiconductor wafers from abrasion and impact due to wind driven debris, rain, hail, etc. Solar cells are also usually connected in series in modules, creating an additive voltage. Connecting cells in parallel will yield a higher current; however, very significant problems exist with parallel connections. For example, shadow effects can shut down the weaker or less illuminated parallel string causing substantial power loss and even damaging the weaker string because of the excessive reverse bias applied to the shadowed cells by their illuminated partners. Strings of series cells are usually handled independently and not connected in parallel, special paralleling circuits are the exceptions. Although modules can be interconnected to create an array with the desired peak DC voltage and loading current capacity, using independent MPPTs (maximum power point trackers) provides a better solution. In the absence of paralleling circuits, shunt diodes can be used to reduce the power loss due to shadowing in arrays with series/parallel connected cells. To make practical use of the solar-generated energy, the electricity is most often fed into the electricity grid using inverters (grid-connected photovoltaic systems); in stand-alone systems, batteries are used to store the energy that is not



needed immediately. Solar panels can be used to power or recharge portable devices.

### Theory of Photovoltaic Cells

The solar cell works in three steps:

- (1) Photons in sunlight hit the solar panel and are absorbed by semiconducting materials, such as silicon.
- (2) Electrons are knocked loose from their atoms, causing an electric potential difference. Current starts flowing through the material to cancel the potential and this electricity is captured. Due to the special composition of solar cells, the electrons are only allowed to move in a single direction.
- (3) An array of solar cells converts solar energy into a usable amount of direct current.

### EFFICIENCY OF PHOTOVOLTAIC CELLS

Solar panels on the International Space Station absorb light from both sides. These bifacial cells are more efficient and operate at lower temperature than single sided equivalents. The efficiency of a solar cell may be broken down into reflectance efficiency, thermodynamic efficiency, charge carrier separation efficiency and conductive efficiency. The overall efficiency is the product of each of these individual efficiencies. A solar cell usually has a voltage dependent efficiency curve, temperature coefficients, and shadow angles. Due to the difficulty in measuring these parameters directly, other parameters are measured instead: thermodynamic efficiency, quantum efficiency, integrated quantum efficiency,  $V_{oc}$  ratio, and fill factor. Reflectance losses are a portion of the quantum efficiency under "external quantum efficiency". Recombination losses make up a portion of the quantum efficiency,  $V_{oc}$  ratio, and fill factor. Resistive losses are predominantly categorized under fill factor, but also make up minor portions of the quantum efficiency,  $V_{oc}$  ratio. The fill factor is defined as the ratio of the actual maximum obtainable power to the product of the open circuit voltage and short circuit current. This is a key

parameter in evaluating the performance of solar cells. Typical commercial solar cells have a fill factor  $> 0.70$ . Grade B cells have a fill factor usually between 0.4 to 0.7 value<sup>14</sup>. Cells with a high fill factor have a low equivalent series resistance and a high equivalent shunt resistance, so less of the current produced by the cell is dissipated in internal losses. Single p-n junction crystalline silicon devices are now approaching the theoretical limiting power efficiency of 33.7%, noted as the Shockley-Queisser limit. In the extreme, with an infinite number of layers, the corresponding limit is 86% using concentrated sunlight.

### MATERIALS USED IN PHOTOVOLTAIC CELLS

The Shockley-Queisser is limited for the theoretical maximum efficiency of a solar cell. Semiconductors with band gap between 1.0 to 1.7 eV or near-infrared light, have the greatest potential to form an efficient cell. Various materials display varying efficiencies. Materials for efficient solar cells must have characteristics matched to the spectrum of available light. Some cells are designed to efficiently convert wavelengths of solar light that reach the earth surface. However, some solar cells are optimized for light absorption beyond Earth's atmosphere as well. Light absorbing materials can often be used in multiple physical configurations to take advantage of different light absorption and charge separation mechanisms. Materials presently used for photovoltaic solar cells include single crystal silicon, polycrystalline silicon, amorphous silicon, cadmium telluride, copper indium selenide/sulphide etc. Many currently available solar cells are made from bulk materials that are cut into wafers between 180 to 240 micrometers thick that are then processed like other semiconductors. Other materials are made as thin-film layers, organic dyes, and organic polymers that are deposited on supporting substrates. A third group are made from nanocrystals and used as quantum dots (electron-confined nanoparticles). Silicon remains the only material that is well-researched in both bulk and thin-film forms.

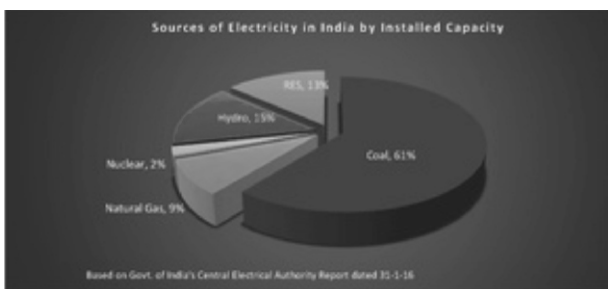
**ADVANTAGES OF SOLAR POWER**

The solar power has following advantages

- a) The first commercial use of photovoltaic cells nearly 50 years ago was powering communication satellites in near earth orbit. The declining cost and increasing efficiency of solar energy technology has given rise to practical applications on from powering personnel electronic devices, home and factories to generate utility scale power.
- b) Solar energy provides a huge advantage for satellites because they can be launched into orbit without the added weight of a fuel supply. But the advantages on earth are even dependent on fuel delivery infrastructures, foreign relations or the price machinations of energy brokers and big business.
- c) Moreover, solar power generation provides energy where and when it is needed, and is highly scalable to match the electrical demand. Since solar energy cells have no moving parts, they are reliable and easy to maintain.

**NATIONAL AND INTERNATIONAL STATE OF ART**

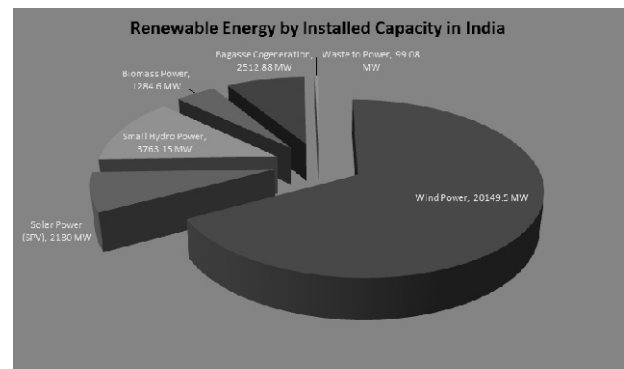
Sources of electricity in India by installed capacity as of 2016 are shown in Fig 2.



**Fig. 2. Sources of electricity in India by installed capacity as of 2016.**

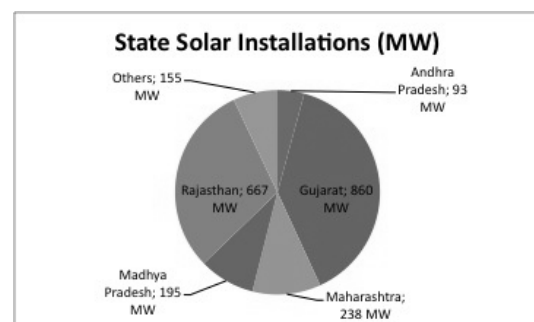
This chart shows that renewable energy sources are

not popular in our country. According to Ministry of non conventional energy sources, among the different renewable energy sources currently used, the wind energy rank first. This source gives 20149.5 MW of electricity. The result is shown in Fig 3. This result also shows that the solar energy



**Fig. 3. Sources of renewable energy in India.**

contributes only 2180MW. But this source has a lot of potential. The early development of solar technologies starting in the 1860s was driven by an expectation the coal would soon become scarce. However, development of solar technologies stagnated in the early 20<sup>th</sup> century in the face of the increasing availability, economy and utility of coal and petroleum. The 1973 oil embargo and 1979 energy crisis caused a reorganization of energy policies around the world and brought renewed attention to developing solar technologies. Then due to deployment strategies photovoltaic installations grew rapidly. The current status of state wise solar installation in India is shown in Fig. 4. This figure shows that Gujarat is much ahead in

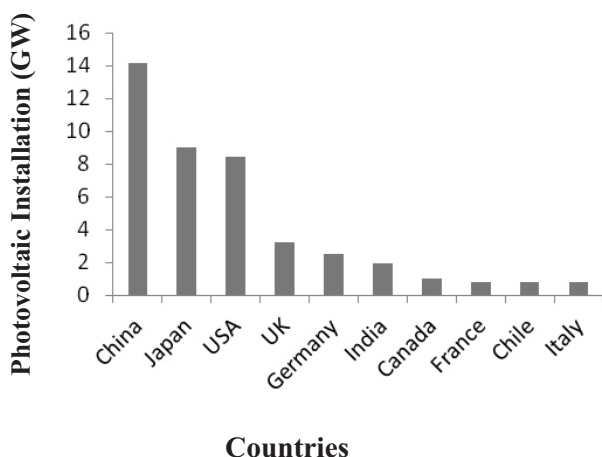


**Fig. 4. State-wise solar installation in India.**



the installation of solar energy systems. If we compare the development of solar voltaic in our country with other country we will see that we are far behind.

The installation demand in this year has grown at a double-digit rate of 16 to 25 percent and installations in the range of 53 to 57 GW. The drivers of growth are remaining largely unchanged from last few years. Geographically, the largest markets again will be China, Japan and the United States, while the largest contributors in terms of absolute growth are China, the U.S. and India. This is shown graphically in Fig 5. The result clearly shows that even though



**Fig 5. Photovoltaic installation in current year in GW.**

our country is suitable for use of solar energy but PV installation is much smaller here than china, Japan etc.

## CONCLUSION

Due to continuous increase in population and increasing demand for electricity, the conventional sources of electricity based on fossil fuels are not found to be sufficient and they cause pollution. Thus it is essential to diversify our energy sources. One need to take concrete steps such as investing for renewable energy, promote environment friendly practices and reduce waste of fossil fuel plants. In our country potential of solar energy remains untapped

just without any satisfactory reason. The need is to focus on the use of solar energy sources so as to gain maximum efficiency and in this way highly efficient and economically cheap solar cells should be developed. In the area where solar intensity is very high, solar thermal power plant should be installed more and more. It will be well accepted in the country. However the practicality of this source should be examined and its benefits and drawbacks should be considered.

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## REFERENCES

1. Pan L, Freifeld B, Doughty C, Zakem S, Sheu M, Cutright B & Terrall T, *Geothermics*, **53**, 100, 2015.
2. Murray R L & Holbert K E, Chapter 24 – Nuclear energy future. *Nuclear Energy* (Seventh Edition), 427, 2015.
3. Hemond H F & Fechner E J, Chapter 4 - The Atmosphere Chemical Fate and Transport in the Environment (Third Edition), 311, 2015.
4. Niu L, Ye H, Xu C, Yao Y & Liu W, *Chemosphere*, **119**, 112, 2015.
5. Daresta B E, Italiano F, Gennaro G de, Trotta M, Tutino M & Veronico P, *Chemosphere*, **119**, 37, 2015.
6. Murray R L & Holbert K E, Chapter 8 - The history of nuclear energy. *Nuclear Energy* (Seventh Edition), 109, 2015.
7. Premalatha M, Abbasi T, Abbasi T & Abbasi S A, *Science of The Total Environment*, **481**, 638, 2014.
8. Palmeirim A F, Peres C A & Rosas F C W, *Biological Conservation*, **174**, 30, 2014.

9. "Chapter 8 – Measurement of sunshine duration" (PDF). CIMO Guide. World Meteorological Organization. Retrieved, 2008.
10. Amrouche B, *Solar Energy Materials and Solar Cells*, **128**, 204, 2014.
11. Plante R H, chapter eight - the economics of solar photovoltaic systems, *Solar Energy, Photovoltaics, and Domestic Hot Water*, 51, 2014.
12. Mellit A, Pavan A M & Lughi V, *Solar Energy* **105**, 401, 2014.
13. Wagner P H & Wittmann M, *Fluid Energy Procedia*, **49**, 1652, 2014.
14. Rodriguez M R Sanchez, Soria A, Verdugo, Almendros J Albanez, Acosta A, & Santana D, *Applied Thermal Engineering*, **63**, 1 428, 2014.
15. Modi A & Haglind F, *Applied Thermal Engineering*, **65** (1–2), 201, 2014.
16. G.Q. Chen, *Communications in Nonlinear Science and Numerical Simulation*, **11**, (4), 531, 2006
17. D. Azofra, E. Martínez, E. Jiménez, J. Blanco, J.C. Saenz-Diez *Applied Energy*, **121**, 28, 2014.
18. Matías Hanel, Rodrigo Escobar, *Renewable Energy*, **49**, 96, 2013.
19. Antonio Urbina , *Renewable Energy*, **68**, 264, 2014.
20. Juergen H. Peterseim, Alexander Herr, Sarah Miller, Stuart White, Deborah A. O'Connell, *Energy*, **68**, 698, 2014.

## Mobile Adhoc Networks (MANETs) : A Perspective

Neeta Singh and Vidushi Sharma

Initially, wireless networks were used only between certain set of computers and devices to form a network between colleagues in an office or in a classroom. A major extension of wireless networks came in the form of ad hoc networks. This system gained all the more prominence as it could be setup even in difficult terrains and without any availability of suitable infrastructure network. The focus of this article is to provide a detailed discussion on the issues related to the ad hoc networks. Moreover, innovations and the future directions of the wireless networks have also been discussed.

### INTRODUCTION

Adhoc networks are formed as and when an immediate requirement of setting up a network in an area arises. They are defined as the category of wireless networks that utilize multihop transmission and are capable of operating without any support from the existing infrastructure. There may be situations when proper infrastructure cannot be setup or is not affordable, ad hoc networks can be easily used in such scenarios. Examples of this can be emergency situations, natural disasters, rural areas or difficult terrain where either setting up infrastructure is too difficult or very expensive.

With the increasing popularity of adhoc networks and also with the simultaneous growth of mobile or portable devices, it was thought that ad hoc networks must be extended to connect users that are mobile or are not fixed at one place. Such kind of networks came to be known as Mobile Adhoc Networks (MANETs).

### MOBILE ADHOC NETWORKS

MANET is a collection of mobile nodes with no pre-established or fixed architecture<sup>1,2</sup>. In MANETs, network nodes act as routers by relaying each other's packets and all the nodes form their own cooperative infrastructure. A MANET is a wireless network in which nodes communicate through single hop or

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multihop paths. Fig. 1 shows a simple adhoc network comprising of mobile handsets, laptops and

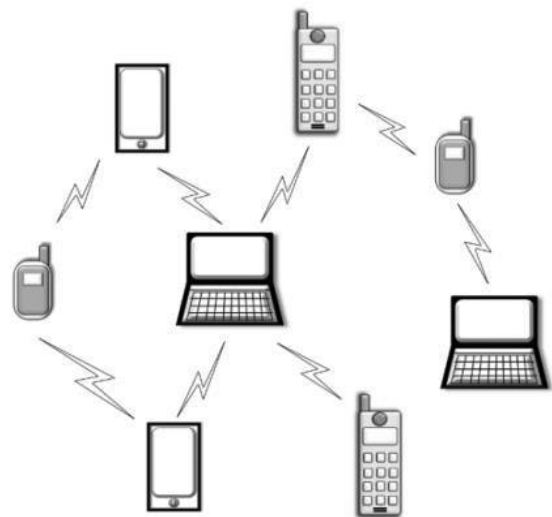


Fig. 1: Ad hoc Network

MANETs are characterized by dynamic topologies, bandwidth constraints, variable capacity links, energy constrained operations and complete self-organized behaviour. Thus, nodes in a MANET should be able to perform the necessary routing functions to discover the optimum route and also be able to forward data packets in such a network. The wireless ad hoc networks can be divided into three categories: WMNs, MANETs and WSNs.

## MANET ARCHITECTURE

In MANETs, each node has a router or switch connected by a wireless connection. The interconnection of all these nodes is in an arbitrary topology. MANET can either function independently or they can be connected to Internet Protocol version 4 (IPv4), Internet Protocol version 6 (IPv6) or some other appropriate protocol<sup>3</sup>. As the MANETs are an independent entity, their performance or their organization depends on the location of the individual nodes, node connectivity, and ability of the nodes to discover routes and send messages using the shortest path or nearby nodes. An important characteristic of such networks is that their organization can change due to the constant movement of nodes. In Fig. 2, the mobile node, device node, sensor node and other portable devices are all capable of transmission as well as reception. Moreover, these devices can simultaneously act as a router also. When any node wants to communicate with some other node or device that is not in its range, it can do so with the help of a multipoint relay node. Also there is a gateway to connect or communicate with other networks if it is required.

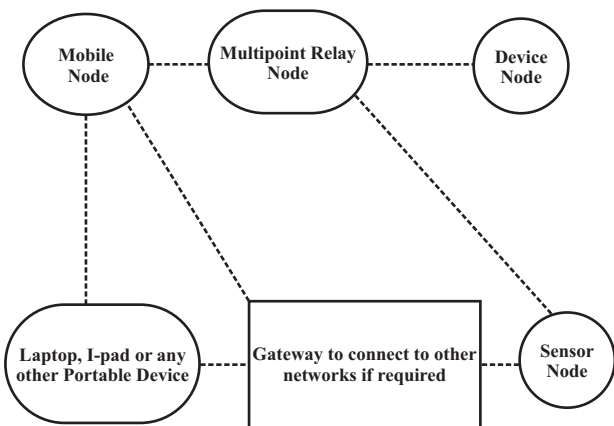


Fig. 2: MANET Architecture

## TYPES OF MANETS

MANETs can be broadly subdivided into two categories: single hop and multi hop MANETs:

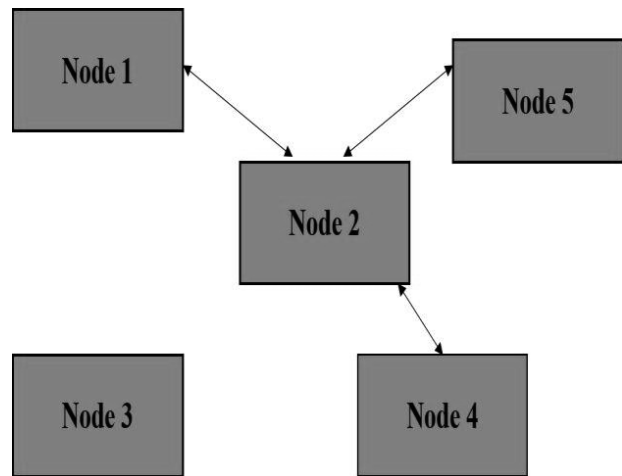
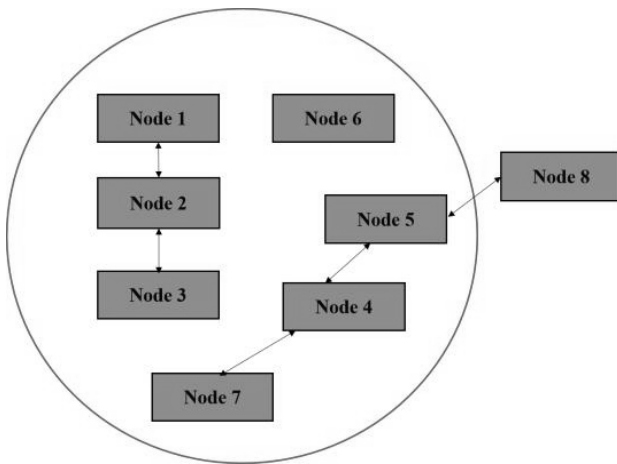


Fig. 3: (A) Single Hop MANET

However, if node 5 is not in communication range of node 3, then node 5 will not be able to communicate or send data packets to node 3. Single hop systems work well when the number of users are few and the system is setup in a small area.

**Multi hop MANETs:** Multi hop systems try to overcome the limitation of single hop networks. Multi hop communication techniques are commonly used to relay data.

**Single hop MANETs:** Single hop MANETs are the simplest networks that can be formed by a collection of several stations<sup>4</sup>. Here, stations that are within the range of each other dynamically configure themselves to setup a single hop MANET. Examples of single hop networks are Bluetooth piconet, 802.11 WLAN that enables communication without an access point. Fig. 3 (A) shows a single hop MANET. Here, node 5 can communicate with node 2 and node 2 can communicate with node 4 as they are in communication range with each other to the destination through intermediate nodes when the source and destination nodes are not in communication range of one another. Here, the nodes connect together over a wireless medium. Since, the users' devices are mobile; these networks are also referred as mobile multi hop adhoc networks. They



**Fig. 3: (B) Multi hop MANET**

have a wide spread application in vehicle-to-vehicle communication, military network setups etc. Fig. 3(B) shows a multihop MANET. Here, all nodes can communicate with each other.

Suppose node 1 wants to transmit data to node 3 and node 3 is not in its range, then node 1 can choose an intermediate node (node 2 in this case) which is in its transmission range.

### PROPERTIES OF MANETS

Few important properties of MANETs are listed as follows:

**Flexibility:** In MANETs networks are established at a fast speed, as the only requirement for establishment of a network is the requirement of few nodes with a certain transmission range.

**Neighbour Discovery:** Every node in a MANET has the capability of route discovery with the help of a service discovery protocol. By discovering a neighbouring node, it can communicate with other remote nodes if required.

**Peer-to-peer Connectivity:** This is another important feature as nodes can directly communicate with each other or through intermediate nodes, thus removing the need for additional infrastructure like routers.

**Resource Constraints:** Many devices acting as MANET nodes are run on battery. Hence, these devices have power and energy constraints.

### INDEPENDENT COMMUNICATION CAPABILITY

Each MANET node can independently function as router, can transmit and receive data. Also, they can process different applications.

### APPLICATIONS

Various MANET applications include military deployment, rescue operations, disaster and recovery operations, formation of network in meetings, conferences, electronic classrooms etc. In war zones or in remote areas, it is virtually impossible to setup an infrastructure based system. So, MANETs can play a crucial role in establishing a communication network in such places. MANETs also come in use in disaster, search and relief operations. Rescue operations generally take place in an area where natural calamity has taken place or in a region hit by internal strife or war and these areas are devoid of most of the basic infrastructure material. MANETs can also be used in Vehicular Adhoc networks (VANETs) for transmission of road maps, information about weather conditions etc. They can be used in sensor networks and location specific services, time dependent services, call forwarding.

### MANET ROUTING PROTOCOLS

To provide a reliable MANET setup that adheres to certain QoS parameters, it is necessary to ensure that an optimum route is found between source and destination but due to the dynamic nature of MANETs, the routing problem is much more complicated as compared to wired networks. Every node in a MANET should try to store information regarding the stable local topology only. Frequent changes in the local topology and changes in the remote parts of the network need not be updated in the topology information maintained by the node.

## ISSUES IN DESIGNING A ROUTING PROTOCOL FOR MANETS <sup>5</sup>

**Mobility:** The network topology is highly dynamic due to the constant movement of nodes. Disruption and frequent path breaks occur due to the movement of intermediate nodes in the path and end nodes.

**Bandwidth Constraints:** In a wireless network, the radio bandwidth is limited, hence the routing protocols should be designed in such a way that bandwidth is used optimally by keeping the overhead as low as possible.

**High Bit Error Rate:** MANETs are wireless networks so node failures and disconnections sometimes become quite high. Hence, bit error rate is generally more in MANETs as compared to wired networks.

### Hidden and Exposed Terminal Problems:

The hidden terminal problem refers to collision of packets at a receiving node due to the simultaneous transmission of those nodes that are not within the direct transmission range of the sender, but are within the transmission of the receiver.

**Collision and Congestion Problem:** In wireless networks, frequent link breakages and collisions occur. Also, transmissions in MANETs results in collisions of data and control packets. This happens due to the hidden terminal problem.

**Resource Limitation:** The devices or nodes that constitute the ad hoc networks are small sized, light weight devices.

### Route Acquisition and Reconfiguration:

Route acquisition refers to the time required to establish route to a destination node. The acquisition time should be as minimum as possible.

**Minimum Overhead:** Control packets consume bandwidth and needs to be as less as possible.

**Scalability:** Scalability means the ability to perform efficiently in a system with large number of network nodes.

**QoS Parameters:** The underlying routing protocol has to ensure that a certain set of QoS parameters has to be achieved. The type of QoS parameters and to what level they need to be supported is determined by the applications sustained by the MANETs.

**Security:** In MANETs, a very common cause of node failure is attack from an external network.

## CLASSIFICATION OF MANET ROUTING PROTOCOLS

Routing protocols are used to setup and maintain routes that essentially support data transmission between various nodes in the system. MANET routing protocols can be classified into three major categories: proactive or table driven routing protocols, reactive routing protocols and hybrid routing protocols <sup>6</sup>.

### Proactive or Table Driven Routing

**Protocols:** Here, every node maintains the network topology information in the form of routing tables. This type of protocol immediately provides the required routes when needed but at the cost of bandwidth which is used in periodic updates of topology.

### Reactive or on Demand Routing

**Protocols :** Reactive routing protocols do not maintain any network topology information and were designed to reduce the overheads in proactive protocols by maintaining information for active routes only. The necessary route from source to destination is acquired as and when required through a connection establishment process.

**Hybrid Routing Protocols (HRP):** HRP are a combination of proactive as well as reactive routing protocols. It combines the merits of proactive and reactive routing protocols to give the best possible



result. HRP tries to reduce the routing overhead and increase scalability by making the neighbour nodes or nodes in close range with each other to work together.

## CONCLUSION

Wireless networks, adhoc networks and MANETs have been explained. The paper continues with an explanation of the architecture of MANETs. The architecture also explains the links that connect various MANET nodes and how the MANETs may be connected to other external networks. Single hop and multihop MANETs are explained. Applications and uses of both the single hop and multi hop networks can be understood by the explanation given and the figures provided. The paper also provides an insight into the various properties of MANETs, and various areas where MANETs are used. Various issues that are encountered in designing a MANET routing protocol.

## REFERENCES

1. Y.S. Yen, R.S. Chang, H.C. Chao, *IET Communications*, **2**, 7, 972-981, 2009.2. I . Chlamtac, M. Conti, J.N. Liu, *Adhoc Networks*, Elsevier, **1**, 1, 13-64, 2003.
3. C. Siva Ram Murthy and B.S. Manoj , “Adhoc Wireless Networks Architectures and Protocols”, Pearson Education, Third Edition, 2008.
4. M. Conti, J. Crowcroft, A. Passarella, “Multi hop Adhoc Networks from Theory to Reality, NOVA Publishers, 2007.
5. S. Mueller, R.P. Tsang, D. Ghosal, *Performance Tools and Applications to Networked Systems*, Springer, 209-234, 2004.
6. L. Chen and W.B. Heinzelman , *IEEE Networks*, **1**, 6, 30-38, 2007.

## LIFE SKETCHES OF OFFICE BEARERS, SECTIONAL PRESIDENTS AND RECORDERS OF THE INDIAN SCIENCE CONGRESS ASSOCIATION, 2016-2017



**PROF. D. NARAYANA RAO**  
**General President**

Prof. D. Narayana Rao, a scientist of repute is known for his scientific contributions in the field of Atmospheric Sciences. He has worked as Lecturer, Reader and Professor in S.V. University, Tirupati during the period 1975-2002. He has carried out several major research projects sponsored by Science Departments and Agencies of Govt. of India like DST, CSIR, MoES (Formerly DOD), MIT (Formerly DOE), ISRO, and UGC. He was later on appointed by the Government of India as Director, National Atmospheric Research Laboratory (NARL), Department of Space. Prof. Narayana Rao has greatly contributed in making NARL a world-class Centre of excellence for research in frontier areas of Atmospheric Science and Radar Technology. He had the unique privilege of sensitizing and motivating the young students of SRM University, Chennai in designing, developing and fabricating a Nano Satellite being launched by ISRO in October 2011.

He has published more than 100 research papers in highly reputed international journals. 27 students were awarded their Ph.D degrees under his research supervision. In recognition of his scientific contributions, he has received several awards including Sir. C.V. Raman award for outstanding

contribution to Physical Sciences awarded by UGC, K.R. Ramanathan award for outstanding contributions to Atmospheric Sciences, Andhra Pradesh Scientist Award for outstanding contributions to Physical Sciences, Astronautical Society of India (ASI) award for excellence in the field of Space Science and Applications, presented by the Hon'ble Prime Minister of India in the year 1996.

He had the privilege of receiving the S.S. Bhatnagar Memorial Award (ISCA) from the Hon'ble Prime Minister of India in the year 2011. He is a Fellow of National Academy of Sciences, India and a Fellow and Member of the Governing Council of IETE and member of several Scientific and Technical Committees at national and international levels. He was the President of Andhra Pradesh Akademi of Sciences during 2007-2010. He has visited a number of countries including USA, Canada, Peru, U.K., France, Italy, Singapore, Hong Kong., Sri Lanka, China, Taiwan, Australia and Japan on various academic and scientific assignments and for international scientific collaboration. He has made significant contributions through international collaboration in the field of Atmospheric Sciences to monitor regional and global Climate Variability.

Prof. Narayana Rao was the Project Director of SRMSAT, a Nano Satellite designed and developed by the students of SRM University. He took the complete responsibility for the design and development of SRMSAT. The satellite was launched from SHAR Centre, Sriharikota in October 2011. Prof. Narayana Rao had the opportunity of serving the Indian Science Congress Association (ISCA) as Local Secretary for the 98<sup>th</sup> Indian Science Congress held at SRM University, Chennai in January 2011 and the 98<sup>th</sup> Indian Science Congress is

acclaimed as a grand success. With more than 30 years of academic, research and administrative experience blended with progressive views, organizational strengths, Prof. Narayana Rao has demonstrated his academic, professional and administrative capabilities as an institution builder.



**PROF. GANGADHAR**  
General Secretary  
(Membership Affairs)

Prof. Gangadhar, an alumni of University of Mysore started his career as Lecturer, reader & Professor of Zoology at Visvevarapura College of Science, Bangalore. Later he was promoted as the Professor and Head, Dept. of Biotechnology, Dean of Science and Principal at BTL group of institutions affiliated to Bangalore University. He has been given the "Best Teacher Award" in the international conference held at Bangalore. He has 37 years of teaching, research and administrative experience.

He has served as Chairman, Board of examiners in Zoology, Genetics & Biotechnology of Bangalore University. He has also served as the member of Board of studies in Zoology and Genetics of Bangalore and various other universities in Karnataka. He has done research in the field of fish toxicology and published research papers and articles in the journals of national and international repute. He has received funds for research projects from UGC, Bangalore University and other funding agencies.

He is a fellow of Zoological Society of India, Society of Environmental Sciences and member of various other academies. He was elected to the

academic council of Bangalore University twice from the teacher's constituency. He has organized number of National, International & regional conferences/seminars, workshops & refresher courses under the aegis of Bangalore University Zoology Teacher's forum.

He has visited number of countries including USA, UK, France, Italy, Ethiopia, Sri Lanka, and Singapore for academic and scientific assignment and collaborations. As a member of European comparative endocrinologist association, he has attended conferences held at Bonn University Germany, Manchester University UK and Genoa University Italy.

His Excellency, the governor of Karnataka was kind enough to nominate him as the syndicate member for Bangalore University (one of the biggest universities in Asia). He had the opportunity to serve as the chairman and member of various academic administrative scientific and technical committees.

He is serving as the President of Bangalore University teacher's forum, Secretary Society for Advancement of Biological Sciences, Treasurer Indian Biotech Association and member of various academic bodies. Prof. Gangadhar had the opportunity of serving Indian Science Congress Association as a life member, Executive and Council member for six years and Council member for three years.



**PROF. PREMENDU P.MATHUR**  
General Secretary (Scientific Activities)

Prof. Premendu P. Mathur is the Vice-

Chancellor, KIIT University, Bhubaneswar, India.

Previously he served as Dean, School of Life Sciences and Professor of Biochemistry & Molecular Biology and Head, Center of Excellence in Bioinformatics, Pondicherry University, Pondicherry.

He received M.Sc. and Ph.D. degrees from Banaras Hindu University, Varanasi. He has guided several Ph.D., M. Phil. and M.Sc. dissertations. He has over 40 years of teaching and research experience. He has published over 160 scientific papers/ reviews in various high impact journals and books and participated in more than 100 national and international scientific conferences. His publications have h index of 27 (Scopus) and 33 (Google Scholar). He is a Fellow of National Academy of Medical Sciences (India) and Vice-President, Asian Association of Andrology, Shanghai (2016-19).

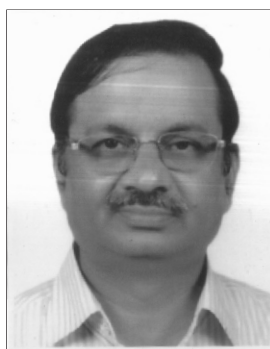
Prof. Mathur has contributed significantly in the field of male reproduction and reproductive toxicity. He developed highly specific radioimmunoassay for clusterin and purified clusterin from ram sera, which gave new direction to clusterin research. He demonstrated that environmental contaminants at very low doses adversely affect male reproduction and proposed a mechanism of action based on generation of ROS and the involvement of mitochondrial- and Fas-FasL - dependent cell death pathways. He demonstrated that Bisphenol A impairs insulin signaling and glucose transport in rat testis thus leading to impaired testicular functions. Using bioinformatics approach he proposed structures of glucose transporters, GLUT-2, GLUT-8 and gap junction protein, connexin 26 for the first time and demonstrated that Bisphenol A interacts with them thereby inhibiting glucose uptake in testis. These studies provided new insights into the mechanism of action of some of the environmental contaminants. Dr. Mathur has also contributed significantly towards the development of Bioinformatics teaching and research in India. He has led to the development of many open access databases. He developed a Center of Excellence in

Bioinformatics at Pondicherry University. He was coordinator of National Biodiversity Strategy and Action Plan for Pondicherry. He is on the Editorial Boards of many national and international journals. He is Reviewer for more than 100 national and international journals. He is recipient of many prestigious awards such as Young Scientists' Award, Asutosh Mookerjee Memorial Award (Indian Science Congress Association), Rockefeller Foundation Special Postdoctoral Fellowship Award, Rockefeller Foundation Biotechnology Career Award, INSA-German Academy (DFG) Exchange Programme, Dr. P.N. Shah Memorial US Vitamin (India) Oration Award, ICMR International Fellowship Award for Senior Indian Biomedical Scientist, Subhash Mukherjee Memorial Infar India Oration Award, Dr. K.K. Iya Memorial Oration (National Dairy Research Institute, India), Vidyasagar Award (Indian Institute of Oriental Heritage, Kolkata) and foundation day lecture, ICAR-Central Rice Research Institute, Cuttack.

Prof. Mathur has been Visiting Professor/ Scientist at The Population Council, Rockefeller University, New York, Cleveland Clinic, USA, Westfälische-Wilhelms Universität, Muenster, Germany and Hamad Medical Centre, Qatar. He has been Chairman/ Member for many national and International Committees. He has been member/ member coordinator of National Assessment and Accreditation Council (India) peer teams to more than 55 institutions and has been Chairman/ Member of many academic/ scientific committees. He was member of Executive Committee of Indian Science Congress Association (ISCA), (2008-09 & 2009-10) and Founder Convener of Pondicherry Chapter of ISCA. He was President, Section of Animal, Veterinary and Fishery Sciences, Indian Science Congress 2013-14. He served on National Task Force on Bioinformatics and Infrastructure Facilities of the Department of Biotechnology (DBT) and Department of Information Technology, Government of India. He is on the National Task Force on Fertility Regulation & Expanding Contraceptive Choices of Indian Council of Medical



Research. He is on the Committee on Reproduction and the Environment of the Society for the Study of Reproduction, U.S.A. and was Vice-Chairman of Scientific Committee of Third Asia-Pacific Forum on Andrology, China. He has made many innovations in teaching and research including launching of Study in India Programme at Pondicherry University and KIIT University.



**PROF. RANJIT KUMAR VERMA**  
Treasurer

Professor Ranjit Kumar Verma has been working as the Pro Vice Chancellor of Patna University (7th oldest university of India) since February 1, 2014 after being appointed for a three year term by the Chancellor through a Search Committee mechanism. He is an internationally acclaimed Thermal Scientist and on account of his outstanding publication activity in thermal analysis, professional activity, awards, etc. his name figures in the prestigious list of 350 world's leading thermal scientists published in the 2nd edition of 'Who is Who in Thermal Analysis' by Springer Science from Europe (<http://www.springer.com/chemistry/analytical+chemistry/book/978-3-319-09485-4>). Presently working as the Secretary of the International Confederation for Thermal Analysis and Calorimetry (ICTAC)- the UN-affiliate (ICSU - IUPAC) professional body of scientists working in this area([www.ictac.org](http://www.ictac.org)), he did also serve as the Chairman, Education Committee (2008-16) and a Member on the panel of Scientific Award

Commission (2008) for ICTAC ([www.ictac.org](http://www.ictac.org)). Besides, he is also the present Vice President of the Indian affiliate of ICTAC, the Indian Thermal Analysis Society([www.itasindia.org](http://www.itasindia.org)). His areas of interest include solid state thermal decomposition, kinetics, calorimetry and nanotisation and his fields include inorganic, materials, nano, complex, food (edible oils) and the methods include TG, DSC, kinetics, specific heat & calorimetry. He is an F.I.C. [Elected Fellow of Institution of Chemists (India)].

Besides publishing in the domain of 'Thermal Analysis', 'Nanotisation' and 'Chemical Education', he has served as Editorial Board Member (2013-16), as Regional Editor, (2010) as well as the Guest Editor for SATAC-2010, SATAC-2011 and SATAC-2014 Special issues of the *Journal of Thermal Analysis and Calorimetry* (Springer Science) ([www.springer.com/10973](http://www.springer.com/10973)). He was the Honorary Editor (Inorganic and Analytical) of the ([www.indianchemicalsociety.in](http://www.indianchemicalsociety.in)) during 2007-2010. He was the paper coordinator (Paper-XI) for the development of interactive e-text books for M.Sc. (Chemistry) students/teachers under the e-PG Pathshala project of the Ministry of Human Resource Development of the Govt. of India under their National Mission on Education through ICT (NME-ICT) project ([http://epgp.inflibnet.ac.in/view\\_f.php?category=666](http://epgp.inflibnet.ac.in/view_f.php?category=666)). Earlier, he participated in the e-Text Book project on 'Inorganic Chemistry' which was published by the Council of Scientific and Industrial Research (CSIR, Delhi) under the nsdl-project (National Science Digital Library-[www.nsdl.niscair.res.in](http://www.nsdl.niscair.res.in)) of Govt. of India. He has also been actively associated with the textual material development projects of NCERT (National Council of Educational Research and Training, Govt. of India, Delhi) for senior secondary students and, is one of the authors of the present Class XI text book.

His earlier workplaces include H.D. Jain College, Ara where he served as Lecturer (1977-1983) and the University Department of Chemistry (now DST-FIST Sponsored and UGC-BSR Supported), Magadh University, Bodh Gaya (1983-

2014) where he had been serving prior to his appointment as the Pro Vice Chancellor of Patna University. Earlier he served as the CCDC of Magadh University(2007-2010). He had become Reader in 1986 and Professor in 1993.

Prof Verma has earlier been in the Executive Committee (2013-2014, 2014-15, 2015-16) and Council of the Indian Science Congress Association.

He was the Founder Convener of the Both Gaya Chapter of the Association. He is Vice President of Indian Council of Chemists ([www.chemicc.com](http://www.chemicc.com)) and, has served on different panels of UGC, AICTE, MHRD and has also been associated with NAAC. He has delivered several dozens of invited lectures at conferences, seminars and symposia in India and abroad (besides lectures in Refresher Courses in Universities in Bihar, UP, MP, Rajasthan, Maharashtra etc.). He has widely travelled in India and abroad (including USA, Italy, France, Finland, Japan, Brazil, Chile, Peru, Hong Kong etc.).

He is a motivational speaker and socially, he is associated with Rotary International (he is a Paul Harris Fellow and two times Club President, 1990-91, 2012-13) and Bharat Vikas Parishad (ex-Zonal Secretary).



**DR. ASHOK K. PATRA**  
**President**  
**Section of Agriculture and Forestry**  
**Sciences**

Dr. Ashok K. Patra did his early education at Araldihi High School and Dubrajpur Uttarayan

Vidyayatan, Bankura, West Bengal. He studied B. Sc. (Agri.) during 1979-1983 from Banaras Hindu University (Varanasi), and M. Sc. and Ph. D. in the discipline of Soil Science & Agricultural Chemistry in 1985 and 1989, respectively, from Indian Agricultural Research Institute, New Delhi. He joined Agricultural Research Service (ICAR) in 1989 and started his career at the Indian Grassland & Fodder Research Institute (IGFRI), Jhansi as a Scientist/Scientist Sr. Scale (1990-1998). Then he moved to CIFE, Mumbai as a Senior Scientist (1998-1999), and to IARI, New Delhi as Senior Scientist (1999-2006) and Principal Scientist (2006-2014).

Under an ICAR-ICRISAT Collaborative programme, he was a postdoctoral scientist (1991-1993) at ICRISAT, Hyderabad, and under an Indo-UK Collaborative programme a Visiting Study Fellow (1996) at the Institute of Grassland and Environmental Research (IGER), Devon, UK. He was a recipient of the prestigious INRA Fellowship (2001-2003) of the French Research Ministry to work on molecular soil ecology in N cycling at the CNRS-Claude Bernard Université Lyon, France and made a significant contribution to unravel the complex processes of nitrogen cycling – its ecology, biodiversity and management in agro-ecosystems. For pursuing the frontier soil science research, DBT (GOI) awarded him the ‘DBT Overseas Associateship’- 2008 for which he visited University of Notre Dame, USA during 2008-2009.

In addition to research, he was actively involved in teaching and guiding of postgraduate students of soil science and allied subjects at IARI, New Delhi (1999-2014). His research interest includes nitrogen cycling, ecology and microbial biodiversity, carbon sequestration and nanoparticles. His research work has been published in different leading professional journals and highly quoted. He contributed more than 220 publications, which includes refereed journals, reviews, books/book chapters, proceedings of seminars/conferences, etc. He is a recipient of several national and international awards/honours, namely British Council TCT



Award 1996; DBT Overseas Associateship Award 2008; FAI Dhuru Morarji Memorial Award, 2011; Bharat Jyoti Award, 2012; Rajiv Gandhi Excellence Award, 2012; ISSS Dr. G.S. Sekhon Memorial Lecture Award of ISSS, 2012; IARI Hooker Award, 2013; Bioved Agri-innovation Award – 2015. He served as an Editor, Range Management and Agroforestry and Journal of the Indian Society of Soil Science. Currently he is Associate Editor, European Journal of Soil Science. He was Councillor, Indian Society of Soil Science, New Delhi (2005-2006); Secretary, Delhi Chapter of Indian Society of Soil Science (ISSS) 2005-2007; Member, Nature's Reader Panel 2009; President (Delhi Chapter), ISSS 2012-2014; Joint Secretary, ISSS 2013-2014 and Vice President, Indian Society of Soil Science (2016-2017). He is a life member of several professional societies and acted as Member/Chairman of several committees.

Dr Patra is a Fellow of the National Academy of Agricultural Sciences, Range Management Society of India and Indian Society of Soil Science.



**PROF. B.B. KALIWAL**  
**President**  
**Section of Animal, Veterinary and**  
**Fishery Sciences**

Dr. B. B. Kaliwal, Vice-Chancellor, Davangere University, Davangere, has a very good academic distinction throughout his career. He completed B.Sc. in 1974, M.Sc in 1976 and Ph.D. in 1981 from Karnataka University, Dharwad. He obtained his

Ph.D. in the field of Reproductive Biology. His other research areas include Reproductive toxicology, Developmental Biology, Physiology, Microbiology and Biotechnology. He has completed 15 short-term courses in Photobiology, Biological Sciences, Orientation Courses, Chronobiology, Zoology, Bioscience, Biotechnology, Microbiology, Bioinformatics etc.

He is a most renowned person and a model for excellence and enthusiasm. He is an honest and modest teacher having served as an Assistant Professor in Karnatak Science College, Dharwad (1979-1988), Senior Assistant Professor, Post-Graduate Department of studies in Zoology (1988-1990), Associate Professor (1990-1999), Professor and Chairman in Post -Graduate Department of studies in Biotechnology and Microbiology for 14 years (1999- 2013), Karnatak University, Dharwad, and presently vice-chancellor, Davangere University, which accounts for 36 years of research and teaching experience and dedication towards research and teaching.

Dr. Kaliwal is an active researcher. He has successfully guided 30 Ph.D. and 34 M.Phil. students. He has published more than 200 research papers in various National and International journals. He has completed 15 research projects funded by UGC, DST, DBT etc. Special Grant-Received Rs. 12 Crores from Department of Biotechnology (DBT), New Delhi. He has attended and presented papers in more than 100 National and International Conferences, delivered key note addresses and Chaired the sessions in various Conferences/ Seminars and Symposia. He is associated with many scientific bodies, in India and abroad. He is fellow of many Academic societies, and received more than 10 Gold medal awards for Life time achievements in the field of Science and Technology. He is Enlisted Person in Marquis 'Who's Who' in the World Directory (1999, 6<sup>th</sup> Edition).

Dr B. B. Kaliwal has contributed significantly to the science and for the first time he has been shown

that there is a co-localisation of Fos containing neurons within SON of the hypothalamus also express nNOS. The compensatory ovarian hypertrophy affecting ovarian follicles studies provide a model to demonstrate in testing the pesticides for antigonadotropic, antiestrogenic or antiandrogenic activity in the rodents. The implantation delay and nidation by progesterone model is used to understand possible mechanisms of anti-implantation activity in rats. Studies on molecular characterization and epidemiology of *Staphylococcus aureus* from clinical samples demonstrates for the first time emergence of VRSA containing van A and van B genes from India and indicates the prevalence of the increased antibiotic resistance. Study of the production of L-Asparaginase, an anti-tumor agent from filamentous Fungi- *Fusarium equiseti* helps in the treatment of cancer. Studies on the treatment of Phytochemicals to diabetes, cancer and antioxidant activities models in mice helps in understanding the mechanisms in controlling the diseases.

In addition to the above accomplishments, Dr. Kaliwal has the honor of being appointed as an Editor of Ten International Journals. Dr. Kaliwal was instrumental in organizing a number of conferences / Symposia. He is very often invited to deliver special lectures Symposia / Seminar / Conferences in various Universities and Academic Staff Colleges of India. He is a referee for evaluating M.Phil. and Ph.D. thesis of different Universities in India and assessing scientific papers, submitted to reputed Scientific Journals at National and International levels, for publication.

He is the recipient of Open Merit Scholarship and a prestigious Post-doctoral Commonwealth Fellowship awardee at University of Bristol, UK, where he worked with Prof. David Murphy, Professor of Experimental Medicine, University of Bristol, UK (2003-2004). He has also visited number of countries such as Japan, Korea, Singapore, Belgium, Netherlands, Switzerland, France, Italy, Denmark, Germany and other European countries. He is involved in many academic and administrative activities and has held many important positions in

Karnatak University. He was a Member and Chairman, Board of studies in Zoology, Applied Genetics, Bioinformatics, Biotechnology and Microbiology of different universities in Karnataka and other States.

He has tremendous experience since he has worked in various cadres such as a Special Officer (1994-95), elected member of the academic council (1995-98), Coordinator for refresher courses, Orientation Programmes, Member of LIC, Development and other committees in the Universities. Apart from his academic distinction, he was president of Research Forum for 4 years, President of Karnatak University Post Graduate Teachers' Association for 6 years and President of Council of University Teachers Association in Karnataka State for 13 years.



**PROF. SUBHO ROY**

**President**

**Section of Anthropological and Behavioural Sciences (including Archaeology, Psychology, Education and Military Sciences)**

Professor Subho Roy received both Bachelor's and Master's degree in Anthropology from the University of Calcutta with first class. Later, he joined the Indian Statistical Institute, Kolkata as a UGC (JRF) to pursue his Doctoral research and was awarded Ph.D. Degree from the University of Calcutta. He was appointed as a Lecturer in the Department of Anthropology, Allahabad University

(2000-2004). Later, he joined the Department of Anthropology (2004), University of Calcutta and is serving in this institute as a Professor till date. Professor Roy has been the Head of the Department of Anthropology, University of Calcutta for one term (Jan., 2010-Dec., 2011). His research is mostly focused in understanding health of a population from its biocultural perspective; precisely how social and cultural factors shape the health status of a population. Presently he is researching in the following areas.

(a) Family planning and decision making, (b) Adolescent reproductive health, (c) Menopausal health and risk factors (d) Menstrual health, (e) Breastfeeding practices (f) Anthropological Demography and (g) Body cognition, food habit, nutrition

Professor Roy has successfully completed three research projects and has published more than 65 articles in national and international journals. He has been invited as a 'Resource Person' for a number of Refresher/Orientation course, outreach and training programmes and workshops; as 'Invited Speaker' in a number of seminars and conferences; as 'Visiting Fellow' to Sambalpur University, Ranchi University, Vidyasagar University and S.V. University, Tirupati. He was the 'Coordinator' for the paper on Physical/Biological Anthropology for the National Programme on e PG Pathshala, A Gateway to All Post Graduate Courses under National Mission on Education through Information and Communication and Technology (NMEICT), a project undertaken by the Ministry of Human Resource Development (MHRD), Government of India. He is presently the 'Managing Editor' of Journal of the Indian Anthropological Society and 'Book Review Editor' of The Indian Journal of Anthropology, 'Associate Editor' of Indian Journal of Physical Anthropology and Human Genetics and member of editorial advisory board for a number of journals. He has also

served as a 'course advisory committee member' for academic institutions like Indira Gandhi National Open University, Sidho- Kanho-Birsha University, Rajiv Gandhi University, Sikkim Central University and West Bengal Council for Higher Secondary Education. He is also a Member of the 'Durbar Research Ethical Review Board' under Durbar Mahila Samanwaya Committee. Professor Roy is presently a Government nominated member of the Rashtrya Manav Sanghralaya Samiti (2015-2020), Ministry of Culture, Government of India.



**PROF. RAJ NATH YADAVA**  
**President**  
**Section of Chemical Sciences**

Prof. R.N. Yadava did his M.Sc. in organic Chemistry and Ph.D. from Dr. Harisingh Gour University, Sagar, (M.P). Prof. Yadava started his career as a Lecturer in the Department of Chemistry at Dr. Harisingh Gour University, Sagar (M.P). There after he became Reader and Professor in the same University. Presently he is Director, Research and Development, Appellate Officer, Coordinator, Equal Opportunity Cell, Liaison Officer and Member of Academic Council of Dr. Harisingh Gour Central University, Sagar. Prof. Yadava has occupied major administrative positions like Dean, Faculty Affairs, Director, Institute of Distance Education and Chairman, Council of Wardens of Dr. Harisingh Gour Central University, Sagar. He is a General Secretary of Madhya Pradesh Chapter of International Accreditation Organization (IAO),

USA. He was Sectional Recorder in Chemical Sciences Section of Indian Science Congress (2005 & 2006). He is Vice President of Institution of Chemists (India). He is joint Secretary of Asian Allelopathy Society also. He has teaching experience of more than 30 years in UG & PG and 35 years experience of research. His research area is Chemistry of Natural Products, Medicinal Chemistry and Allelopathy. He has successfully supervised 35 PhD students and currently 03 students are registered under him for Ph.D. Degree. He has published more than 172 research papers in highly reputed National and International Journals. He is recipient of Professor K.A. Thaker award for the best published research papers in the Journal of Institution of Chemists (India) 2001, 2004 & 2006. Several times Prof. Yadava work has been awarded in the form of best research papers in National and International Conferences. He is member and fellow of various professional and academic bodies. He has delivered 10 invited lectures in International Conferences and presented/delivered invited lectures in more than 75 National conferences & chaired several National and International Conferences. He is co-author of the book Organic Chemistry Part-III published by M.P. Granth Academy, Bhopal. He has written 04 chapters in the reference books of Natural Products. He is referee of various National and International Journals. He is member of Editorial Board of various standard Journals. Prof. Yadava is also member in Editorial Advisory Board of ISCA Everyman's Science. Prof. Yadava is founder and Life Member of International Allelopathy Society. He is also life member of Asian Allelopathy Society. He has successfully completed five Major Research Projects of UGC, CSIR & MPCST. He has been member of UGC Visiting Committee for the evaluation and Assessment of X<sup>a</sup> & XI<sup>a</sup> Plan. He has been expert of selection committees in various universities. He has visited various countries like USA (Chicago & New York), Canada (Thunder bay), Japan (Tokyo), Australia

(Sydney) and China (Guangzhou & Fuzhou) and delivered invited lectures & Chaired Scientific Sessions.



**DR. ONKAR SINGH CHAUHAN**  
**President**  
**Section of Earth System Sciences**

Dr. Onkar S. Chauhan was born on 12/01/1956. He acquired M.Sc. and M.Phil Degrees from the J.N. University and D. Phil from the Garhwal University. Dr. Chauhan has served at Engineers Indian Ltd, Geological Survey of India, and that at the CSIR-National Institute of Oceanography as Scientist - Chief Scientist. Dr. Chauhan is known for his high quality, unconventional, multidisciplinary research. He is one of the few researcher in India who has acquired over 3000 lkm of multi sensor data from the entire northern Indian ocean leading or participating in over 25 sea expeditions. He is the first researcher to have used multi-ships technique for synchronous data collection to get a real time regional and local distribution of suspended matter, marine productivity, nutrient, coastal circulation, and probable influence of sea level rise on coast, a daunting task that remains a dream even in the developed nations. He developed the innovative application of remote sensing multispectral data and has obtained high resolution, week-scale maps for sustainable coastal zone management and for demarcation of the vulnerable areas due to global climate change.



World over, the formation of manganese nodules was thought to be in the area of low sedimentation only, and no study has found it at the high sedimentation sites. He discovered the polymetallic micronodules from the high sedimentation sites of the submarine fans in the Bay of Bengal, and that work led to redefining of the Mn-Ni diagenetic processes world over with better prospects to find new ore deposits from the sites that were thought unsuitable.

Dr. Chauhan has deciphered the role and linkage of the Himalayan climate with that of the monsoon (the life line of agrarian economy of the India) and with that of the North Atlantic climate. His multiproxy studies of marine core, lake sediments, rivers had brought out sub-century scale changes in monsoon precipitation and Himalayan glaciations due to variability in solar influx and North Atlantic climate, and that remains an outstanding contribution on global changes.

He has published 60 Research papers in reputed journal such as EPSL, JGR, G<sup>3</sup> Marine Geology, Sedimentary Geology, Jour. Coastal Res. etc. that have been cited over 451 times (IF 51.97). He remains a frequent peer reviewer of several international journal such as JGR, Basin Res., Boreas, EPSL, Marine Geology of Elsevier etc.

Dr. Chauhan has completed 21 S&T and R&D projects worth 22.3 Crore. He has guided 15 students of Goa University, IIT, Khargpur, Delhi University, Pune University etc for their Ph.D., M.Tech, M.Sc. He had been resource person for summer schools at IIT Kanpur and Mizoram University. He is a recognized Ph.D. Guide of Goa and Mangalore Universities, and that of the Academy of scientific and innovative research. He has been associated with several International and national committees of earth system science. His contribution has earned

him the National Mineral Award 1995.



**MR. SISIR KUMAR BANERJEE**  
**President**  
**Section of Engineering Sciences**

Son of Late Anil Kumar Banerjee -Born 6<sup>th</sup> January 1947 at Kolkata, Bachelor of Science from Calcutta University in 1965. Graduated in Civil Engineering from The Institution of Engineers (India) in 1977. Associate Member of The Institution of Engineers (India) in 1979, Chartered Engineer (India) in 1980, Member, The Institution of Engineers (India) in 1985 and Fellow, The Institution of Engineers (India) since 2004. Life Member- Indian Association of Hydrologists, Roorkee, in 1993 and Life Fellow since 2005, Specialization in Water Resources Investigation and Development. Life Member, Indian Science Congress Association since 1994, Eminent Social Scientist – BOG - Rural Development Forum of the IEI - 1995-2007 and Member till date. Committee Member of West Bengal State Centre, The Institution of Engineers (India) since 2002, Council Member, The Institution of Engineers (India) since 2004-2005 to till date, Past Chairman - Civil Engineering Division Board (CVDB) 2009- 2010 & 2010 - 2011 Past Vice President 2012-2013, The Institution of Engineers (India), Member, Finance Committee



2011-2012, 2015-2016, 2016-2017, Chairman Service Rules and Headquarter Management Committee IEI 2013-2014, Chairman CRC IEI – 2013-2014, Secretary General, and Vice President - Eastern Regional Federation of State Engineering Services Associations (ERFSESA), Secretary General, Federation of Associations of Engineers and Technical Officers' (FAETO), West Bengal - 2000 to 2007 Joint Organising Secretary, Silver Jubilee Programme of FAETO, WB, Chairman, Indian Engineers' Federation (An apex body of State & Central Engineering Services Associations of India) – 2002 -2005, Former Treasurer, Indian Science Congress Association, Kolkata Chapter.

Former Secretary, American Society of Civil Engineers - India Section, Presently – Chairman, The Institution of Engineers (India), West Bengal State Centre – 2014-2016, Member Board of Governors - Sustainable Development Forum IEI. Member, BOG Rural Development Forum IEI, Assistant Secretary – Federation Hall Society, Member - Committee for Advancement of Technology & Engineering, Civil Engineering Division Board, Finance Committee, Reinstatement of Corporate Members, Engineering Information Services Committee, Central Coordination Committee, Executive Committee, Indian Association of Hydrologists, West Bengal Regional Centre.

Served as Member - Committee for Advancement of Technology & Engineering, Reinstatement of Corporate Members, Engineering Information Services, Equivalence Committee, Education, Examinations and Accreditation Committee, Membership Committee (Special Invitee), Reinstatement of Corporate Members, Committee on Poverty Alleviation of Federation of Engineering Institutions of South and Central Asia (FEISCA). Indian Member Committee of Federation Internationale Du Beton (IMC- fib). Convener, International Committee of Indian Engineering Congress, Logistic Committee – Indian Engineering Congress, Logistic Committee – World Congress on Sustainable Development.

Member of Sub Committee and special assignment for Organizing Seminar / Congress / Convocation of IEI organized by West Bengal State Centre. Attended various National / International Seminars and presented papers in Indian Engineering Congress, IEI.

Besides above Organized International Conference on Water Related Disaster in Dec 2002 and Crisis Management in Water Environment in July 2005 as Organizing Secretary under Indian Association of Hydrologists, West Bengal Regional Centre and All India Seminars and also organized Seminar under the aegis of Indian Science Congress Association, Kolkata Chapter.

Involved in interaction with the Sixth – Central Pay Commission, Govt of India as Chairman, Pay Committee of Indian Engineers' Federation in resolving anomalies of pay structures of Engineers and Technologists of Govt Organizations and Undertakings. Engineers and Technologists throughout the country were immensely benefited and also involved in interaction with the Seventh Central Pay Commission, Government of India.



**PROF. SWATI GUPTA  
BHATTACHARYA**

**President**

**Section of Environmental Sciences**

Dr. Swati Gupta Bhattacharya, recipient of P.H.Gregory Award, is currently Senior Professor and Head, Division of Plant Biology, Bose Institute, Kolkata, West Bengal. She was born on 29<sup>th</sup> July

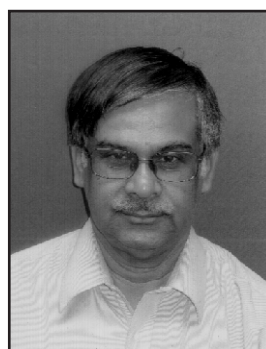
1956 at Jalpaiguri - a small township in North Bengal where she completed her schooling from Jaipalguri Govt. Girls' School. She got her graduation with Botany honours from Darjeeling Govt. College and M.Sc. degree in Botany from Kalyani University. She did her Ph.D. from Bose Institute (Calcutta University). Dr. Gupta Bhattacharya was Postdoctoral Research Fellow of CSIR in the Department of Botany for two years and then joined as a lecturer in Botany at Bose Institute in 1991. She also worked in the Rothamsted Experimental Station at Harpenden, Herts, UK in a collaborative research programme for a couple of years.

Prof. Gupta-Bhattacharya is particularly interested on proteomic identification and immunological characterization of disease eliciting allergen molecules derived from airborne pollen grains and fungal spores. Her research started with identification of airborne allergenic pollen and molds triggering respiratory allergy especially in eastern India by correlation studies among aerobiological data, clinical data, and meteorological factors. She prepared annual calendars of allergenic pollen/spores of a number of urban and sub-urban areas, which are of practical use for allergy diagnosis and forecast. She has prepared recombinant allergens and mapped IgE binding epitopes from four predominant allergen sources which have been approved by International Union of Immunological Societies (IUIS) as clinical diagnostic antigens for skin tests. Her work on understanding the immunological role of glycoprotein allergens in pollinosis by Asteraceae pollen have been awarded by European Academy of Allergy and Clinical Immunology (EAACI). Her lab, for the first time, determined the NMR-based solution structure of a cyclophilin allergen from periwinkle pollen. Other important works include bioinformatics study to understand the molecular basis of (i) immunoreactivity of birch pollen allergen and (ii) cross-IgE reactivity of homologous pan-allergens. Currently, she is working on immuno-screening of pro-allergic epitopes of these allergens and eventually to convert them into non-allergenic immunogens with vaccination potential by

mutagenesis. These immunogens are important immunotherapeutic candidates for allergen-specific desensitization therapy. Purified allergens of the most important environmental allergen sources are important to study the patho-mechanisms of allergy and to develop novel diagnostic tests and strategies for therapy and prevention of allergy.

She has developed the database of asthma biomarkers first in India, 'DAAB: Database of Allergy and Asthma Biomarkers' which stores molecular information of genes and proteins that are significantly modulated in asthma pathogenesis.

Prof. Gupta-Bhattacharya has published about 50 research papers in highly reputed International Journals. She has authored two books and edited one book. She has lectured in various universities and delivered invited talks at national and international seminars. Till now nine students received Ph. D. Degree under her guidance from Calcutta University and Jadavpur University. She is Fellow of Indian Aerobiological Society; Indian College of Allergy, Asthma and Applied Immunological; and West Bengal Academy of Science and Technology.



**MR. DEVAPRASANNA SINHA**  
**President**  
**Section of Information and**  
**Communication Science & Technology**  
**(including Computer Sciences)**

Mr Devaprasanna Sinha, born on 12 November 1950, has more than four decades of experience in a

number of areas of Computer Science & Engineering, Information Technology and allied areas. He had his M.Sc. in Physics from Jadavpur University in 1972 and a Post Graduate Diploma in Computer Science (Software) from the same University in 1974. After a brief stint at Jadavpur University as a Research Fellow, he worked in different capacities at the then RCC, Kolkata and Price Waterhouse – both in India and abroad and also a President and Director, Cad Cam Consultants Pvt Ltd before settling down to Peerless – IT & CS Division and retired from there in 2009.

Mr Sinha is a Fellow of Computer Society of India (CSI) and also Past Chairman, CSI Kolkata Chapter. At present, he is the Regional Vice-President II, Eastern Region, Computer Society of India and the Sectional President of Section of Information and Communication Science & Technology (including Computer Sciences) of Indian Science Congress Association for the year 2016-17. He was the Chairman, Programme Committee, CSI Annual Convention in 2006 and served in different capacities in all CSI Annual Conventions held in Kolkata since 1978. He has been actively engaged in many regional programmes in this part of the country since 1980 and chaired technical sessions in the Regional Conventions of CSI held in Patna in 1992 and Cuttack in 1993.

Currently, serving as a Guest Faculty, Department of Computer Science and Engineering, University of Calcutta and as a Visiting Faculty, Institute of Educational Research & Studies, Kolkata since 2009.

Over these years, he has been involved in design, development, implementation and supervision of a large number of scientific and

commercial systems on various platforms. He worked in Liberia for more than a year and attended programmes in Singapore. He is member of various professional societies and associations like Indian Science Congress Association, Indian Science News Association, Association for Improvement of Mathematics Teaching, Science Association of Bengal. He has authored more than four hundred articles/papers in approximation theory, computer science, computer education, science and other related areas in various journals in English and Bengali. He is the General Editor of Indian Journal of Mathematics Teaching.

Besides delivering lectures at different universities, institutions including schools and colleges and also various conferences, seminars at different levels organized by different societies, he has actively participated in different capacities in a large number of conferences from time to time. He has been associated with teaching, examining, training, supervision of projects etc. in a number of courses on different aspects of Computer Science & Engineering, Information Technology etc. of a number of universities, colleges, school and professional societies including those at government levels like DOEACC (now NIELIT); also associated with computer courses of Ramakrishna Mission Swami Vivekananda's Ancestral House & Cultural Centre. He was Consultant to "Multimedia Rabindranath", the project funded by Department of Electronics, Government of India at Visva-Bharati. He was the Research Associate, Project on the History of Science in India, Ramakrishna Mission Institute of Culture and NASI, Allahabad for more than a year (2013-14).



**DR. DURGESH NATH TRIPATHI**  
**President**  
**Section of Materials Science**

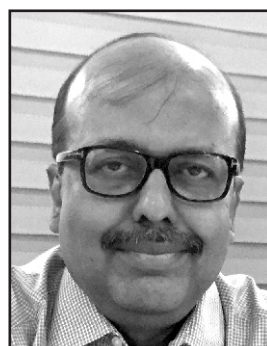
Dr. D.N. Tripathi Scientisi "G", DMSRDE(DRDO), Kanpur joined Defence Research and Development Establishment (DRDE), Gwalior in 1981 and worked there upto July 1997. Then on transfer to he joined Defence Materials and Stores Research and Development Establishment (DMSRDE), Kanpur. Dr. Tripathi did M.Sc. in Chemistry (Physical) and Ph.D. in chemistry on "Studies of some chemical toxicants under lab conditions particularly with Mass Spectrometry" from Jiwaji University Gwalior.

He has life membership of various societies viz. Indian Society of Mass Spectrometry, NMR Society of India, Electron Microscopy Society of India and Society of Polymer Science, ISCA.

Dr. Tripathi, Head, Directorate of Rubber, Polymer & PMC's has been working on design, development, life prediction and production of polymeric i.e. rubber, thermoplastics and carbo-graphite materials, seals for aeronautical applications and composite armour panels.

He has more than 45 publications in National and Inter-national journals. 03 patents have been granted and 06 are in process to his credit. Some of the important awards and recognitions that Dr. Tripathi received include: DRDO award for Path

breaking research and outstanding technology development-2014, Technology group award-2008 on Development of high temperature carbo-graphite materials for use in Kaveri engine, Technology Group Award-2012 on "Dynamic seals for nozzle hydraulic actuator assembly of Kaveriengine", CIPET award for innovation in polymers- 2015. He visited abroad on various assignments.



**PROF. TARUN KUMAR DAS**  
**President**  
**Section of Mathematical**  
**Sciences (including Statistics)**

Professor Tarun Das is presently Registrar, University of Delhi, Delhi. Prior to this position, he served as Joint Director, Cluster Innovation Centre, University of Delhi, Delhi. He joined the Department of Mathematics, University of Delhi as Professor in February 2014. His research interest include Compactifications and Absolutes, Topological and Differentiable Dynamical Systems. He has published many research papers in journals of international repute. He was awarded Research Professorship in 2011 and Research Fellowship during 2007 for collaborative research work at the Chungnam National University, Daejeon, South Korea. He visited for post doctoral work, Department of Mathematics, University of Athens, Athens, Greece during 2002. He was awarded Research Associate



ship at the Institute of Mathematical Sciences, Chennai. He was selected for Research Award of the National Board for Higher Mathematics, and Research Scholarship at School of Mathematics, Tata Institute of Fundamental Research, Mumbai. He obtained his PhD degree in Mathematics from University of Allahabad in 1992.

Prior to joining University of Delhi, he was Professor in the Department of Mathematics, Faculty of Science, The Maharaja Sayajirao University of Baroda. He had served the Baroda University for more than 20 years in various capacities including Head of the Department of Mathematics and Vice Dean, Faculty of Science. He also served as Director, Internal Quality Assurance Cell and Coordinators of various Centres at the M.S. University of Baroda.

He has organized many Conferences / Workshops which include ICTS Program on "Recent Trends in Ergodic Theory and Dynamical Systems", in December 2012., ICM2010 Satellite conference on "Various Aspects of Dynamical Systems", in August / September, 2010, NBHM sponsored "Mathematics Training and Talent Search Programme", May/June, 2011 and NBHM sponsored "Mathematics Training and Talent Search Programme", May / June 2011 at the Department of Mathematics, Faculty of Science, The Maharaja Sayajirao University of Baroda). He has been part of Editorial Board of various journals including for "Recent trends in Ergodic Theory and Dynamical Systems", Volume 631, Contemporary Mathematics, American Mathematical Society 2015. He has delivered invited lectures in many conferences / workshops in various universities in India and abroad. He is also presently serving as Honorary Treasurer of the Indian Society for History of Mathematics.



**PROF. SOMNATH ROY**  
**President**  
**Section of Medical Sciences**  
**(including Physiology)**

Prof. Somenath Roy is a senior professor of Physiology in the department of Human Physiology with Community Health at Vidyasagar University, Paschim Midnapore, West Bengal. He did his M.Sc. in Physiology from University of Calcutta in 1977 and obtained his Ph.D. Degree in 1989 on the thesis entitled "Studies concerning Kinins in Malaria" from University of Calcutta. He joined Vidyasagar University in 1990 as Assistant Professor. Prof Roy founded the Post Graduate department of Human Physiology at Vidyasagar University. His three decades long dedicated teaching of Physiology and Immunology to the post graduate students idealizes him as a role model of a professor.

Alongside teaching, research has been the primary focus of Prof. Roy's scientific career at Vidyasagar University. He was mostly interested in working at the interface of chemistry and biology using nanotechnology as a tool to fight fatal disease like cancer. He and his co-workers have also worked extensively on malaria. Very recently, Roy *et al*, have identified a unique novel mutations in *pfkelch* gene correlating with artemesinin resistance, raising the al Conference of South Asian alarm for the requirement



to revise the malaria control programme in India. Major scientific contribution of Prof Roy lies in the field of drug resistant microorganisms like super bugs and *Plasmodium falciparum* malaria. Prof. Roy's work has a great impact on the country's Malaria control program which is prevalent in the Indian subcontinent. Prof. Roy has supervised 19 doctoral students and has published several research papers in both International (106) and National (19) peer reviewed journal. His publications received total citation of 1479 and H index of 21 and i-10 index 41. Prof. Roy has also authored several book/book chapters the most recent one being a text book on '*Basic Concepts in Immunology*'. He also filed a couple of patents based on drug delivery of resistant bacteria and drug resistant Malaria. Prof. Roy is the editorial member of the journal 'BLDE University journal of health science' published by Wolters-Kluwer and BLDE University.

Prof. Roy has been elected as fellow of West Bengal Academy of Science and Technology in 2013 for his notable contributions in the field of drug development. He has delivered several invited lectures in international conferences like the 4<sup>th</sup> Biennial Region Association of Physiologists (SAAP), Dhaka, Bangladesh, 2014, the 13<sup>th</sup> Annual Meeting of Society for Research on Nicotine and Tobacco at Austin, Texas, USA, 2007 and at the VU-IIMS International Conference at Bangkok, Thailand, 2012. Prof Roy acted as a resource person on various orientation/refresher programs of Academic Staff College, University of Calcutta, Tripura University and North Bengal University. He has served as the Organizing Secretary of the VIII Annual Conference of Physiological Society of India, National Symposium on Community health. He was a sectional recorder of Indian Science Congress Association (2006-2008) and acted as a

joint secretary of UGC Sponsored National Seminar on 'Current Trends of Researches in Health and Diseases (30-31st March 2009)'. Prof. Roy received DBT national associateship, from Ministry of Science and Technology, Govt. of India in 1993 and worked with Prof Jyotirmoy Das, Director of IICB in a project entitled "Site directed mutagenesis of the dam gene of *Vibrio cholerae*". Prof. Roy received several awards during his scientific career a few of which include "Dr. P.K. Debnath Memorial Award", 2015 from the Society of Ethnopharmacology." "Prof. B.B. Sircar Memorial Oration Award" in 1996 and "Smt. Sakuntala Dasgupta Memorial Oration Award", 2009 from Physiological Society of India.



## **PROF. DHRUBAJYOTI CHATTOPADHYAY**

**President**

**Section of New Biology (including Biochemistry, Biophysics & Molecular Biology and Biotechnology)**

Prof. (Dr.) Dhrubajyoti Chattopadhyay is currently the Hon'ble Vice Chancellor of Amity University, Kolkata from 2015 onwards. He graduated as a Bachelor in Science from the Presidency College, Kolkata in 1973 with a major in Chemistry. Prof. Chattopadhyay did his Masters in Science in Bio-Chemistry in 1975 and completed his PhD in 1984 from Department of Bio-Chemistry at

Bose Institute, Calcutta.

Prof. Chattopadhyay started his career as a Lecturer in the Department of Chemistry at Jogamaya Devi College Calcutta, from 1981 till 1983 after which he joined as a Lecturer in the Department of Bio-Chemistry, University of Calcutta in 1983. In 1997 he became the Guha Professor at Dr. B.C. Guha Centre for Genetic Engineering Biotechnology under the department of Bio-chemistry, University of Calcutta.

Prof. Chattopadhyay was the Dean, Faculty of Science at the University from 2003 to 2007. He was the Pro-Vice Chancellor of the University on 2008 till 2015. He was also the Director at the Centre for Research in Nano Science and Nano Technology at the University from 2007 till 2015.

Prof. Chattopadhyay has a research experience of more than 33 years. During his reserach career he had visited numerous places in India and abroad. Dr. Chattopadhyay had been to Roche institute of Molecular Biology in New Jersey, USA as a visiting Post-doctoral Fellow, As visiting Project Scientist to the Cleveland Clinic Foundation, Cleveland Ohio, USA, to Stowers Research Institute, Kansas City, USA, to the University of Texas, USA, to Nihon University and Hosei University both located in Japan.

He is also the recipient of numerous awards, accolades and distinctions which includes The Young Scientist award in 1989, Member of Guha Research Conference in 1992, Professor Umakant Sinha Memorial Award in 1992, Fellow of the National Academy of Science in 1998, He received the prestigious UNESCO-IUMS-MIRCENS-SGM fellowship to carry out research under the department of Bio-chemistry at the University of Texas. He was the Fellow of the Indian Academy of Sciences in 2004, Fellow of West Bengal Academy of Science and Technology in 2006 to name a few. Dr.

Chattopadhyay has life time memberships in various Organistions and Scientific Associations like Indian Science Congress Association, Member of the Asiatic Society, Member of Biotechnology Society, Member of Virological Society and so on.

Above all these, Prof. Chattopadhyay has a teaching experience of more than 35 years during which a lot many students have completed their PhD's successfully under his able guidance. 20 students obtained their PhD under his direct supervision and 10 more students partly worked in international journals with him during their PhD programme. He has around 102 research papers and 6 book publications to his credit till date.

Prof. (Dr.) Dhrubajyoti Chattopadhyay is a scientist and academic par excellence. He has an established track record of highly innovative ideas and in-depth research activities. He is an excellent communicator

with an impressive logical approach of delivery and communicating ability. His gifted communication skills make him an excellent class room teacher. His amiable personality and willingness to share group responsibilities allow him to be a precious member of any administration team.



**PROF. SUGRIVA NATH TIWARI**  
**President**  
**Section of Physical Sciences**

Dr. Sugriva Nath Tiwari is Professor and Head,

Department of Physics, D.D.U. Gorakhpur University, Gorakhpur (U.P.). He was born in 1959 in a village-Nonapar of Deoria District, situated in the eastern part of Uttar Pradesh. He obtained his B. Sc., M.Sc. (Physics) and Ph.D. (Physics) degrees in 1978, 1980 and 1987 respectively from the University of Gorakhpur, Gorakhpur. He pursued Ph.D. on the topic "Studies of Molecular Interactions in Some Biological Systems and Liquid Crystals" under the supervision of Professor Nitish Kumar Sanyal. He has been awarded National Merit Scholarship (Govt. of India), UGC (JRF and SRF), CSIR (SRF) and CSIR (Research Associate-Grade 'C') fellowships. He has been conferred ISCA Young Scientist Award in Physics in 1988. He joined the Department of Physics, University of Gorakhpur in July 1988 as a Lecturer and in 1998 as Reader. He became Professor in 2006 and was elevated to the chair of Head of the Department in December 2015. His research interest includes Materials Science (Liquid Crystals and Superionic Solids) and Biophysics (Molecular Biophysics, Radiation Biophysics and Biosensors). He has completed two research projects and published more than 75 research papers in peer reviewed journals; and presented nearly 200 papers in national/ international symposia/ conferences. He is a co-author of a reference book entitled 'Graft Compatibility and Plant Growth Through Electric Control: Developing an Electronic Biosensor for Graft Compatibility Detection' (ISBN No. :978-659-11107-5) published by LAP GmbH and Co.KG, Germany. He has been Guest Editor of 'Progress in Crystal Growth and Characterization of Materials'- An International Review Journal published by Elsevier (USA). Under his supervision eight students have been awarded Ph.D. degree and currently three students are pursuing their research work besides one Research Associate awarded by CSIR, New Delhi. Recently he has initiated collaborative research work with scientists of Aryabhata Research Institute of Observational Sciences (ARIES), Nainital (U.K.). Dr. Tiwari is reviewer of Journal of Molecular Liquids (USA), Spectrochimica Acta Part- A: Molecular and Biomolecular Spectroscopy, Z. Naturforschung (Section- A), Germany, etc.

Having more than 28 years of undergraduate and postgraduate teaching and 35 years of research experience, Dr. Tiwari has contributed to almost all the activities of the University such as President of Athletic Association, Course Coordinator, Warden etc. Presently, he is working as a Coordinator of Pre-Ph.D. course work (Computer Application) and Coordinator, Department of Computer Science and University Computer Centre. Dr. Tiwari has actively organized Refresher Courses, Seminars, Workshops and Symposia/Conferences. Recently, he has organized a three week Refresher course on "Environmental Studies" during November 18 to December 9, 2015 and a three day National Conference on "Functional Materials" during March, 10-12, 2016. Dr. Tiwari is actively engaged in different academic bodies like Board of Studies, Research Degree Committee, Academic Council etc. of various universities. He has delivered many invited talks and chaired sessions in various scientific programs. He has visited The Hebrew University of Jerusalem, Israel.

Dr. Sugriva Nath Tiwari is a life member of ISCA, Kolkata; LASSI, Varanasi; ILCS, Bangalore; NASI, Allahabad; IBS, Kolkata; IAPS, Allahabad and ISCAS, Jammu.



**PROF. VIJAI PAL SINGH**  
**President**  
**Section of Plant Sciences**

Prof. Vijai Pal Singh born on 25<sup>th</sup> Nov., 1954

obtained his master's degree and Doctorate degree respectively in 1973 and 1978 from Agra University, Agra (U.P.). He joined Department of Plant Science, Mahatma Jyotiba Phule Rohilkhand University, Bareilly as Reader on 22<sup>nd</sup> Feb., 1985 and became Professor on 16<sup>th</sup> August, 1995. He has taught Environmental Biology and Genetics to the P.G. students and 27 students have been awarded Ph.D. degree under his guidance. Thus he has about forty years of teaching and research experience.

Prof. Singh has published 88 research papers in National/International Journals including high Impact Factors Journals. Initially he worked on Improvement of Pulse Crops through induced mutagenesis and published findings in some of the important journals like *Genetica Agraria*, *Current Science*, *Indian J. of Agriculture Sciences*, *Mutation Breeding News Letter*, etc. up to 1994. Then he focused on remediation aspects of pollution through phytoremediation and chelate assisted phytoremediation and published findings in Journals like *Environ. Science*, *Pollution Research*, *J. of Environ. Biology*, *J. of Bioremediation and Biodegradation* etc. Currently he is working on the degradation of hair dye components by microorganisms and published findings in Journals like *Scientific Reports* (Nature publishing group), *J. of Hazardous Material* (Elsevier), *Microbial Cell Factories*, *Virus Genes & Environ. Sci. Pollution Res.*, etc.

Prof. Singh has visited Germany in 1994 under INSA-DFG Scientist Exchange Programme and has worked at Institute of Plant Genetic Research, Gatersleben and has also visited Kaiserslautern University, Martin Luther University, Halle, Germany. He is Fellow of Indian Botanical Society and Fellow of the Society of Plant Reproductive Biologists. He has completed 6 major research projects sanctioned by UGC, New Delhi and UPST, Lucknow and has written one edited book on *Biosciences: Advances, Impact & Relevance*.

Prof. Singh is recipient of UGC-Basic Science Research Faculty Fellowship Award (BFF Award)

which is awarded to active senior faculty nearing superannuation and it enables continuance of their productive research career and mentorship role in University for a longer period. Beside JRF & SRF, Dr. D.S. Kothari Fellow has worked and SERB Young Scientist Fellow is working under his mentorship.

At present, he is working as Pro-Vice Chancellor in Mahatma Jyotiba Phule Rohilkhand University, Bareilly (U.P.) and is monitoring the research activities of the University. He is also serving Indian Botanical Society as Secretary since 2011. He has been the former HOD and Dean, DSW, Chief Proctor, Chief Coordinator: Entrance Test, Medical & Dental Colleges affiliated to the University, etc.



### **PROF. NEERJA AGRAWAL**

**Recorder**

**Section of Agriculture and Forestry  
Sciences**

Professor Neerja Agrawal graduated in bio stream in the year 1974 and obtained M.Sc. Zoology degree with specialization in Entomology, successfully holding a position in the merit list in the year 1976, from University of Allahabad. She pursued her Ph. D. in Entomology from C.S. Azad University of Agriculture and Technology, Kanpur, under the guidance of Dr. K.D. Upadhyay, Professor and Dean Agriculture and was conferred the Ph. D. degree in 1982.

She was awarded Commonwealth Fund for



Technical Cooperation (CFTC) Fellowship to attend International Course on 'Taxonomy of insects and mites of agricultural importance' at CAB International Institute of Entomology, London (U.K.) in 1986, while working as Senior Research Fellow.

She started her research and teaching career in 1987 as Junior Scientist/ Assistant Prof. with the Department of Entomology at C.S. Azad University of Agri. & Tech., Kanpur. She presented Country Report on "Fruit flies Problem associated with cultivated Crops in India and its Control", in the first International Symposium on Fruit flies in the Tropics held at Kuala Lumpur, Malaysia (1988). Later she presented scientific papers in International Conferences in Malaysia (1990) and Japan (1993). Further, she has presented a number of Research Papers in National and International Conferences.

At present Prof. Agrawal is Head, Deptt. of Entomology, in C.S. Azad University of Agriculture and Technology, Kanpur. She has been involved in teaching Insect Morphology, Systematics and Ecology to UG and PG students, besides guiding students for their thesis work in M.Sc. (Ag) and Ph.D. students. Till now, she has guided 18 M.Sc. (Ag) and 8 Ph.D. students, while she is presently supervising one Post Doctoral Fellow (UGC). Dr.Agrawal has worked as Co-ordinator, "National Integrated Fruit fly Surveillance Project" and national Project on "Survey and monitoring of nut weevil and pulp weevil in U.P."(2006-2008), sponsored by Ministry of Agriculture, Govt. of India. She is Co- PI in two projects i.e. "Niche area of excellence in IPM" and "Establishment of bio

control laboratory", sponsored by Indian Council of Agricultural Research, New Delhi.

Prof. Agrawal has published more than 45 research papers in the Journals of National and International repute, 1book and 10 book chapters. She has edited many souvenirs, monographs and published popular articles in newspaper and magazines, for the benefit of farmers. She is life member of four scientific societies with member editorial board in Indian Journal of Environmental Research. She was one of the esteemed speaker from academic sector in the 100<sup>th</sup> Indian Science Congress organized by Women's Science Congress at Calcutta University, Kolkata, 3-7 January, 2013.



**DR. SHIVESH PRATAP SINGH**  
**Recorder**  
**Section of Animal, Veterinary and**  
**Fishery Sciences**

Dr. Shivesh Pratap Singh is Chairman, Board of Studies, A.P.S. University, Rewa and Professor and Head, P.G. Dept. of Zoology, Govt. Autonomous P.G. College, Satna (M.P). He has born in 21 March 1963. He obtained M.Sc degree in 1982, M.Phil in 1983, Ph.D in 1991 and D.Sc degree in 2003 from A.P.S. University, Rewa. He has started his teaching carrier as Lecturer in Zoology in year 1983. Prof. Singh has



several academic honors and professional distinctions to his credit. Presently he is working as Secretary, BER Chapter, The National Academy of Sciences India; In-charge Central Regional Chapter of Zoological Society of India and General Secretary of Society of Life Sciences.

He has supervised 27 Ph.D and 13 M.Phil students for their research degree and currently 08 Ph.D scholars are working with him from M.G.G.VV, Chitrakoot and A.P.S. University, Rewa. Dr. Singh is Chief Editor of three Multidisciplinary Research Journals *National Journal of Life Sciences*, *Life Science Bulletin* and *Vindhya Research Journal*. Dr. Singh also took active part in various Indian academic societies. He is fellow member of Academy of Environmental Biology, Zoological Society of India, Society for Science and Environment, Society of Bio-sciences, Society of Life Sciences, The Institute of Applied Sciences and Zoological Society of Kolkata.

Dr. Singh has got Appreciation award in 1997 from Society for Science and Environment and awarded by Gold medal in 1998, 2000, 2009 and 2012 from Zoological Society of India. Dr. Singh also awarded gold medal by ICCB & MSET and Indian Academy of Environmental Sciences in 2009 and 2012. Recently he was awarded Devki Dutta Gold medal 2015 by The Academy of Environmental Biology at Mumbai.

He has completed two U.G.C. research projects on primate's behaviour. He has also organised five National symposium and workshop in Dept. of Zoology, Govt. P.G. College Satna (M.P.) sponsored by U.G.C., M.P.C.O.S.T, Higher Education, National Academy of Sciences India and M.P. Biodiversity Board.

Dr. Singh has edited seventeen text books and practical books of Zoology based on M.P. unified

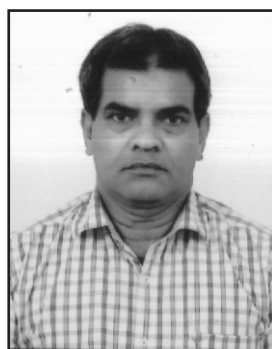
B.Sc annual and semester pattern syllabus, published by Ram Prasad and Sons, Arun Prakash and Hindi Granth Academy Bhopal. He has also edited research books entitled "Eco-development and Environment" and "Sustainable management and conservation of biodiversity" and published more than seven dozen research papers in reputed journals, proceedings and also attended and chaired a number of national and inter-national conferences and symposium.



**DR. MEENAL DHALL**  
**Recorder**  
**Section of Anthropological and Behavioural Sciences (including Archaeology, Psychology, Education and Military Sciences)**

Meenal Dhall is presently Assistant Professor in Department of Anthropology, University of Delhi, Delhi. She did her doctoral degree in 2013 on pattern of physical activity and metabolic syndrome among adults of Delhi. She was University Teacher Assistant during her Phd (2009-2013) in Department of Anthropology, University of Delhi. She did post graduate diploma in public health nutrition from PHFI, Delhi in 2011. She has received various research and academic awards in international and national conferences. She has attended workshop and training in India as well as in abroad. She has visited Germany, Sweden, Austria and France in connection with academic activities. She has been

actively working on public health problems especially obesity and cardio metabolic disease; nutritional status, physical activity and its related health outcome among different populations. She has twenty one international and national publications in this field. She has published four books with International and Indian publishers. Her areas of interest are Physiological Anthropology, Kinanthropometry and Ergonomics, Human growth and development, Public health and Epidemiology, Nutrition, Physical activity. She has completed four research projects and four are in progress. She is the life member of various national and international organizations. She served as committee member and subject expert of various academic and administrative committees of University of Delhi, UGC and various organizations.



**DR. R.K.P. SINGH**  
Recorder  
Section of Chemical Sciences

Dr. R. K. P. Singh (05 March 1958), Professor, Department of Chemistry, University of Allahabad obtained his M.Sc. (1978) and D. Phil. (1981) from University of Allahabad. He was awarded with 2 Gold and 1 Silver medal for standing first in B.Sc. (Bio Group) and had first position in M.Sc. Inorganic Chemistry.

Dr. Singh worked as JRF, SRF, PDF, Pool

Officer and Research Associate in the Department. He joined University of Allahabad as Faculty in 1994 and is actively engaged in teaching and research with more than 30 years of experience.

His research work is mainly focused on developing environmentally benign one pot electrochemical synthetic methodologies for synthesis of important organic compounds. Synthesis of heterocycles of natural and synthetic origin as oxadiazole, bis-oxadiazole, triazole derivatives and Electropolymerization of several important monomers were done and their anticorrosive properties has been investigated.

He has completed five major research projects till now. So far fifteen students have obtained their D.Phil. Degree and seven students are enrolled for the same. Two students have also completed their M. Phil. Degree research work under his supervision. He has published more than hundred research papers in the National and International Journal with high impact factor and written two books. He is also reviewer of a number of high impact International Journals.

He has participated in various National and International conferences/seminars and chaired various technical sessions and delivered many invited talks. He has organized about fourteen national seminars.

Dr. Singh is member of different academic bodies and scientific organizations such as Indian Science Congress Association, Kolkata, Indian Chemical Society, Kolkata, National Academy of Sciences, India and Bioinformatics Institute of India. He is Vice President of Materials Research Society of India, Allahabad Chapter and worked as Convener, Indian Science Congress Association, Allahabad Chapter from 2007 to 2014.

He is recipient of RAMACHAR AWARD from Electrochemical Society of India at Indian

Institute of Sciences, Bangalore for research paper in 1981 and Prof. S. S. Sandhu Award from Indian Chemical Society at NITTTR Bhopal in 2011.



**MS. RIMJHIM B. SINGH**  
**Recorder**  
**Section of Earth System Sciences**

Rimjhim Bhatnagar Singh is a Remote Sensing Applications Scientist and GIS expert, working in the field of Earth Sciences at Space Applications Centre (SAC), Indian Space Research Organization (ISRO), Ahmedabad since 2004. She has made significant contributions in broadband and narrowband remote sensing applications in the fields of forestry, agriculture, desertification and oceanic studies. This involves modeling, monitoring and mapping studies using remote sensing data and GIS environment. Her specific modeling works (all at large spatial scale) include development of models for estimating evapotranspiration in forest ecosystem; site suitability analysis for bio fuel (an alternative energy source) plantation on land undergoing desertification; desertification Vulnerability; identification of desertification hotspots and Brightspots and for wind erosion. She has contributed significantly to Desertification Status Mapping and desertification status change monitoring over a decade for India at 1:500K scale and for select districts at 1:50K scale. She has also worked towards assessment of potential

evapotranspiration for different forest types of India at different phenological stages; generation of tropical forest classification and mangrove tree classification maps, tropical forest health map; post harvesting crop residue management; and shallow water bathymetry map for parts of Arabian Sea coast, all at large spatial scale. She has developed spectral libraries for various agricultural crops, tropical forest species and mangrove tree species. She has played significant role in providing specifications/instrument characterization/ calibration for various airborne, spaceborne and hand-held instruments.

In the year 2014, she has received the prestigious Indian Science Congress Association (ISCA) Young Scientist award in the field of Earth science and ISCA best paper award in 2013. She has played key role in organizing many symposiums, pre-symposium tutorials and workshops. She has more than 30 scientific papers, reports and chapters in books to her credit in the diverse fields of Earth Science.



**MR. SAMIRAN GHOSH**  
**Recorder**  
**Section of Engineering Sciences**

Graduated in Civil Engineering from Institution of Engineers (India) in the year 1995 and completed Post Graduation in Geotechnical Engineering from Bengal Engineering and Science University, Shibpur in the year 2004.

Presently he is the Executive Engineer (Civil) of The Kolkata Municipal Corporation and posted at Planning and Development Department.

Under the direct supervision of his Engineering skills a good number of Urban Renewal and Infrastructural Development projects for the city of Kolkata have been completed and continuing successfully from planning to detailed engineering.

To name a few Ranikuthi Overhead reservoir of 1 MG capacity, Naktala Semi Underground Reservoir of 0.30MG capacity, Rehabilitation of Man Entry Brick sewer of Beadon Street and Canning Street by trenchless Technology under JNNURM projects of KMC for rehabilitation for 100+ years sewers, Shore protection work for Indira Gandhi Water Treatment Plant at Palta, complete renovation of Behala Sarat Sadan and Uttam Mancha auditorium etc. are only a few among the large number successful projects.

He is also experienced in large construction like 30 metre deep Diaphragm wall for kakinada port construction in Andhra Pradesh and Sulphur recovery Unit/ Amine Treatment Unit of Haldia Refinery of Indian Oil Corporation as site Engineer on Behalf of Cementation India Limited (The then Trafalgar House Construction Company limited) and Bridge & Roof Company respectively.

He had the opportunity to visit Austria and Germany at a number of occasions on invitation as an appreciation of engineering skill.

He is a Life Member of The Indian Science Congress Association. He is also associated with The Institution of Engineers (India), The Institution of Public Health Engineers (India), Geotechnical Study Circle (Kolkata Chapter of Indian Geotechnical Society), Life member of association of Administrative Staff College of India (Bella vista/ Hyderabad) etc.



### **MR. SAURAV SNEHVRAT**

#### **Recorder**

#### **Section of Environmental Sciences**

Saurav is a highly accomplished and driven technocrat with more than eleven years of Indian and foreign experience in the field of engineering, financial services, business analysis and pharmaceutical entrepreneurship. He has worked in various Indian and Multinational firms in the Software, Automotive and Pharmaceutical sectors.

He has earned his B. Tech. (with honours), Electrical Engineering from National Institute of Technology, Rourkela (2003). Further he was awarded his MBA, with distinction, from the University of Michigan, USA (2011) with a focus on finance and strategy.

Since 2011, Saurav has founded a pharmaceutical startup based on the herbal preparations based out of the rich flora available in and around Jharkhand. His firm works at researching the efficacy of various herbal formulations and preparing marketable solutions for many common ailments. Also, he is pursuing his doctoral degree in strategic management from Indian Institute of Management, Ranchi.

His fields of interest are Sustainability, corporate social responsibility, technology,

innovation, pharmaceuticals and environmental management. He has also worked as a guest faculty in prestigious institutes like Central University of Jharkhand, Ranchi and Xavier Institute of Social Service, Ranchi. He has published various papers in reputed national journals and International conferences on topics like sustainability and Indian energy policy.



**PROF. INDRA PRASAD TRIPATHI**  
**Recorder**  
**Section of Materials Science**

Prof. Indra Prasad Tripathi, is a Dean, Faculty of Science and Environment, MGCGV, Chitrakoot Satna, MP, founder member of BER Chapter, NASI and honored by many awards viz. Professor R. D. Desai 80th Birthday Commemoration Award-2007, by Indian Chemical Society, Research Board of Advisors, by The American Biographical Institute, BIOVED Fellowship Award-2012 by Bived Research Society, Best Science Research Award-2012, by MP Council of Science & Technology, Bhopal and Bharat Shiksha Ratna Award- 2014. He is Chief Editor, Editor and Editorial Board Members of many Research Journals. He is a good academician and administrator. Prof. Tripathi has made outstanding contribution towards research and re-standardization of traditional formulation of

antidiabetic and antiseptic drugs using new techniques and methods (IJOC-2013, Intrnationle Pharmaceutica Scientia-2012, Life Science Bullet.-2012, IJRAP-2013). Simultaneously Dr. Tripathi has made remarkable contributions towards the synthesis, characterization of metal complexes with their antidiabetic properties, antioxidant activity, superoxide dismutase mimicking activity, free radical scavenging activity, catalytic behavior etc. (Biochem. Molecul Biology International-1996, Trace and Toxic Elements in Nutrition and Health-1994, Indian J. Chemistry-1994, Synth React. Inorg. Met. Org. Chem. -1995, IJAR-2013, RJCS-2013, JCS-Photon- 2014, IJAR-2014, American Journal of Advanced Drug Delivery-2015).

Prof. Tripathi has also worked on synthesis, characterization of carbon nanotubes. He made carbon nanotubes through metal complexes with natural proteins like spinach, egg albumins (Nanotech & Bionic Engg.-2010, IJCR-2011, JICS-2012) using various spectroscopic, diffraction/scattering, electrochemical characterization tools.

Prof. Tripathi has great contribution in the field of environmental monitoring, sanitation, diffuse chemical pollution and green chemistry (IJEP-200,2001,2003,2008,2009,2010,2012,2013, IRJES-2012,3013, IJERMT-2013, RJCS-2013,2014, IRJES.-2014). His innovative contribution on water, air and diffuse chemical pollution of Bundelkhand and Vindhyan Pleatue of the country is appreciable.

Prof. Tripathi has been invited as speaker and Chair the Session in the UAE- 3rd International conference on Chemistry for Sustainable Development: Indian Prospective and Nepal- 3rd International conference on Applied Sciences, Engineering and Technology. He has also organized many seminar, workshops and activities for rural masses, student's, research scholars and scientists.

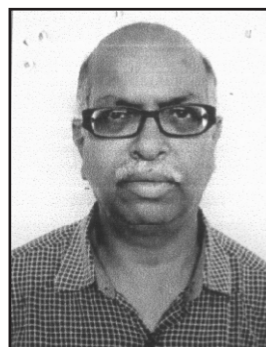




**DR. BADAM SINGH KUSHVAH**  
**Recorder**  
**Section of Mathematical Sciences**  
**(including Statistics)**

Dr. Badam Singh Kushvah is an Associate Professor of Applied Mathematics at the Indian School of Mines (ISM), Dhanbad. He is a Visiting Associate of IUCAA Pune since 2011. He received a B.Sc. from Govt. Science and Commerce College, Benazir in 1998, and an M.Sc. from Govt. Motilal Vigyan Mahavidyalaya in 2000 with Second Position in the Barkatullah University, Bhopal. He qualified NET in December 2002. He earned his PGDCA in 2004 and Ph.D. degree in Mathematics from B.R.A. Bihar University, Muzaffarpur in 2007. He started his career as a Reader of Mathematics at Gwalior Engineering College, Gwalior in 2007. He worked as a Lecturer (Assistant Professor) in National Institute of Technology (NIT), Raipur from July 2008 to May 2009. Subsequently, he joined ISM Dhanbad as a Senior Lecturer (Assistant Professor) of Applied Mathematics in May 18, 2009. His research interest includes Celestial Mechanics, Dynamical Astronomy, Orbital Mechanics and High Performance Computing. His 24 research articles have been published in international peer-reviewed journals including Monthly Notices of the Royal Astronomical Society, Acta Astronautica, Advances in Space Research, Astro physics and Space Science, Astronomy and Computing, Planetary and Space Science, Earth, Moon and Planets etc. He is a reviewer of many peer-reviewed journals. He

received the Best Poster Presentation award of 93<sup>rd</sup> Indian Science Congress for year 2005-2006 and Canara Bank Research Publication award 2015 on 90<sup>th</sup> Foundation Day of ISM Dhanbad. He is a member of various academic bodies such as CMS, ISTAM, ASI, ISIAM, ISCA and SAM. He coordinated the Workshop on Mathematical Methods & Astronomy (WMMA 2013) and the Workshop on High Performance Computing (WHPC 2015). He is an Associate of Committee on Space Research (COSPAR). He completed two research projects successfully, funded by DST under Fast Track Scheme for Young Scientists and ISM Dhanbad respectively. He is a Principal Investigator of RESPOND and GPU Education Centre projects supported by ISRO and NVIDIA respectively.



**DR. AMIT PAL**  
**Recorder**  
**Section of Medical Sciences**  
**(including Physiology)**

Dr Amit Pal did his Bachelors and Masters in Physiology from Calcutta University. He did his Ph.D at the National Institute of Cholera and Enteric Diseases working on enteric pathogens and their role in pathogenesis. After completing his Ph. D in 1992 he joined as a Monbusho fellow at Kyoto University, Japan. He also did postdoctoral studies at Indian Institute of Chemical Biology, Kolkata and National Children's Hospital, Tokyo, Japan. He joined as a Senior Research Officer at the Division of

Pathophysiology, NICED, Kolkata in 1999. He was a visiting researcher at Umea University, Sweden in 2008 and a JICA fellow at Osaka Prefecture University, Japan in 2006. At present he is working as Scientist F at NICED. His major interest of work is on bacterial proteases and their role in pathogenesis and tumor regression. He has purified and characterized several proteases secreted by *V. cholerae* and *Escherichia coli*. This work on microbial proteases resulted in a major collaborative programme with Umea University, Sweden and a STINT grant from Sweden was awarded to work on molecular pathogenesis of *V. cholerae*. Dr Pal has been also working on the role of proteases in tumor regression. The major protease secreted by *V. cholerae* is hemagglutinin protease (HAP). HAP has been shown to play a role in tumor regression. HAP has been shown to activate Protease Activated Receptor 1 and induce apoptosis of breast cancer cells. He has published papers in internationally reputed journals like infection and immunity, PloS ONE and Apoptosis and has written several book chapters related to protease and health.



**DR. CHINMAY KUMAR PANDA**  
**Recorder**  
**Section of New Biology (including**  
**Biochemistry, Biophysics & Molecular**  
**Biology and Biotechnology)**

Dr. Chinmay Kr. Panda (born August 13, 1959, West Bengal, India) has made significant contribution in understanding the molecular

pathogenesis of solid tumors. He received his bachelor's degree in chemistry from the Scottish Church College, Calcutta University in 1978, followed by master's degree in biochemistry from Calcutta University in 1980. He spent the following years completing his doctoral degree in biochemistry at Chittaranjan National Cancer Institute, Kolkata where he worked to understand the molecular mechanisms of interaction of Anthracycline anti-tumor drugs with chromatin. He received his PhD degree in 1988 from Calcutta University. In 1986, he was appointed as Junior Scientific Officer at Chittaranjan National Cancer Institute. Then in 1988, he received prestigious post-doctoral fellowship from Karolinska Institute, Stockholm, Sweden to work under Prof. George Klein on molecular cancer genetics deciphering the cellular mechanisms of activation of oncogene c-myc in different types of B-cell lymphomas. He also availed ICRET fellowship of UICC to learn advanced molecular techniques related to cancer research.

Now, he is working as the Assistant Director at Chittaranjan National Cancer Institute. His research mainly focused on analysis on carcinomas of head and neck, uterine cervix and breast, due to their high prevalence in Indian subcontinent. Based on copy number variations (CNVs), promoter methylation and mutation profiles followed by expression (RNA/Protein) analysis he has identified several candidate tumor suppressor genes (TSGs) and oncogenes associated with the development of these tumors. These genes were seen to be involved in several cellular pathways like Stem cell renewal, Cell cycle regulation, DNA Repair, Receptor Tyrosine Kinase (RTKs) signaling etc. The validation of these pathways in tumorigenesis has been done in *in vitro* and *in vivo* animal model systems.

Dr. Panda also showed chemopreventive potential of novel natural products (amarogentin, eugenol and some tea polyphenols) in restriction of

mouse tongue, liver, skin and lung carcinogenesis. It was evident that the restriction of the carcinogenesis at the pre-malignant stage by the natural compounds might be due to the modulation of several biological pathways like Stem-cell self-renewal, cell cycle, apoptosis etc. At present, he has focused on global genomic analysis of these carcinomas to further shed light on their pathogenesis.



**DR. KISHOR MAHADU  
SONAWANE**

**Recorder**

**Section of Physical Sciences**

Born on June 13, 1969 at Dhule, Maharashtra and completed the secondary education from New City High School, Dhule. Graduation (B.Sc.) from S.S.V.P.S. College Dhule in first class with distinction. Has done PG (M.Sc. Physics) from Fergusson College, Pune, with first class. Pursued Ph.D. from SRTM, Nanded. Visited Tokushima University, Japan and Marien South Korea University, South Korea. He is Ph.D. supervisor at Savitribai Phule Pune University, Pune under which 3 Ph.D. students are registered. He has published 14 papers in national and international conference and journals. Moreover, he has research collaboration with L&PTD, BARC and Department of Physics SPPU and finished BCUD project of SPPU and now

supervising DAE-BRNS 3 years major project in a sensor field. In a service from December 1992 i.e. for about 24 years. Presently working as M.Sc. chairman for theory and practical. Also life member of ISCA, IAPT (Indian Association of Physics Teachers), IPA (Indian Physics Association).



**PROF. Y. VIMALA**

**Recorder**

**Section of Plant Sciences**

Professor Y Vimala, born in August 1960, is the Professor of Botany since 2002 at the CCS University Meerut, and has been the Head of the Department in the University from 2010-2013, and again from 2016. She had a brilliant academic career standing first throughout, receiving merit scholarships and was awarded University Gold Medal by the CCS University, Meerut, for securing first rank in the M.Sc. Botany (1981). She did her M.Phil (1982) and PhD (1985) in Botany from the Institute of Advanced Studies, Meerut University, Meerut under the supervision of Prof D Banerji, and was awarded M.S.Swaminathan and Sahni-Iyengar award at the early stage of her professional career for the best paper published in the Journal of Indian Botanical Society for the biennium 1983-84, and later the Prof YS Murty Medal (1998). In 1985, she visited Biological Research Center, Szeged,

Hungary on a UNESCO fellowship for training in modern techniques of Biology followed by academic visits to Czechoslovakia, Poland and Yugoslavia.

After 10 years stint as Lecturer at Jiwaji University Gwalior, she joined the Department of Botany at CCS University Meerut as Reader in 1998, and was selected as Professor in 2002. In addition to teaching the PG and PhD students, she has mentored 52 students for the award of M.Phil and 25 students for PhD degree, published 53 research papers in peer reviewed journals in the area of Plant Physiology and Tissue Culture, delivered invited lectures in India and abroad (including ICV-3 in China, at Kecskemet and Szeged in Hungary, Czech republic etc.), Executed R & D Projects sponsored by DBT, CSIR, DST, UGC and was twice awarded Centre of Excellence project awards for the Department by the UP Government, serving the Indian Botanical Society as the Chief Editor of its journal (since 2007 continuing), organized National / International level symposia / Seminar / Workshops/cultural activities (to name a few- in 1996- A 7-days National Workshop for Women Scientists on Tissue Culture technology and Environmental Toxicology; in 1997 - a series of popular lectures sponsored by DBT, in 2001- UGC sponsored Refresher Course in Stress Physiology; in 2009— Workshop on Bioresource conservation and utilization; in 2009 a symposium on Challenges and

opportunities in Reproductive Biology and Evolution; in 2010- a symposium, in 2011- a DBT sponsored National Workshop on Isolation, characterization and upscaling of secondary metabolites using tissue culture technology, in 2015- a National Seminar on Challenges in Plant Sciences.

Her major scientific contributions relate to : Physiology of plant senescence identifying a possible biomarker for senescence, upscaling secondary metabolites through optimal manipulation of the set of conditions for metabolite-enriched callus development and subcultures using explants preferably from plants surviving on degraded soils, finding allelopathic relationships between weeds and crops/cropweeds/trees, etc. for promoting sustainable agroforestry. She is an elected Fellow of the - Indian Botanical Society, Society of Reproduction Biology, Linnean Society of London, and Member, National Academy of Science India. She has been actively associated with the CCS University as Dean, Students' Welfare, Hostel Warden, Admission Coordinator for centralized online admissions in 600- 800 affiliated colleges, Coordinator for UGC related plan/non-plan activities of the University, etc. A Life Member of ISCA since 1991, was elected as a Member of the Plant Sciences sectional committee (2012), delivered invited lectures at ISCA sessions in 2004 (Chandigarh) and 2011 (Bhubaneswar).

## KNOW THY INSTITUTIONS



### NATIONAL AGRI - FOOD BIOTECHNOLOGY INSTITUTE, MOHALI

National Agri - Food Biotechnology Institute (NABI) is an autonomous institute of the Department of biotechnology, Ministry of Science and Technology, Government of India, located in the Knowledge City at Mohali, Punjab. The institute aims at catalysing the transformation of agri - food sector in India.

NABI is co-located alongwith Bioprocessing Unit (BPU) , an independent institute, being set up under the DBT and an Agri-Food Biotech Park(ABP) being set up under public-private partnership. The NABI, BPU and ABP would therefore comprise an Agri-Food Biotech cluster that would act as a “biotechnology hub” in the region. The agri food cluster has been developed to link three essential related biotechnologies of crops, food and nutrition, and carry out bench to market activity through its state and regional resource networks.

A translation unit would be set up in NABI to establish linkages in the region among relevant R&D units, Management Institute and Small & Medium industries. The unit will support, strengthen, and promote innovation through several initiatives. It

will support R&D research resource units in the State and region. It will administer innovation grants in agri and food sector to create innovation ecosystem in punjab and neighboring states. It will scout early stage leads and technologies in existing institutes at Punjab and rest of the country and offer partnership for product development & commercialization. It will integrate S&T development through bottom up science & horizontal technology acquisition & development. It will establish "resource center" within existing institutes of Punjab State to enable the generation of a competitive intramural process and expand the talent pool for innovation and product development. It will facilitate traversing the complete path from discovery to market.

#### VISION

To be a nodal organization for knowledge generation and translational science leading to value added products based on agri- food biotech innovations.

#### MISSION

- 1 To transform agri-food sector into globally



rewarding and sustainable biotechnology-based enterprise through innovative solutions in primary and secondary agriculture including high-end food processing.

- i) To develop synergy among knowledge providers and investors in agri-food sector to carry innovations to marketplace.

## RESEARCH DEPARTMENTS

### Agri-Biotechnology

- i) Comparative genomics for gene discovery and function
- ii) Molecular breeding
- iii) Genetic resource prospecting
- iv) Value added designer crops
- v) Transgenic crops
- vi) Association genetics
- vii) Phenomics
- vii) Metabolomics
- viii) Bioinformatics

### Food Science & Technology

- i) Food processing & technology
- ii) Bioprocess engineering & energy optimisation

- iii) Post harvest food stability
- iv) Biochemistry & metabolic profiling
- v) Flavours & dyes
- vi) Food safety

### Nutrition Science & Technology

- i) Novel foods
- ii) Nutrition for wellness
- iii) Nutraceuticals
- iv) Nutrigenomics and nutritional biology
- v) Foods and nutrients for public health including biofortification, biosynthesis and molecular breeding
- vi) Public health nutrition technologies
- vii) Bioactives of nutritional value from plants & microbes

### CONTACT

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## CONFERENCES / MEETINGS / SYMPOSIA / SEMINARS

### **Veterinary Pathology Congress-2016, 09-11 November, 2016, Durg, Chhattisgarh**

**Theme:** Innovative Approaches for Diagnosis and Control of Emerging and Reemerging Diseases of Livestock, Poultry and Fish

**Topics:**

- |   |   |
|---|---|
| Innovative approaches on Disease Diagnosis      | Molecular Pathology and Oncology        |
| Farm Animal Pathology                           | Fish Aquatic Animal Pathology           |
| Poultry Pathology                               | Wildlife Pathology                      |
| Pet and Companion Animal Pathology              | Young Scientist Oral Presentation Award |
| Laboratory Animal Pathology and Toxicopathology | ICVP Special Technical Session          |

**Contact:**

Dr. R. C. Ghosh, Organizing Secretary & Professor and Head Department of Veterinary Pathology, College of Veterinary Science & Animal Husbandry, Chhattisgarh Kamdhenu Viswavidyalaya, Anjora, P.B. 6., Durg-491001, Chhattisgarh, E-mail: iavpdurg@gmail.com, Mobile no.: 09827151618.

### **3<sup>rd</sup> International Conference on Soft Computing and Computational Mathematics I 2016, 15-16 December 2016, Kuala Lumpur, Malaysia**

**Topics:**

The Interest Area of the Conference Include Soft Computing and Computational Mathematics.

**Contact:**

Kamal, ICSCCM Information Office, Science and Knowledge Research Society, FB:www.facebook.com/sandkrs E-mail: info@icsccm.com, website: www.icsccm.com

## **XXV Annual Conference of Society of Animal Physiologists of India(SAPI) and National Symposium, 21<sup>st</sup> to 23<sup>rd</sup> December, 2016, Mhow, M.P.**

### **Topics:**

- |   |   |
|---|---|
| Cardiovascular, Respiratory and Physiology                            | Poultry, Fisheries and Wildlife physiology    |
| Reproductive Physiology Interventional Technologies and Biotechnology | Livestock, Health Management and production   |
| Climate Change, Stress Neurophysiology and Endocrinology              | Teaching Veterinary Physiology and Production |
| Digestive and Nutritional Physiology Bioenergetics                    | Young Scientist Award                         |
|   | Poster Session                                |

### **Contact :**

Dr. Archana Jain, Organizing Secretary, XXV SAPICON 2016, Professor & Head, Department of Veterinary Physiology, College of Veterinary & Animal Husbandry, Mhow, M.P.-453441, Mob. 08109173846, E-mail: sapicon2016@gmail.com, website: www.sapi.in

## **4<sup>th</sup> National Conference on Innovation in Indian Science, Engineering & Technology(Focus : Rural Housing), March 4-5, 2017, New Delhi**

### **Topics:**

Innovative indigenous inter-disciplinary translational research & scientific efforts/ Eco-friendly Technology in the path of Traditional Knowledge and Sustainable Consumption/Living/Development in the areas such as Rural Areas, Rural households, Rural Urban Connections, Demographic Trends and Housing Needs, Access level of Housing Supply, Housing Conditions, House Construction Activities in Rural areas by Public Sector, Private Sector, and PPP model, Environmental Impact of Rural housing, it Rural housing Schemes running by Union and various State Government, Sanitation, Drinking Water, Water harvesting, Energy (eg. Solar panels, Solar Rooftop systems) & wastewater technology, Role of Cooperatives in Rural Development in present scenario, Materials & Technologies such as agricultural and industrial wastes like plastic, Bio-waste, fly-ash, rice husk/straw, coconut husk, vegetable reinforced concrete, Bamboo Mat Board, Banana leaves & stalks, Animal & Poultry shelter designs, etc. for rural housing, Vastu & other quake resistant technological guidelines of disaster management and IPR leveraging vis-à-vis New economic environment with a special focus on Rural Housing.

### **Contact :**

Dr. D.P. Bhatt, National Coordinator, NCISSET 2017, Chief Scientist & Head, IPR'M Group, Room no. 154, CSIR-National Physical Laboratory, Dr. K.S. Krishnan Road, New Delhi-110012, E-mail: dpbhatt@mail.nplindia.org / swadeshivigyan@gmail.com, Tel.: 011 45608353, Mobile no.: 8510974923 website: www.swadeshisciences.org

## **1<sup>st</sup> Asian Conference on Water and Land Management for Food and Livelihood Security (WLMFLS-2017), January 20-22,2017, Raipur, Chhattisgarh**

### **Topics:**

- | Integrated Water and Land Resources Management and hydrologic Modeling
- | Geospatial Technology in Land and Water Resources Management
- | River Basin Management and Inter-basin Transfer & Resolving Conflicts
- | Policy Issues in Land and Water Use
- | Water and Land Productivity in Agriculture
- | Watershed Management
- | Groundwater Exploration Recharge and Management
- | Water and Land Quality Pollution and Remediation
- | Water and Land in Relation to Climate Change and Food & livelihood Security
- | Water and Land Property Right regimes

### **Contact :**

Dr. Vinay K. Pandey, Dean, Organising Secretary, WLMFLS-2017, S.V. College of Agriculture Engineering and Technology & Research Station, Indira Gandhi Agriculture University , Raipur, Chhattisgarh, Mob.: 91-9425521942 / +91-771-2102575 (office), Email: [vkp12@yahoo.co.in](mailto:vkp12@yahoo.co.in) / [svcaet.raipur@gmail.com](mailto:svcaet.raipur@gmail.com)

## S & T ACROSS THE WORLD

### SCIENCE-RELIGION CONFLICT MAY LIE IN OUR BRAINS

The conflict between science and religion may originate in our brain structure, researchers have found.

Clashes between the use of faith versus scientific evidence to explain the world dates back centuries and is perhaps most visible today in the arguments between evolution and creationism.

To believe in a god or universal spirit, people seem to suppress the brain network used for analytical thinking and engage the empathetic network, researchers say. When thinking analytically about the physical world, people appear to do the opposite.

In fact, the investigators say, the two brain networks suppress each other, which may explain why some of us tend to extremes.

“When there's a question of faith, from the analytic point of view, [faith] may seem absurd,” said Tony Jack of Case Western Reserve University in Cleveland, who led the research. “But, from what we understand about the brain, the leap of faith to belief in the supernatural amounts to pushing aside the critical/analytical way of thinking to help us achieve greater social and emotional insight.”

Jack is an associate professor of philosophy and research director of the university's Inamori International Center of Ethics and Excellence, which helped sponsor the research.

“A stream of research in cognitive psychology has shown, and claims, that people who have faith (i.e., are religious or spiritual) are not as smart as others. They actually might claim they are less intelligent,” said Richard Boyatzis, also of Case Western, and a member of Jack's team. “Our studies confirmed that statistical relationship, but at the same time showed that people with faith are more pro-social and empathic.”

In a series of eight experiments, the researchers found the more empathetic the person, the more likely he or she is religious. That finding offers a new explanation for past research showing women tend to hold more religious or spiritual worldviews than men, they added. The gap may be because women have a stronger tendency toward empathetic concern than men.

Atheists, the researchers found, are most closely aligned with psychopaths—not killers, but the vast majority of psychopaths classified as such due to their lack of empathy for others.

The new study is published in the online journal PLoS One.

The research is based on the hypothesis that the human brain has two opposing domains in constant tension. In earlier research, Jack's Brain, Mind & Consciousness lab used a brain scanning procedure, functional magnetic resonance imaging, to show the brain has an analytical network of neurons that enables us to think critically and a social network that enables us to empathize. When presented with a physics problem or ethical dilemma, a healthy brain fires up the appropriate network while suppressing the other.

“Because of the tension between networks, pushing aside a naturalist world view enables you to delve deeper into the social/emotional side,” Jack explained. “And that may be the key to why beliefs in the supernatural exist throughout the history of cultures. It appeals to an essentially nonmaterial way of understanding the world and our place in it.”

Friedman said, “Having empathy doesn't mean you necessarily have anti-scientific beliefs. Instead, our results suggest that if we only emphasize analytic reasoning and scientific beliefs, as the New Atheist movement suggests, then we are compromising our ability to cultivate a different type of thinking, namely social/moral insight.”

“These findings,” Friedman continued, “are consistent with the philosophical view, espoused by (Immanuel)



Kant, according to which there are two distinct types of truth: empirical and moral.”

The researchers examined the relationship between belief in God or a universal spirit with measures of analytic thinking and moral concern in eight different experiments, each involving 159 to 527 adults. Consistently through all eight, the more religious the person, the more moral concern they showed. But no cause and effect was established.

They found that both spiritual belief and empathic concern were associated with frequency of prayer, meditations and other spiritual or religious practices, though with not the socializing aspects of religious affiliation such as church dinners.

While others theorize that mentalizing—interpreting human behavior in terms of intentional mental states such as needs, desires or purposes—has a positive association with belief, the researchers found none.

Like other studies, these experiments found that analytic thinking discourages acceptance of spiritual or religious beliefs. But the statistical analysis of data pooled from all eight experiments indicates empathy is more important to religious belief than an-analytic thinking is for disbelief.

So why can the conflict between science and religion become so strong?

“Because the networks suppress each other, they may create two extremes,” Boyatzis said. “Recognizing that this is how the brain operates, maybe we can create more reason and balance in the national conversations involving science and religion.”

The researchers say humans are built to engage and explore using both networks.

“Far from always conflicting with science, under the right circumstances religious belief may positively promote scientific creativity and insight,” Jack said. “Many of history's most famous scientists were spiritual or religious. Those noted individuals were intellectually sophisticated enough to see that there is no need for religion and science to come into conflict.”

They refer to Baruch Aba Shalev's book 100 years of Nobel Prizes, which found that, from 1901 to 2000, 654 Nobel laureates, or nearly 90 percent, belonged to one of 28 religions. The remaining 10.5 percent were atheists, agnostics or freethinkers.

“You can be religious and be a very good scientist,” Jack said.

The researchers agree with many atheists that suspension of analytical thinking—at the wrong time—can be dangerous, and point to the historical use of religious differences to persecute or fight wars.

“Although it is simply a distortion of history to pin all conflict on religion,” Jack said. “Non-religious political movements, such as fascism and communism, and quasi-scientific movements, such as eugenics, have also done great harm.”

The researchers suggest, however, that taking a carefully considered leap of religious faith appears to be an effective route to promoting emotional insight. Theirs and other studies find that, overall, religious belief is associated with greater compassion, greater social inclusiveness and greater motivation to engage in pro-social actions.

Jack said the conflict can be avoided by remembering simple rules: “Religion has no place telling us about the physical structure of the world; that's the business of science. Science should inform our ethical reasoning, but it cannot determine what is ethical or tell us how we should construct meaning and purpose in our lives.”

To dig deeper into belief, the researchers are planning studies to learn if people who increase their empathy then increase their religious or spiritual belief, or vice versa.

*(Courtesy of Case Western Reserve University and World Science staff March 24, 2016)*

## **DNA “MARKINGS” MAY TRANSMIT LEARNED EXPERIENCES**

Learned experiences can be transferred through genetic structures—not by changes to genes themselves, but rather, to how they're “marked” by other molecules, a study reports.

Such “markings” are called epigenetic changes. Scientists in recent years have increasingly recognized them as playing important roles in biological inheritance.

The finding that learned experiences may be transferred this way is part of a recent wave of research overturning what biologists used to assume—that only information in the DNA itself is passed across generations.

The study, published online Dec. 1 in the research journal *Nature Neuroscience*, argues that mice biologically inherit information learned by their grandfathers.

Genes can be turned on or off semi-permanently with molecular changes to the DNA, known as epigenetic marks. Some of these changes are maintained across generations, others aren't. Through epigenetic changes, past studies have linked traumatic or stressful experiences in animals to effects on later generations' emotional behaviors.

In the new work, Brian Dias and Kerry Ressler of the Emory University School of Medicine in Atlanta, Ga. found that specific learned information can also be transmitted through epigenetic changes in sperm.

The researchers trained mice to fear a cherry blossom-like smell and then let these mice mate and conceive offspring. These offspring showed more fearful responses to whiffs of cherry blossom than to a neutral scent despite never having encountered the smells before, the scientists said.

Moreover, they added, the next generation of offspring showed the same behavior. This fear response was passed to offspring even if they were conceived with artificial insemination using sperm, according to the researchers.

They also found that both in the trained mice and their offspring, the fear response was associated with changes to brain regions used to detect the feared scent, and with epigenetic marks in the sperm on the gene responsible for detecting the smell.

*(Courtesy of Nature Neuroscience and World*

*Science staff Dec. 1, 2013)*

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## **DISTANT PLANET SAID TO BE HALF-MELTED**

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Astronomers have obtained what they call the most detailed “fingerprint” of a rocky planet outside our solar system to date, and concluded that half of that world is almost completely molten.

Scientists also say the planet is even hotter than radiation from its star alone would explain, so there must be an unknown heat source.

The researchers, led by the University of Cambridge in the U.K., say scorching temperatures on the planet's hotter side may have made the atmosphere evaporate. That could have led the two sides to have radically different temperatures by preventing some heat from spreading around.

Temperatures on the hot side can reach 2,500 degrees C (4,500 F), while temperatures on the cool side are around 1,100 degrees C (2,000 degrees F), according to the findings, reported in the journal *Nature*.

Using data from NASA's Spitzer Space Telescope, the researchers examined a planet known as 55 Cancri e, which orbits a sun-like star located 40 light years away in the Cancer constellation. They have mapped how conditions on the planet change throughout a complete orbit, the first time this has been done for such a small planet.

55 Cancri e is classified as a “super Earth,” a rocky world about twice the size and eight times the weight of Earth, and orbits its parent star so closely that a year lasts just 18 hours. The planet is also tidally locked, meaning that it always shows the same face to its parent star, similar to the Moon, so there is a permanent “day” side and a “night” side.

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## **IT'S AMONG THE NEAREST KNOWN SUPER EARTHS WHOSE MAKEUP CAN BE STUDIED.**

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Uncovering the characteristics of super Earths is hard, since they're so small compared to the parent star and their contrast relative to the star is tiny com

pared to gas giant planets, so-called “hot Jupiters.”

“We haven't yet found any other planet that is this small and orbits so close to its parent star, and is relatively close to us, so 55 Cancri e offers lots of possibilities,” said Brice-Olivier Demory of the university's Cavendish Laboratory, the paper's lead author. “We still don't know exactly what this planet is made of—it's still a riddle. These results are like adding another brick to the wall, but the exact nature of this planet is still not completely understood.”

55 Cancri e has been extensively studied since its 2011 discovery. Based on readings taken at different times, it was thought to be a water world, or even made of diamond, but researchers now think it's almost completely lava-covered.

“We have entered a new era of atmospheric remote sensing of rocky exoplanets,” said study co-author Nikku Madhusudhan, from Cambridge's Institute of Astronomy. An exoplanet is a planet outside our solar system. “It is incredible that we are now able to measure the large scale temperature distribution on the surface of a rocky exoplanet.”

One thing that's unclear is that there seems to be an unknown heat source that makes the planet hotter than expected solely from its star, the astronomers said. They added that they may have to wait until the next generation of space telescopes are launched to find out.

*(Courtesy of the University of Cambridge and World Science staff March 31, 2016)*



## भारतीय विज्ञान कांग्रेस संस्था

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#### सदस्यता की शर्तें और सदस्यों की विशेषाधिकार/Terms of Membership and Privileges of Members :

संस्था की सदस्यता उन सभी लोगों के लिए खुली है, जो स्नातक या उसके समान स्तर पर शैक्षणिक योग्यता अर्जन कर चुके हैं, और जिन्हें भारत में विज्ञान की तरक्की में रुचि है।

Membership of the Association is open to person with Graduate or equivalent Academic Qualifications and interested in the advancement of Science in India.

1. **वार्षिक सदस्य** : जो व्यक्ति नये रूप से वार्षिक सदस्यता ग्रहण करना चाहता है उसे वार्षिक सदस्यता शुल्क ₹ 200/- के साथ भर्ती शुल्क ₹ 50/-\* (विदेशियों के लिए\*\* U.S. \$ 70) मात्र देने पड़ेंगे। वार्षिक सदस्यता शुल्क प्रत्येक वर्ष के 01 अप्रैल को देय हो जाएगा। जो भी 15 जुलाई के भीतर अपनी सदस्यता शुल्क नहीं अदा कर पाएगा वह उस साल के लिए अपनी वोट देने की क्षमता से वंचित हो जाएगा और/या वह उस वर्ष के लिए संस्था के कार्यालय को भी नियंत्रण नहीं कर पाएगा। वार्षिक सदस्य अपनी सदस्यता दोबारा अगले साल 15 जुलाई के भीतर बिना शुल्क दिए पुनः अपनी सदस्यता प्राप्त कर सकता है।

सदस्यगण अपना पेपर कांग्रेस सत्र के समय पेश कर सकते हैं। उन्हें वार्षिक विज्ञान कांग्रेस सत्र की कार्यविवरण की एक प्रति बिना मूल्य में प्राप्त हो सकती है। इसके साथ वे संस्था के रोजनामचा "एवरीमैन्स साइंस" की प्रति भी बिना मूल्य उस साल के लिए प्राप्त कर सकते हैं। सदस्यता के नवीकरण के लिए कृपया ISCA वेबसाइट से फार्म डाउनलोड करें।

1. **Annual Member** : A person willing to be enrolled as new Annual Member has to pay an annual subscription of ₹ 200/- along with an admission fee of ₹ 50/-\* (for foreign \*\* U.S.\$ 70) only. The annual subscription of a Member shall become due on the 1st April of each year. Anyone who fails to pay the subscription on or before the 15th July in any year shall lose the right of voting and/or holding any office of the Association for that year. A member failing to pay the annual subscription by the end of March of the following year shall cease to be a Member. Annual members can renew their Membership without paying the admission fee in the next year by remitting subscriptions in time i.e. within 15th July. Members may contribute papers for presentation at the Science Congress. They will receive, free of cost, reprints of the Proceedings of the Session of any one section of their interest and also the bi-monthly journal of the Association Everymans Science for that year only. For Renewal of Membership please download the form from ISCA website.

2. **सत्र सदस्य** : यदि कुछ कारणों से वार्षिक सदस्य अपनी सदस्यता उस वर्ष के 15 जुलाई के अंदर दोहराना भूल जाएँ, तो उनकी सदस्यता, सत्र सदस्यता के रूप में बिना वोट डालने की क्षमता में सीमित कर दिया जाएगा। सत्र सदस्यको ₹ 200/- (विदेशियों के लिए \$ 50) अदा करना पड़ेगा। एक सत्र सदस्य को लेख/पोस्टर प्रस्तुतीकरण का अधिकार प्राप्त होगा जिस कांग्रेस सत्र का वह सदस्य है। एक सत्र सदस्य वोट प्रक्रिया में भाग लेने के योग्य नहीं हैं। सत्र सदस्य को विभागों के व्यवसाय बैठकों और साधारण बैठकों में भाग लेने की योग्यता प्राप्त नहीं है।
2. **Sessional Member** : If for some reasons, Annual Members fail to renew their Membership by remitting subscription prior to 15th July each year, their Membership for the year would be restricted to Sessional Membership without voting right. Sessional Member has to pay ₹ 200/- (for foreign \$50). A Sessional Member shall have the right to present paper / poster at the session of the congress of which he/she is a member. A Sessional Member shall not be eligible to participate in the voting process. A Sessional member shall not be eligible to participate in the Business meetings of the Sections and the General Body.
3. **छात्र सदस्य** : जो व्यक्ति स्नातक स्तर से नीचे पढ़ाई कर रहा है, उसे वार्षिक सदस्यता शुल्क ₹ 100/- मात्र देने पड़ेंगे अपना नाम छात्र सदस्य के रूप में लिखवाने के लिए, बशर्ते उसके आवेदन पत्र पर उसके प्राचार्य/विभागाध्यक्ष/संस्थान के प्रधान के हस्ताक्षर हों। एक छात्र सदस्य को यह अधिकार दिया जाएगा, कि वह अपना पेपर कांग्रेस सत्र के समय पेश कर सकें, बशर्ते वह पेपर वह किसी वार्षिक सदस्य या संस्था के कोई अवैतनिक सदस्य के साथ पेश करें। उसे वोट करने का या कार्यालय को नियंत्रण करने का अधिकार प्राप्त नहीं होगा। छात्र सदस्य को विभागों के व्यवसायबैठकों में भाग लेने की योग्यता प्राप्त नहीं है।
3. **Student Member** : A person studying at the under - graduate level may be enrolled as a Student Member by paying an annual subscription of ₹ 100/- **only provided his/her application is duly certified by the Principal/Head of the Institution/Department.** A student member shall have the right to submit papers for presentation at the Session of the Congress of which he / she is a member, provided such papers be communicated through a Member, or an Honorary Member of the Association. He/She shall not have the right to vote or to hold any office. A student member shall not be eligible to participate in the Business Meetings of the Sections and the General Body.
4. **आजीवन सदस्य** : एक सदस्य अपने भविष्य की सारी वार्षिक सदस्यता शुल्क एक बार में ₹ 2,000/- (विदेशियों के लिए U.S.\$ 500) मात्र अदा करके पा सकता है। एक व्यक्ति जो 10 साल या उससे अधिक नियमित रूप से सदस्यता प्राप्त कर चुका है, उसे उसकी संयुक्त सदस्यता शुल्क के ऊपर प्रतिवर्ष ₹ 50/- की छूट दी जाएगी, बशर्ते कि उसकी संयुक्त शुल्क ₹ 1,200/- से नीचे न हों (विदेशियों के लिए U.S.\$ 12.50 और U.S.\$ 300 क्रमशः)। एक आजीवन सदस्य को उसके पूरे जीवन काल में सदस्यता की सारे विशेषाधिकार प्राप्त होंगे।
4. **Life Member** : A Member may compound all future annual subscriptions by paying a single sum of ₹ 2,000/- (for foreign\*\* U.S.\$ 500) only. Any person who has been continuously a member for 10 years or more, shall be allowed a reduction in the compounding fee of ₹ 50/- for every year of such membership, provided that the compounding fee shall not be less than ₹ 1,200/- (for foreign\*\* U.S.\$ 12.50 and U.S.\$ 300 respectively). A life Member shall have all the privileges of a member during his/her lifetime.
5. **संस्थान सदस्य** : एक संस्थान जो ₹ 5,000/- सदस्यता शुल्क के रूप में दे वही संस्था के संस्थान सदस्य उस वित्तीय वर्ष के लिए बन सकता है, (विदेशियों के लिए U.S.\$ 2,500)। इसमें वह विज्ञान कांग्रेस के वार्षिक सत्र में अपने एक व्यक्ति का नाम नामांकित कर सकता है, जो उनका प्रतिनिधि हों। एक संस्थान सदस्य को वार्षिक विज्ञान कांग्रेस



सत्र की कार्यविवरण की एक पूर्ण प्रति बिना मूल्य में प्राप्त हो सकती है। इसके साथ वे संस्था के रोज़नामचा "एवरीमैन्स साइंस" की प्रति भी बिना मूल्य प्राप्त कर सकते हैं।

5. **Institutional Member** : An Institution paying a subscription of ₹ 5,000/- (for foreign\*\* U.S.\$ 2,500) only, can become an Institutional Member of the Association for that financial year. It shall be eligible to nominate one person as its representative to attend Annual Session of the Science Congress. An Institutional Member shall be eligible to receive, free of cost, a copy of the complete set of Proceedings of the Annual Science Congress Session as also a copy each of the Associations journal Everymans Science.
6. दाता : कोई भी व्यक्ति जो एक साथ ₹ 10,000/- (विदेशियों के लिए U.S. \$ 5,000) मात्र दें, वह संस्था के दाता बन सकते हैं। एक व्यक्तिगत दाता को वह सारे अधिकार और विशेषाधिकार मिलेंगे जो एक सदस्य को उसके पूर्ण जीवन काल में प्राप्त होते हैं।

एक संस्थान जो एक साथ ₹ 50,000/- (विदेशियों के लिए U.S. \$ 25,000) मात्र दें, सदा के लिए इस संस्था के संस्थान दाता बन सकते हैं, जिसे वह एक व्यक्ति को नामांकित करके उसे अपने संस्थान के प्रतिनिधि के रूप में विज्ञान कांग्रेस के वार्षिक सत्र में भेज सकते हैं। एक संस्थान/व्यक्तिगत दाता वार्षिक विज्ञान कांग्रेस के कार्यविवरण और संस्था के रोज़नामचा "एवरीमैन्स साइंस" की प्रति भी बिना मूल्य प्राप्त कर सकते हैं।

6. **Donor** : Any person paying a lump sum of ₹ 10,000/- (for foreign \*\* U.S.\$ 5,000) only, can become an Individual Donor of the Association. An **INDIVIDUAL DONOR** shall have all the rights and privileges of a member during his/her lifetime.

An Institution paying a lump of ₹ 50,000/- (for foreign \*\* U.S.\$ 25,000) only, can become an **INSTITUTIONAL DONOR** of the Association forever, which shall have the right to nominate one person as its representative to attend Annual Session of the Science Congress. An Institutional/ Individual Donor shall be eligible to receive, free of cost, a copy of the complete set of Proceedings of the Annual Science Congress Session as also the Associations journal Everymans Science.

\* भर्ती शुल्क ₹ 50/- सिर्फ एक नये वार्षिक सदस्य के लिए ज़रूरी है। यह सत्र सदस्य/आजीवन सदस्य/ संस्थान सदस्य/छात्र सदस्य/दाता के लिए ज़रूरी नहीं है।

\* Admission fee of ₹ 50/- is needed only for becoming a new Annual Member and not for Sessional Member/Life Member/Institutional Member/Student Member/Donor.

\*\* (एक विदेशी सदस्य का अर्थ है, जो भारतवर्ष के बाहर का नागरिक हों।)

\*\* (A Foreign Member means one who is normally Resident outside India).

(अ) **पेपर पेश करना** : एक पूर्ण पेपर की प्रति उसके साथ तीन सारांश की प्रति जो 100 शब्दों से ज्यादा न हों और जिसमें कोई आरेख या फार्मूला न हों, वह प्रत्येक वर्ष 15 सितम्बर के अंदर अनुभागीय अध्यक्ष तक पहुँच जाना चाहिए।

(A) **Presentation of Papers** : A copy of complete paper accompanied by an abstract in triplicate not exceeding one hundred words and not containing any diagram or formula, must reach the Sectional President latest by September 15, each year.

(ब) सभी वर्गों के सदस्य जो विज्ञान कांग्रेस सत्र में भाग लेने के पश्चात लौटते समय के टिकट में रियायत प्राप्त कर सकता है, बशर्ते कि उनकी यात्रा के खर्च का थोड़ा भी भाग सरकार (केन्द्रीय या राज्य),

कोई कानूनी सत्ता या कोई विश्वविद्यालय या कोई नगरपालिका न उठाएँ और उनकी कुल कमाई या परिलब्धियां ₹ 5,000/- (प्रति माह पाँच हजार रुपए) से अधिक नहीं हैं। कृपया ISCA वेबसाइट से रेलवे रियायत फार्म डाउनलोड करें।

- (B) Members of all categories are entitled to **Railway Concession** of return ticket by the same route with such conditions as may be laid down by the Railway Board for travel to attend the Science Congress Session provided that their travelling expenses are not borne, even partly, by the Government (Central or State), Statutory Authority or an University or a City Corporation and their total earning of or emoluments drawn do not exceed ₹ 5,000/- (Rupees Five Thousand per month). Please download the Railway Concession form from ISCA Website.
- (स) संस्था के पुस्तकालय में सभी वर्गों के सदस्य को पढ़ने की सुविधा सुबह 10.00 बजे से शाम को 5.30 बजे तक सभी काम के दिनों में (शनिवार और रविवार) को छोड़कर प्राप्त होगी।
- (C) Members of all categories are entitled to reading facilities between 10.00 a.m. to 5.30 p.m. on all weekdays (except Saturdays & Sundays) in the library of the Association.
- (ड) समय समय पर संस्था द्वारा तय की गई मूल्य दरों पर विश्रामगृह, सभागार आदि सुविधाओं की प्राप्ति भी सभी वर्गों के सदस्य कर सकते हैं।
- (D) Members of all categories may avail Guest House facilities, Lecture Hall hiring at the rates fixed by the Association from time to time.
- (ई) भविष्य में भारतीय विज्ञान कांग्रेस संस्था द्वारा आयोजित परिसंवाद, सम्मेलन और वार्षिक कांग्रेस में सभी वर्गों के सदस्यों द्वारा भाग लेने के लिए अपनी—अपनी सदस्यता पत्र को लाना जरूरी होगा।
- (E) Members of all categories should bring the Membership Card always for attending any Seminar, Conference and Annual Congress organized by ISCA in future.

**ध्यान दें :** (1) सभी बैंक ड्राफ्ट The Indian Science Congress Association के नाम से ही लिखा जाएँ, और जो कोलकाता के किसी भी शाखा में देय हों। सदस्यों से यह निवेदन किया जा रहा है, कि वे अपनी सदस्यता संख्या का उल्लेख भारतीय विज्ञान कांग्रेस संस्था के कार्यालय के साथ पत्राचार के वक्त अवश्य करें।

(2) भारतीय विज्ञान कांग्रेस संस्था द्वारा मनीऑर्डर, आई. पी. ओ., ई. सी. एस. या चेक से भुगतान ग्रहण नहीं किया जाएगा। कोई भी सदस्यता निर्धारित सदस्यता फार्म (आवेदन-पत्र नई सदस्यता/सदस्यता की नवीकरण के लिए) में विधिवत बिना भरने से नहीं लिया जाएगा।

(3) नकदी केवल ISCA मुख्यालय में हाथ से लिया जाएगा। कृपया डाक द्वारा लिफाफे के भीतर नकदी नहीं भेजें।

**Note :** (1) All Bank Drafts should be drawn in favour of *The Indian Science Congress Association* Payable at any branch in Kolkata. Members are requested to mention their Membership No. while making any correspondence to ISCA office.

(2) No money order, I.P.O., ECS or cheque will be accepted by ISCA. No Membership will be taken without duly filled in prescribed Membership Form (Application Form for New Membership/ Application for Renewal of Membership).

(3) Cash will only be taken by hand at ISCA Hqrs. Pl. do not send the Cash by Post within the envelope.



## भारतीय विज्ञान कांग्रेस संस्था

14, डॉ० बिरेश गुहा स्ट्रीट, कोलकाता - 700 017, भारत

**THE INDIAN SCIENCE CONGRESS ASSOCIATION**

14, Dr. Biresh Guha Street, Kolkata-700 017, INDIA

दूरभाष/Telephone : (033) 2287-4530, 2281-5323

फैक्स/Fax : 91-33-2287-2551

वेबसाइट/Website : <http://sciencecongress.nic.in>

ई-मेल/E-mail : [iscacal@vsnl.net](mailto:iscacal@vsnl.net)

[es.sciencecongress@nic.in](mailto:es.sciencecongress@nic.in)

### सदस्यता के लिए नया आवेदन पत्र / Application Form For New Membership

सेवा में/To

महासचिव (सदस्यता कार्य)/ The General Secretary (Membership Affairs)

भारतीय विज्ञान कांग्रेस संस्था/The Indian Science Congress Association

14, डॉ० बिरेश गुहा स्ट्रीट/14, Dr. Biresh Guha Street,

कोलकाता - 700 017/Kolkata - 700 017

महोदय/Dear Sir,

मैं भारतीय विज्ञान कांग्रेस संस्था का आजीवन सदस्य/वार्षिक सदस्य/सत्र सदस्य/छात्र सदस्य/संस्थान सदस्य/व्यक्तिगत दाता/संस्थागत दाता अपना नाम लिखवाना चाहता/चाहती हूँ।

I like to be enrolled as a Life Member/Annual Member/Sessional Member/Student Member/Institutional Member/Individual Donor/Institutional Donor of The Indian Science Congress Association. (Pl. Tick)

मैं इसके साथ ----- सदस्यता शुल्क के रूप में नक़द ₹ -----/बैंक ड्राफ्ट संख्या ----- दिनांकित ----- प्रचालक बैंक ----- 01 अप्रैल 20--- से 31 मार्च 20--- तक भेज रहा/रही हूँ।

I am sending herewith an amount of ₹ in payment of my subscription by Cash/Bank Draft No. dated issuing bank from the year 1st April 20 to 31st March 20.

मैं निम्नलिखित विभाग में रुचि रखता/रखती हूँ (कृपया किसी एक में निशान लगाएँ)/ I am interested in the following section (Please tick any one).

#### विभाग/Sections

1. कृषि और वानिकी विज्ञान/Agriculture and Forestry Sciences
2. पशु, पशुचिकित्सा और मत्स्य विज्ञान/Animal, Veterinary and Fishery Sciences
3. मानवशास्त्रीय और व्यवहारपरक विज्ञान (जिसमें सम्मिलित हैं, पुरातत्व-विज्ञान, मनोविज्ञान, शैक्षिक विज्ञान और सेना विज्ञान)/Anthropological and Behavioural Sciences (including Archaeology, Psychology, Education and Military Sciences)
4. रसायन विज्ञान/Chemical Sciences

5. भू-पद्धति विज्ञान/Earth System Sciences
6. अभियन्ता विज्ञान/Engineering Sciences
7. पर्यावरण विज्ञान/Environmental Sciences
8. सूचना और संचारण विज्ञान और प्रौद्योगिकी (जिसमें कंप्यूटर विज्ञान भी सम्मिलित है)/Information and Communication Science & Technology (including Computer Sciences)
9. भौतिक विज्ञान/Materials Science
10. गणित विज्ञान (जिसमें सांख्यिकीय सम्मिलित है)/Mathematical Sciences (including Statistics)
11. चिकित्सा शास्त्र (जिसमें शरीर विज्ञान भी सम्मिलित है)/Medical Sciences (including Physiology)
12. नया जीवविज्ञान (जिसमें जीव रसायन, जीव भौतिकी और आणविक जीवविज्ञान और जीव-प्रौद्योगिकी भी सम्मिलित है)/New Biology (including Bio-Chemistry, Biophysics & Molecular Biology and Biotechnology)
13. भौतिकीय विज्ञान/Physical Sciences
14. वनस्पति विज्ञान/Plant Sciences

(कृपया टंकित करें या ब्लॉक अक्षरों में भरें)/Please type or fill up in Block Letters)

नाम/Name (ब्लॉक अक्षरों में/in Block Letters) :

श्री/सुश्री/श्री/श्रीमती/डॉ॰/प्रो॰/Mr./Ms./Shri/Shrimati/Dr./Prof (कृपया टिक करें)/(Please tick)

कुलनाम/Surname

प्रथम नाम/First Name

मध्य नाम/Middle Name

शैक्षणिक योग्यता/Academic Qualifications :

(अंतिम शैक्षणिक योग्यता प्रमाण-पत्र अंक-सूची का स्वतः सत्यापित जिराक्स प्रति संलग्न करना है / Self attested xerox copy of last educational certificate/marksheet must be attached)

पदनाम/Designation

सम्पर्क का पता/Address of communication :

(राज्य, शहर/नगर और पिन कोड सहित/including state, city/town and pin code)

दूरभाष संख्या/मोबाईल संख्या और ई-मेल/Phone No./Mobile Number & E-mail :

स्थायी पता/Permanent Address :

टिप्पणी (अगर कोई)/Comments (if any)

दिनांक/Date :

भवदीय/Yours Faithfully

हस्ताक्षर/Signature

**ध्यान दें :** (i) सभी बैंक ड्राफ्ट The Indian Science Congress Association के नाम से ही लिखा जाएँ और जो कोलकाता के किसी भी शाखा में देय हों।

- Note :** (i) All Bank Drafts should be drawn in favour of *The Indian Science Congress Association* Payable at any branch in Kolkata.
- (ii) सभी सदस्यता और सदस्यता के नवीकरण के लिए आवेदन-पत्र आवेदकों को अपने खुद के पते उपलब्ध कराके करने चाहिए न कि देखभाल के पते प्रस्तुत करने चाहिए।
- (ii) All Application Forms for Membership and the renewal of Membership must be submitted by providing the address of the applicants themselves only and not any care of address.
- (iii) भर्ती शुल्क ₹ 50/- सिर्फ एक नये वार्षिक सदस्य के लिए ज़रूरी है। यह सदस्य/आजीवन सदस्य/संस्थान सदस्य/छात्र सदस्य/दाता के लिए ज़रूरी नहीं है।
- (iii) Admission fee of ₹ 50/- is needed only for becoming a new Annual Member and not for Sessional Member/Life Member/Institutional Member/Student Member/Donor.
- (iv) सदस्यों से यह निवेदन किया जा रहा है कि वे अपनी सदस्यता संख्या का उल्लेख भारतीय विज्ञान कांग्रेस संस्था के कार्यालय के साथ पत्राचार के समय अवश्य करें।
- (iv) Members are requested to mention their Membership No. while making any correspondence to ISCA office.
- (v) भारतीय विज्ञान कांग्रेस संस्था द्वारा मनीऑर्डर, आई. पी. ओ., ई. सी. एस. या चेक से भुगतान ग्रहण नहीं किया जाएगा।
- (v) No Money order, I.P.O., ECS or Cheque will be accepted by ISCA.
- (vi) कोई भी सदस्यता निर्धारित सदस्यता फार्म (आवेदन-पत्र नई सदस्यता/सदस्यता की नवीकरण के लिए) में विधिवत बिना भरने से नहीं लिया जाएगा।
- (vi) No Membership will be taken without duly filled in prescribed Membership Form (Application Form for New Membership/Application For Renewal of Membership)
- (vii) नकदी केवल ISCA मुख्यालय में हाथ से लिया जाएगा। कृपया डाक द्वारा लिफाफे के भीतर नकदी नहीं भेजें।
- (vii) Cash will only be taken by hand at ISCA Hqrs. Pl. do not send the cash by Post within the envelope.