

## Annual Report 2018-19

- 1. Introduction:** The Society for Promotion of Science and Technology in India came in to existence on Oct. 14, 2009. Since then, it has continued to grow steadily and to expand its activities mainly in Chandigarh and Haryana. The year 2018-19 was another exciting year and full of activities. Five activities, namely Mobile Science Laboratory, Summer Schools in Science and Mathematics, How and Why Monthly Lecture Series, Sky-Watch and Stage Show in Science have acquired the status of standing activities, i.e. regular and permanent in character. Our support staff performed well and have acquired the necessary expertise to execute all the activities with a high degree of finesse and quality.
- 2. Income and Expenditure:** The total income of the Society during the year was Rs.49,37,018. A sum of Rs. 13,96,849 was raised by way of donations and contributions. This includes a sum Rs. 11 lacs given Shri Raj Aggarwal, one of the Patrons' of the SPSTI, through Parvati Trust. The Society also received a grant of Rs. 19 lacs from the Department of Science and Technology, Government of India for operating the Mobile Science Laboratory with effect from December 1, 2018 onwards. The Society received grants amounting to Rs. 14,15,756/- from various sources. Out of this Department of School Education had given a sum of Rs. 8.25 lacs for eleven summer schools held in Haryana. Hon'ble Chief Minister had also given grant of Rs. 5 lacs for the Summer Schools. The Society also received interest of Rs. 91,697 by way of interest on its deposits. The total expenditure was Rs. 35,81,513. There was a surplus of Rs. 13,55,502.44. This was mainly due to the advance grant received from the Govt. of India for the Mobile Lab. and also from the Chandigarh Administration for different activities.
- 3. Mobile Science Laboratory:** The Mobile Laboratory, Circus of Science (Vigyan Ka Jantar-Mantar), is a premier and flagship activity of the SPSTI. It was launched on April 06, 2016 by Hon'ble CM Haryana from Karnal. The Society operated the Mobile Lab. in Karnal district with the grant received from Hon'ble Chief Minister on trial basis up to the end of year. The Lab visited all the Secondary and Senior Secondary Schools in the district with DST support from January 01, 2017 to March 31, 2018. Thereafter, the Society kept operating the Lab with its own resources and submitted a proposal to the Department of Science and Technology, Government of India on September 27, 2018 for grant for another two years to operate the Lab in Kurukshetra and Mewat districts. On November 27, 2018, the Department sanctioned an amount of Rs. 39,02,216/- for a period of two years to operate the Mobile Lab. in two districts of Haryana, namely Kurukshetra and Nuh. A sum of Rs. 19,00,000 was received on Dec 06, 2018. The effective date of start of the DST funded project is December 1, 2018. The expenditure during the period from December 1, 2018 to March 31, 2019 was Rs. 6,05,677/-. The total expenditure on the Mobile Science Lab during the financial year 2018-19 was Rs. 16,04,774/-. By end of the year 2018-19, the Lab. had successfully operated for three years.

4. **Summer Schools in Science and Mathematics:** The Summer Schools are another flagship program of the Society. The schools are of three-four weeks' duration and held during the month of June, when schools are closed. During June 2018, twelve summer schools were held in Haryana and three in Punjab. The locations in Haryana were: Ambala, Faridabad, Gurgaon, Jind, Kaithal, Karnal, Kurukshetra, Mewat, Narnaul, Palwal, Panchkula and Yamunanagar. The Bus spent two days at each station. A total of 1,224 students completed the Summer Schools. The Mobile Science Lab. visited the Summer Schools and interacted with the students, who were encouraged to perform experiments.



Mobile Science Laboratory during Summer Schools

5. **School visits in Kurukshetra:** During the period the proposal was submitted to DST, from September 04, 2018 up to November 30, 2018, the Mobile Science Lab had visited 20 Senior Secondary Schools and 07 High Schools in Kurukshetra district. Total 5515 students interacted with Circus of Science during this period.



Demonstrations at Govt. Sr. Sec. School, Village Beholi (Kurukshetra) on Sept 07, 2018





Demonstrations at Govt. Sr. Sec. School, Village Prahladpur (Kurukshetra) on Oct 12, 2018



Demonstrations at Govt. Sr. Sec. School, Village Bani (Kurukshetra) on Oct 15, 2018

6. **School visits in 2018-19 (Under DST):** The proposal got sanction on November 27, 2018 and the project under DST sanction commenced on December 01, 2018. From December 01, 2018 to March 31, 2019, twenty-seven Senior Secondary Schools were visited in Shahabad and Thanesar Blocks of District Kurukshetra. Total 3,868 students interacted with Mobile Science Lab.



Demonstrations at Govt. Sr. Sec. School, Village Bhiwani Khera (Kurukshetra) on Feb 08, 2019



Demonstrations at Govt. Sr. Sec. School, Village Yara (Kurukshetra) on Feb 13, 2019

7. **Prayas Community Programs:** During winter break of the schools, the Society utilizes Mobile Science Lab, to conduct evening programs named as Prayas in the villages by

screening videos on relevant themes involving science and technology, such as water conservation, women empowerment, health, solar system, forest etc.. During December 31, 2018 to January 15, 2019, the Mobile Lab visited fourteen villages in Kurukshetra district and interacted with more than one thousand and two hundred persons including children, adults and senior citizens



Community Program at Village Beholi (Kurukshetra), January 04, 2019

8. **National Science Day:** The SPSTI celebrated the Science Day on 26 February, 2019 at Sugni Devi Arya Girls Senior Secondary School, Ladwa with the help of Mobile Science Lab. One hundred and eighty students of Classes 7th to 10th participated.



Mobile Science Lab at Sugni Devi Arya Girls Sr. Sec. School, Ladwa, February 26, 2019

9. **National Science & Mathematics Day “The Sci-Pi ‘19”** was celebrated at Gyan Gunn Sagar International School, Maur Mandi, Bathinda (Punjab) on February 27-28, 2019. Students from various schools participated in many activities based on Science & Mathematics theme. The Mobile Science Lab exhibited all the equipment and experiments to the students of classes 3<sup>rd</sup> to 10<sup>th</sup>.



Science Exhibition at Sci-Pi '19 at Gyan Gunn Sagar International School, Bathinda on Feb 27-28, 2019

10. **Exhibition at Shiksha Sadan, Panchkula:** The laboratory visited at Department of School Education, Panchkula, Haryana on February 02, 2019. An exhibition for the teachers was conducted by Circus of Science. Sh. Rakesh Gupta (IAS), Director General, DSE, Haryana also reviewed the bus equipment.



Dr. Rakesh Gupta, Director General, Department of School Education, Panchkula, Haryana reviewing Mobile Science Laboratory on Feb 02, 2019

11. **Summer Schools:** This is one of the flagship programs of the Society. During the summers of 2018, fifteen summer schools were organized – twelve in Haryana and three in Punjab for the students of Classes IX to XII, compared to nine summer schools during the previous year. The Summer School in Punjab was held at Maur Mandi, Bathinda and Lopoke (Moga) in association with another NGO, Maur Education Welfare Society. All Schools were of three to four weeks' duration.

The salient features are as follows:

a. **Locations of Summer Schools:**

**Haryana:** Ambala, Faridabad, Jind, Kaithal, Karnal, Kurukshetra, Mewat, Narnaul, Palwal, Panchkula, Bilaspur (Yamunanagar) and Gurgaon.

**Punjab:** Maur Mandi, Bathinda and Lopoke (Moga)

b. **Mentors:** Seventy-nine students (70 for Haryana and 09 for Punjab) of IITs, IISER Mohali, Punjab University, Central Universities, St. Stephen's College Delhi, NIT Kurukshetra and a State University of UP were engaged as intern-cum-mentors. Out of 70 mentors deployed in Haryana, forty-six were boys and twenty-four girls. The institution-wise distribution of mentors was: 20 were from IITs, 13 from Central Universities, 16 from IISER Mohali, 6 from Panjab University, seven from BITS Pilani and the rest from other institutions. Another highlight was that the mentors were from several States of India, including Kerala and Maharashtra.

c. **Methodology of Teaching during Summer Schools:** Broadly, the following strategy was adopted: -

- i. Emphasis on concepts and basic principles,
- ii. Teaching through PPT presentation wherever possible,
- iii. Problem solving,
- iv. Doubt clearance sessions,
- v. Home-work and their timely correction,
- vi. Short revision notes on important topics,
- vii. Frequent tests – weekly as well as snap tests,
- viii. Final test and prizes,
- ix. Group exercises,
- x. Display of a few interesting experiments and short videos on science,
- xi. Celebration of special days: Environment Day and International Yoga Day,
- xii. Career Counseling: Mentors also valuable resource persons for options in higher education and careers.

d. **Number of Students:** The Department of Education, Government of Haryana and District Education Officers of the district concerned were requested to sponsor

good and willing students of Government Schools. While the number of students who applied was large, but 2,210 joined and 1,224 successfully attended them till end. 986 students left at different stages due several reasons. The district-wise number of students, who completed the Summer Schools, is given in Table-2. The reasons for drop-outs were: - (i) late sponsoring of students by schools, (ii) shoddy selection process, (iii) poor fundamentals and slow pace of learning, (iv) tuition classes and (v) family commitments. The students, who attended the Summer Schools for the entire duration, were committed and showed a considerable improvement.

- e. **Feedback:** Feedback was obtained from the Mentors as well as the students who completed the Summer Schools. The feedback was very positive and encouraging. The students wanted such camps of longer duration as well as short interactions at regular intervals during the year.
- f. **Expenditure:** The Summer School at Maur Mandi, Punjab was held in collaboration with another NGO, Maur Education Welfare Society, which met all the expenditure. For the remaining four of eight Summer Schools, the SPSTI had raised the funds. The SPSTI had also met the expenditure on supervision, guidance, certificates and other such common items. In all, the SPSTI had spent a sum of Rs.9,06,109.00 lacs on the Summer Schools.
- g. **Visit to Dharohar at Kurukshetra University:** The students of Kurukshetra Summer School, Kurukshetra visited the Dharohar in Kurukshetra University.



Visit of Summer School Students to Dharohar, Kurukshetra University

- 12. **How and Why Monthly Lecture Series:** The Monthly Lecture Series is one of the standing activities of the Society. Efforts are made to hold such lectures as often as possible. However, due to examinations and admissions, it has not been possible to hold lectures every month. During the year 2018-19, the following five lectures were held under the Monthly Lectures Series: -

- a. **Title: Intruding into God’s Domain**

**Speaker:** Dr. Jai Rup Singh, Founder Vice Chancellor of Central University of Punjab and GNDU, Honorary Professor, Panjab University

**Date and Time:** February 9, 2019 at 10:00 AM

**Venue:** Seminar Room, Department of Botany, Panjab University, Sector 14 Campus, Chandigarh

**Summary:** 4,000 years before Mendel fiddled with pea plants in 1865 to “discover” the basic principles of genetics, man had effectively utilized these principles for animal and plant breeding. same era tablets showing cross-pollination in date palm, the presence of superior varieties of rice during 4000 BCE and documentation of genetic diseases in 2500 BCE, are all testimony to the deep observation power of man. The analytical power of man & his understanding of inheritance principles, coupled

with discoveries involving hereditary material, advancements in related technologies and medical sciences led to in-depth studies on birth defects and genetic diseases and it resulted in the launch of Human Genome Project (HGP) in 1990. Gradually the number estimates got reduced to 30,000-40,000 in 2001, ~20,500 in 2007, 19,000 in 2014, 20,054 in 2017 and in March 2018 it was 18,894 but revised to 21,306 on 28th May 2018 and now on 13th October 2018 it stands at 46,381. These protein coding sequences account for only ~ 1.5% of the total genome, the remaining ~ 98.5% of genome being associated with non-coding RNA molecules, introns, regulatory DNA sequences, LINEs, SINEs and the sequences about whom no function has yet been described. We need new tools, technologies and novel thoughts to decipher the role and function of this major component. On 3rd May 2018, scientists from The Netherlands reported for the first time, self-organization of mouse stem cells into a very early embryo in a laboratory dish. On 11th October 2018, researchers from Chinese Academy of Sciences, who had earlier reported producing mice with two mothers only, announced birth of mice with two fathers only. Brazilian scientists, on 4th December 2018 announced a live birth after uterus transplantation from a dead donor. Recent developments in molecular genetics, like CRISPR-CAS9, have empowered the scientists to intervene into the living embryo, before implantation, alter specific genes and implant it to get a genetically modified individual. On 25th November 2018, a Chinese scientist, He Jiankui, announced his unprecedented experiment that edited human embryos by altering a gene in human fertilized eggs and healthy twin girls have been born from the gene-edited egg.

Newer technologies like CRISPR-Cas9, do not require highly sophisticated laboratories so there is great vulnerability of our genome being hacked by amateur or villain biologists for grave misuse.

**b. Title: Building the Pushpa Gujral Science City – Issues & Challenges**

Speaker: Dr. R.S. Khandpur, Former Director General, Pushpa Gujral Science City, Kapurthala

Date and Time: January 19, 2019 at 10:00 AM

Venue: Auditorium, SAIF/ Central Instrumentation Lab (next to Maths. Dept.), Panjab University, Sector 14 Campus, Chandigarh

Abstract: The enlightened political leadership post independence was conscious of the important role science and technology can play in development of the country. It was also realized that infusing scientific temper among the general masses would be essential to pull the society out of superstitions, that is necessary for a developed nation. Setting up a series of science centers in the country was considered as an essential component to meet the intended objectives. Creation of Pushpa Gujral Science City (PGSC) at Kapurthala stands towering as a part of this initiative. The building of the PGSC was a task that was full of constraints and challenges as the project was to be set up in rural hinterland of Punjab with no trained manpower in the field readily available in the country and very little support in terms of manufactured scientific exhibits. The other challenges included building an all-inclusive place for people of all ages with different educational and social background. The talk will dwell upon as to how these and many other such challenges were met with meticulous planning and well thought out strategy in developing the most modern Science City in the country.

**c. Title: Genome Editing: A Game Changer Technology for Re-designing Life Forms**

Speaker: Prof. Rakesh Tuli, FNA, FASc, FNASc, FAAS, Sr. Research Advisor, UIET, Panjab University, Chandigarh

Date and Time: November 24, 2018, 10:00 AM

Biologists have been endeavoring to make life a rewarding experience. Some of the illustrative examples from life sciences are the discovery of molecular scissors that cut

DNA at specific sequences, decoding the sequence information in DNA that holds the secrets of life forms, and chemically synthesizing DNA sequences to create a functionally successful artificial script. A large number of similar discoveries are awaiting interdisciplinary efforts to reach their potential of changing life. A natural home where such transformational teams can emerge are the universities and clusters of organizations that impart boundless education in varied disciplines and can provide ecosystems where teams set clear goals in interest of knowledge or society, and are inspired by the best. Through the last about four decades, life sciences have led to the development of unprecedented technologies based on the study of genome. This is an amazing self duplicating, self programming and self correcting molecule that hold the secrets of life forms. Some of the recent technologies like “genetically modified crops” are at the threshold of transition to transformational technologies, like “genomically edited crops”. Examples of correcting even multiple birth disorders by genome editing have become available during the last 5 years. Yet, important challenges lie ahead for refining and applying the new technologies, and deciding in which form and with what ethical limits, these should be used for evolving healthier life.

d. **Title:** Rise of Artificial Intelligence: Future of Machine Learning

**Speaker:** Shri Harit Mohan, CEO and Founder, Signicent Information Solutions LLP and Shri Sushil Kumar

**Place:** Seminar Room, Department of Chemistry, Panjab University

**Date & Time:** July 14, 2018, 10:00 am

**Abstract:** Introduction of human intelligence vis a vis artificial intelligence along with its various applications like game playing, expert systems, natural language understanding and processing, perceptions and robotics. The lecture also focused on various types of intelligence such as agent and multi-agent systems, machine intelligence, data mining and web intelligence. Intelligent web applications such as Google News, Amazon online retail stores and Netflix are already making big strides. Case studies like Google Duplex and Marc Zuckerberg’s Jarvis were discussed and their videos shown.

e. **Title:** Artificial Intelligence & its Applications

**Speaker:** Prof. M. Syamala Department of Computer Science & Applications, Panjab University, Chandigarh

**Place:** Seminar Room, Department of Physics, Panjab University, Chandigarh

**Date & Time:** May19, 2018, 10:00 am

**Abstract:** Artificial Intelligence is the part of computer science concerned with design and development of systems that can display human attributes as reasoning with knowledge, understanding natural language, learning from examples, perceiving things, making systems to perform tasks on behalf of humans and helping in decision making. Applications that incorporate intelligence perform better and provide desired results which are otherwise impossible for traditional systems. There are a number of applications that require artificial intelligence. Intelligent Internet search or semantic web, natural language queries in information systems, using computers as experts in specific domains and Robots performing various types of required tasks to name a few. In this talk, the above concepts are explained with examples. Some case studies of artificial intelligence systems that are available are also demonstrated. It is concluded that artificial intelligence is indispensable in future software systems.

### 13. **Public viewing of Jupiter, Saturn, Mars & Moon (Sky-Watch, सितारों से मुलाकात)**

October 28, 2018: To generate interest and curiosity about astronomical objects and in science, the Society conducted an event on October 28, 2018 (Sunday) in the prestigious Rose Garden of Chandigarh by the name "Sky Watch – सितारों से मुलाकात".





It was the second program conducted by the Society in Rose Garden. Earlier, on January 31, the Super Blue Moon Lunar Eclipse was shown to people through the telescopes at the same place. The event was supported by the Department of Science & Technology, Chandigarh Administration.

The experts were Professor J. S. Bagla of Indian Institute of Science and Technology Mohali (IISERM) and Professor Keya Dharamvir, formerly of Panjab University and General Secretary, SPSTI. They were assisted by six research scholars namely, Ankit, Avinash, Ranbir, Ashish, Manvendra and Juhi of IISERM and Narinder and Anuj, MSc students of Panjab University. The SPSTI had installed four telescopes and one binocular in the Rose Garden of Chandigarh for the public to view moon and a few planets of our solar system. Three telescopes were arranged by Professor J. S. Bagla and the rest by the SPSTI.

More than 400 persons, mostly children viewed the moon, Mars, Saturn and Jupiter with considerable excitement. The SPSTI had also displayed solar system and explained the movement of the planets and the moon. In addition, plasma balls, solar toys, piezoelectric balls etc. were also deployed for the children to learn more about solar system and how day and night occurs.

Shri Dharam Vir, former Chief Secretary, Haryana and President, SPSTI, interacted with a large number of children and others and obtained their feedback. There was a general view that such events should take place more often.

14. **Jyotirgama, Stage Science Experiments Show at Sci-Pi' 19:** With the Mobile Science Laboratory, Circus of Science, a science show of exciting and eye-catching experiments was organized at the Gyan Gunn Sagar International School, Maur-Mandi in Bathinda on 27.02.2019. There were two types of activities: (1) display of many scientific equipment, where students were encouraged to handle them and perform experiments and (2) several experiments were performed with the active participation of the students on the stage, which kept the school students and the teachers spell bound. The students were actively involved in the show. Prof. Keya Dharamvir was the leader of the team comprising the team of Mobile Science Laboratory.

They also explained the principles behind each experiment, which was appreciated by most of the students. There was also a healthy question and answer session.



Prof. Keya Dharamvir demonstrating Experiments during Stage Show

Encouraged by the response of the students as well as the public to the science-based activities, the Society has decided to expand its outreach programme in the State of Haryana, Panjab and Chandigarh.

15. **Media Coverage:** The SPSTI's events and activities were covered quite prominently by the print and electronic media. The Society has also set up a channel on YouTube and lectures are being telecast through the channel.



16.

