

WELCOME ADDRESS

J C Bhattacharyya
Indian Institute of Astrophysics
Bangalore-560034, India

Participants of the IAU Symposium # 142 on 'Basic Plasma Processes in the Sun', Ladies and Gentlemen.

Most hearty welcome to the beautiful city of Bangalore, which is aptly described as the present-day scientific capital of India. Although it is beginning to suffer from the inevitable effects of a world-wide population explosion, Bangalore still retains some of its old charms, which had all along attracted the cream of intelligentia from all over the country. They came in search of a serene atmosphere, where undisturbed minds and unfettered thoughts could flourish; they have contributed to some of the gems of human creativity from this part of the world.

The present city of Bangalore has grown out of a settlement of a chieftain owing allegiance to the mighty Vijayanagar rulers in the sixteenth century A.D. Four hundred years ago, the founder, Kempe Gowda, had dreamt of a giant metropolis; he had laid four corner stones of the future city, which can be seen even today. The city has now spread far beyond the founder's dreams, but the original charm still lingers around. The rulers of the state of Mysore, the great challengers to British expansionism in India, were Hyder Ali and his son, Tippu Sultan. They had poured out their hearts in beautifying the city; relics of their devotion are evident among the gardens and old edifices scattered all over. The British had found it an ideal place for locating their army base, which still persists as a sprawling cantonment, occupying a large area at the heart of the present metropolis. Sir Winston Churchill, the saviour of Britain in Second World War, had spent some of his younger years here, as a British army officer.

The salubrious climate and the serene atmosphere had attracted other interests. At the beginning of the present century, Sir Jamshedji Tata, the pioneer industrialist of the country, decided to establish an institution for higher learning. It was against the advice of many of his friends, who advocated that the money be spent in feeding the hungry and clothing the poor. But Sir Jamshedji had insisted on creating an institution where the best talents in the country would find a heaven for blossoming. The Indian Institute of Science, located in the north-western corner of the city has kept his vision alive.

Bangalore has welcomed several other great minds of India. It is here that the Nobel Laureate poet Rabindranath Tagore has composed some of his soul-stirring poems and songs which still ring in the hearts of millions all over India. One of his famous novels, "Sesher Kavita", meaning "The concluding poem" was largely composed here in a house named "Balabruicee", very close to this place. The novel has an unusual theme; its main character Amit Ray is an unconventional and unorthodox philosopher and a poet. Through his words, Tagore has given a beautiful definition of the quality known as culture. Amit says: "The stone which makes up a diamond is learning; but the sparkle which emanates from it is culture".

The high tide of scientific culture flowed into Bangalore with Sir C V Raman, when he moved over from Calcutta in the thirties. He was associated first with the Indian Institute of Science and later established his own laboratory. Besides building a very active school of researchers, he established a Science Academy, with activities covering

the important aspect of scientific publications. His research institute and the Academy, both are forging ahead; the latter having completed its golden jubilee five years ago.

It will not be possible to give you a fair account of the scientific activities in Bangalore within the limited time which has been allotted to me. But I can tell you that as far as the subject of Astronomy and Astrophysics is concerned this is the Mecca of India. As many as five of the research and educational institutions in the city have large aspects of this subject in their curriculum activities. The international journal of Astrophysics and Astronomy is published by the Academy of Sciences here; even the editorial work of the Bulletin of the Astronomical Society of India, the other astronomical journal in India, is also done here. A majority of the community of astronomers in present-day India is attached to these five institutions in the city. From very low-frequency radio waves to high-energy gamma rays, all bands of electromagnetic spectra are covered by them.

One of these five institutions in Bangalore is the Indian Institute of Astrophysics, which is playing host to the present symposium. The Institute shifted its centre of activities to Bangalore from Kodaikanal only fifteen years ago, but it has a chequered history of more than two hundred years. In the penultimate decade of the eighteenth century, a small observatory had started in Madras and continued there till the end of the next century. The names of Goldingham, Taylor and Pogson are associated with it, who had carried out astronomical activities over those lean years in India. Among notable achievements are the Madras Star Catalogue of 1845 and discoveries of some asteroids and variable stars. The observatory was shifted to Kodaikanal along with the dawn of the present century, where work on solar physics, a subject more directly relevant to the present symposium, was started. It was there, in Jan 1909, that John Evershed made systematic studies of sunspot spectra and discovered the radial motion of solar matter; it was perhaps the first observation of solar plasma movements.

I shall not burden you with the details of solar work which has been continued at Kodaikanal till today. It will perhaps suffice to say that five years ago a small group of solar physicists from USA was surprised to find in the archives of the Kodaikanal Observatory an unbroken series of photoheliograms and spectroheliograms covering almost eight sunspot cycles. The discovery has led to a collaborative program between the Hale Observatories and Kodaikanal, aiming at solving the riddle of solar rotation.

One more international collaborative investigation is also being pursued between the Pulkovo Observatory in USSR and Kodaikanal, where the large-scale distribution of solar magnetic fields over the past eight sunspot cycles is being deciphered from the old H-alpha spectroheliograms.

I must point out that even before Kodaikanal started functioning, several important discoveries in solar physics were achieved on Indian soil. On 18th August 1868, the central track of a total solar eclipse crossed over the present state of Andhra Pradesh. On that occasion two European teams, a British team led by Col. Tennant and a French one led by the famous astronomer Janssen, had their camps in the vicinity of Guntur town. Both the teams detected a bright yellow line in the flash spectra, which did not match any line known from laboratory experiments. Based on these findings, Sir Norman Lockyear predicted the existence of a new element, Helium. That was twenty seven years before the element was isolated in laboratories by Ramsay. The event is often described as the birth of solar astrophysics.

Another total solar eclipse three years later yielded a proof of existence of the F-corona; the discoverer was Janssen who had once again come to India for the event. Still a third eclipse in January 1898 resulted in the discovery of the ultra-violet extension of chromospheric spectra by a British team; young Evershed was in the group; his experience had paved the way for his return to Kodaikanal eight years later.

The 1898 eclipse is very important to India from a different point of view too. It was at this eclipse that Kavasji Naegamvala, an Indian scientist, independently organized and led a successful team of observers. He recorded excellent photographs and spectrograms of the event. Although no outstanding results came out of his effort, he managed to break a psychological barrier, which had discouraged native scientists in attempting experiments in the contemporary frontiers of astronomy. His success enthused many young hearts, who started cherishing dreams of becoming astrophysicists. The culmination came twenty years later, when a young lecturer in Physics, in the University of Calcutta, solved the persistent puzzle of the anomalous strengths of ionized calcium lines in chromospheric spectra. The young scientist was Megh Nad Saha, who went on to establish stellar spectroscopy on a solid foundation.

I feel I have given you enough details about the venue and the local interest in the subject of the symposium; I wish to add just one more point of the special significance of the Sun in the Indian mind. As in many other civilizations the world-over, the Sun is worshipped as an all-powerful god in this country too. The traditional hymn in praise of the Sun, is Gayatri Mantra, which generations of Hindus have been reciting daily over the past few millenia. The key words of that mantra are:

"Tat sabitur varenyam, bhargo devasya
dheemahi, dheeyo yo nah prachodayat."

Let us meditate on that heavenly splendour, the glorious Sun, so that he may inspire our wisdom. The hymn is mainly an acknowledgement of the vital role played by this heavenly body in our very existence, but the underlying message of searching our minds for the ultimate truth is abundantly clear. It is the same idea which has brought us together, from all parts of the globe, to understand this enigmatic process, which is our Sun. The details of questions have kept on changing, but the query remains the same comprising the eternal musings of the human mind.

With these words, I welcome you all once more to the Symposium.