

Science In Indian Media

- a Blueprint for the New Millennium

Dilip M. Salwi



Vigyan Prasar

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Science in Indian Media : A Blueprint for the New Millennium

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To
the late SURENDR JHA
a pioneer in science communication
in India who would have loved to see this book

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Foreword

The Publication Programme of Vigyan Prasar has taken some shape in the last few years. To start with, Vigyan Prasar brought out a number of publications on a variety of topics of science and technology on an experimental basis. Popular Science classics, India's Scientific Heritage, Natural History, Health, and Do-it-yourself are some of the series that evolved over the years. Our emphasis has been on bringing out quality publications on various aspects of science and technology at affordable prices. Further, Vigyan Prasar is putting in efforts to bring out publications in major Indian languages for various target groups.

The present book, "Science in Indian Media, a blue print for new millennium" written by Dilip M. Salwi, a well known popular science writer, is a departure from the current series. The author attempts to give an overview of present status and future potential of science communication in the country, based on his interactions with a large number of science communicators, scientists and media persons. After a discussion on the present scenario of science communication through various media, the author charts a path way for science communication in the future. The book, incidentally, present author's perceptions, and it is hoped that the book would start a healthy debate on various aspects of science communication.

New Delhi
September 2002

Vinay B. Kamble
Acting Director
Vigyan Prasar

Preface

Communicating science to the masses through various media is a much neglected field in India. It is no surprise then that it lacks the necessary infrastructure and manpower for this activity despite the fact that it has a huge scientific base. Much blame for this malaise can be laid on the faulty science education in the country. From high school onwards, communication skills are given the least priority among science students. A science student is good at a language by his (or her) personal initiative. Often, science students are told that language is not important, only the scientific message is! Science students therefore become poor communicators and rarely try their hand at communication. Leave alone communicating science to the masses, they are at loss even to communicate for their personal advancement!

In this competitive age, science students therefore have to take a back seat. Major changes are called for in science education to rectify this fault. Apart from the inclusion of science communication as an important subject, especially at college level, there is a need to bring in attitudinal change towards communication in the scientific community. Science students, teachers and scientists must be encouraged to communicate with each other and the outside world.

How to include communication in science education in India and bring in attitudinal changes towards it among the scientific community is in itself a subject of research. It does not come under the purview of the present work. This book is aimed at identifying problems that hinder the entry of science (science includes 'technology' in this book unless stated specifically) into the various media in the country. It is a

known - and much talked about - fact that very little science enters the media but what hinders its entry has never been systematically studied and analysed.

Media persons are blamed for their indifference to science. Of course, it can be easily said that as media persons often come from humanities - or to put it more bluntly, during schooling or college they had shifted to humanities because they had disliked science-they had developed a life-long aversion to, or fear of, science. No wonder they do not promote science in the media. Judging by their personal experience they believe that Indian masses are also not interested in science. Again, this attitude towards science can be attributed to faulty education.

First of all, science is not properly taught and, secondly, the system encourages compartmentalisation of subjects and breeds prejudice against others. Besides, scientists have nothing to offer to media persons by way of perks, facilities, gifts, gossips, scoops or quotable quotes which a politician, businessman or filmstar offers them at any time. On the other hand, it is true that real scientists are often too busy with their research work to bother about the media.

In Government labs several 'service rules' further prohibit scientists from speaking to media persons. For instance, no scientist other than the Director of a lab is supposed to speak to media persons about the research done either by him or by the lab. No less than the Director General of a Council is supposed to speak to media persons about policy matters. Essentially, these rules are meant to avoid embarrassment for the lab or the concerned authority due to misreporting. But they are so rigidly followed that Indian scientists do not even answer basic queries about a scientific subject a media person is trying to understand to write a story!

Another reason why a scientist, especially the chief of a lab, does not open the doors of his lab to media persons is the fear of exposure. If something appears in the media, it amounts to an open invitation for public queries and criticism. Further, there is always internal politics as well as the fear of being misrepresented or misreported. Add to all these factors is the traditional attitude of the scientific community that

talking to media amounts to seeking cheap publicity in the name of science. Why stir a hornet's nest?

But in the present millennium, when all scientific labs, institutes and organisations have to generate revenue for their survival, scientists have to report about their activities in the media to attract the attention of the masses, particularly the buyers of technologies. At the same time, the media has to pay attention to the coverage of science. If big media houses do not do so, the smaller ones will grab a bigger share of the audience because the masses value science.

The status of education, science and media in India being what it is today, what can be done to increase the quantum of science in various Indian media? Obviously, the answer lies with the persons engaged in science communication (science communication includes both science writing and science journalism in this book unless stated specifically) or associated with science or media.

This book is a result of encounters with science communicators, scientists, and media persons working in different parts of India. Their selection was not based on their being the best in the field but on their experience, availability and accessibility. A 'Blueprint' and 'Recommendations' for more science, more effectively presented science, and more interesting science, in the media, in tune with the needs of the Indian masses, follow their viewpoints and suggestions.

It can easily be seen that in addition to infrastructural requirements, considerable changes are needed at various levels such as content, finance, policy, etc, to increase the quantum of science in the media. Much attention has to be paid to the creation of necessary manpower to communicate science to the masses not only in rural areas but also living in urban areas.

It is now upto science communicators, scientists and media persons to take the blueprint and recommendations seriously and convert them into reality. It is high time this is done because in the days to come if science literacy is not spread among the masses it would lead to rampant misery and unhappiness across the country. Today, nobody is free from both the positive and the negative effects of science. The need is for a balanced development and growth which can be achieved

only through a proper understanding of science, of its potential and limitations, and its appropriate applications in different walks of life.

It is hoped that the blueprint and recommendations will suit most of the Third World countries all over the globe because their development is constantly bogged down by more or less the same problems which India faces today.

Dilip M. Salwi

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I am particularly indebted to Dr N.B.K.Choudhury, Secretary, Orissa Bigyan Academy, Bhubaneswar; Dr Dilip Kumar Sarma, Secretary, Assam Science Society, Guwahati; Dr Shiv Gopal Misra, President, Vigyan Parishad, Allahabad; A.P.Deshpande, Secretary, Marathi Vigyan Parishad, Mumbai; and several friends and well-wishers, namely, Prof A.K.Bhatnagar, Dr Anil Lachke, Dr H.V.Bathla, Bharvi Dutt, Sumati Sampemane, Dr N.R.Mankad, Dr P.K.Panda, Dr Gyan Singh, Dr K.R.K.Mohan, Dr A.K.Baruwa, Dr Nabjyoti Sarma, Dr Sunil Kumar Pandey and Dr Dinesh Mani who helped me to successfully complete this work. Special thanks go to my friends and relatives Sumati Tawde, Amol Tawde, Shefali More, T.C.Alexander and his wife, V.S.Chaturvedi, Anand Chaturvedi, Minal Salvi and Prakash Salvi who made my life easy and comfortable during my stay at their places.

Last but not least, I am thankful to my wife Smriti, daughter Neha and son Romel who bore with me patiently both during my presence in and long absence from home.

Dilip M. Salwi

I Science for Survival and Democracy

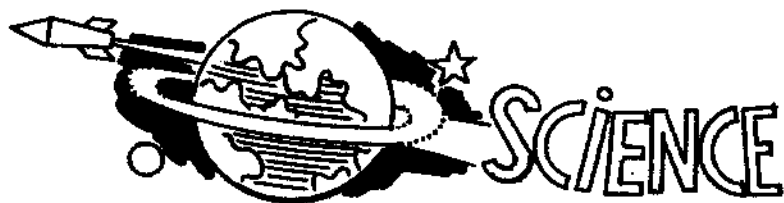
Man has to fight his own battle. Our emphasis is to equip him with the knowledge of science and technology as they alleviate his poverty and his underdevelopment.

M. P. Parameswaran

It is suicidal to create a society dependent upon science and technology in which hardly anybody knows anything about science and technology.

Carl Sagan

Nobody can deny the important role that science is playing in the daily lives of the masses. As a result sweeping changes are seen in their socio-economic status, culture, values and environment, notwithstanding the overall effect of all these factors on the



country's and the world's social, political and economic scenario. In other words, science is a phenomenon that is sweeping the world today, sometimes sending shock waves across the globe and sometimes reshuffling the lives of masses. Is it possible to remain ignorant of this phenomenon, sometimes referred to as a force?

Certainly, masses are not ignorant of this phenomenon. A large majority is aware of its presence and awesome power to do good as well as evil. But awareness has its own limitations. It very often creates fanatics who either applaud it sky high as a magical wand that is transforming the world or inveigh against it as an evil force destroying environment, culture and human values. It does not create 'science literate' individuals who understand science and its working, know its potentials as well as limitations, know that science is neither good or bad, and it is the way a system uses it makes science good or bad. If science creates pollution, for instance, it is science again which could effectively be used to counteract or circumvent it. More—rather than less—science is required to live in harmony with nature.

Understanding the working of science and its implications in a system would not only create such science literate individuals but also create individuals who would know how to use science for their own good and for the overall good of a system, a society or a country—or for that matter, the earth. As far ago as on March 4, 1958, the Science Policy Resolution of the Government of India (For more details, see Appendix-II) stated clearly at one place, "The dominating feature of the contemporary world is the intense cultivation of science on a large scale, and its application to meet a country's requirements".

Why understand science?

But, then, why is it necessary to know and understand science and *not* simply be aware of it as a tool for the development and survival of a country? Because every other day politicians are taking major policy decisions involving science for the development of a country, which would sooner or later affect the lives of masses. Although politicians often do not understand science, they are guided willy-nilly in taking major policy decisions for development by scientists as well as businessmen, who could have, depending upon the

situation, vested interests in the decisions.

For instance, scientists could be interested in establishing a huge particle accelerator facility which may help produce a spate of discoveries that would win applause for them the world over but nothing for masses. On the other hand, businessmen could be interested in setting up factories that produce ozone-destroying aerosols for a privileged few in a country. In either case, masses would not understand the importance of these decisions because they do not understand science, though they pay for these investments through taxes!

In other words, such major science-orientated policy decisions of politicians would be undemocratic in a country where the majority does not know or understand science. But masses have the power of vote in a democratic system. If they understand science, they can argue, debate and even protest against such undemocratic decisions of the politician-scientist-businessman nexus. By means of national debates, mass protests, rallies and strikes, they can bring the issue to the notice of the politicians, put sense into their heads by placing before them scientific facts and figures and get the decision reverted. Without widespread science literacy among masses, no country can claim to be a democratic country.

Besides, science is not a mere tool for the material development and prosperity of a country. It is also a powerful tool for the mental growth of masses. The scientific methodology, the foundation of science, imparts analytical thinking and rational outlook, and sharpens insights. It is a powerful weapon against blind beliefs, faiths and



superstitions which hinder the creation of an enlightened society. In the long run, it inculcates the proverbial 'scientific temper' much needed in a country like India where caste, creed, custom and ritual rule the roost. It would also enable the masses in making value judgements about science and in deciding priorities needed for the balanced development of a system or country.

In short, science literacy needs to be spread among masses for a healthy and balanced development of the country. But, how can science literacy be spread among masses? Of course, through education. The word 'education' immediately evokes the image of schools, colleges and universities where teachers are thrusting various subjects down the gullets of students! It is a bad yet real image of education. Education should inculcate the urge to refresh and update one's knowledge, thinking and aspirations. It should not be a static system where acquisition of a degree becomes an end to education!

Spreading science literacy

How can one continuously educate masses without making it a compulsory activity? Through various media, of course. "Media, by altering the environment, evoke in us unique ratios of sense perceptions," said the media wizard Marshall McLuhan, "The extension of any one sense alters the way we think and act and perceive the world. When these ratios change, men change". Moreover, media is a tool created by science itself! Like science, it is dynamic, ever changing and constantly in tune with the needs and aspirations of the masses. Today, through radio and television, science literacy can be spread among the vast majority of the unlettered masses of a country like India.

Bleak scene

Thanks to the liberalisation policies of the Indian Government in recent times, science is entering the life of every Indian living in a metropolis or a city in a big way. However, very little of it is percolating down to masses through various media. Although no extensive research has been done to date to assess the quantum of science entering various Indian media, some recent studies show that the percentage of science range about one to three per cent in

all three media, namely, print, radio and television. This despite the Article 51 A.(h) of the Fundamental Duties, *The Constitution of India*, which states that, "It shall be the duty of every citizen of India to develop the scientific temper, humanism and the spirit of inquiry and reform". Reasons for this malady are several but the three most important are: Indian media persons give hardly any importance to science; secondly, there are very few trained and committed science communicators available in the country; and, thirdly, Indian scientists are as indifferent to science communication as they are to any other issue facing the country.

"When a public has neither the training nor the interest to follow the working of science it can still be willing to acclaim results, the more marvellous the better, and to listen to the opinions of sufficient eminence on any subject whatever." said the eminent science historian J.D. Bernal more than 50 years ago but his words held true even in May 1998, when Indian scientists conducted nuclear tests. Although no science reports giving a proper perspective on nuclear energy, nuclear bombs and their mechanism, their development in the country, etc., appeared in any media except a few elite news magazines, the Indian masses were euphoric and hailed the tests as a matter of national pride. An excellent opportunity to educate Indian masses about nuclear energy was missed!

The reason why this activity of 'science communication' has since the Independence of India in 1947 continued with fits and starts, with some occasional bright spots, is because no systematic or planned effort was made by either scientists or media persons to create appropriate manpower and infrastructure to encourage and sustain it. In the 70s, Delhi-based Press Institute of India conducted some workshops on science writing. Off and on, the Central Institute for Educational Technology (a wing of NCERT), New Delhi, also conducts workshops on script-writing for TV. In recent times, the Department of Science and Technology's National Council for Science and Technology Communication (NCSTC) and the National Centre for Science Communication, Mumbai, have made some noteworthy efforts in this direction by conducting workshops for regional science communicators all over India.

Except for these workshops and seminars, science communication has not been given any importance over the years

because both scientists and media persons think the activity belongs to the other's court! Scientists have by the very nature of their work confined themselves to their labs and looked down upon media as something dubious. Media persons, on the other hand, being most often of non-science background, have always been shy of science and kept distance over the years. Science communication has therefore languished having literally fallen between C.P.Snow's two cultures, of sciences and humanities, which never meet in the real world!

Today, no mechanism exists in the country to create manpower in science communication. Few who are surviving in this field despite unfavourable conditions is due to their personal initiative and drive. Few Indian universities offer a full fledged course in science communication. A few journalism courses introduce 'science journalism' as one of the streams of journalism. No special training is imparted to the interested except a few preliminary lectures!

This is indeed a sad commentary on the media of a developing country like India which is launching its own satellites, has nuclear weapons capability, has built super-computers, has sent expeditions to Antarctica, and is exploring ocean beds for minerals. An essential

Laws of Science Communication?

Any phenomenon, whether natural or man-made, follows some laws. Similarly, science communication is also governed by some laws. In the following are five laws of science communication enunciated by Dilip M. Salvi, which may enable science communicators and media persons to bring science to the masses more effectively.

1st: Only those elements of science receive attention in a society which suit its goals or which inspire awe.

2nd: A science communicator tends to impose his or her limited ideas of science, scientists and scientific research upon the audience.

3rd: The amount of space allotted to science in different media of a country is the index of the quality of life of its average citizen.

4th: The quality of science communication or presentation in a country is directly proportionate to the quality of science produced in it.

5th: To popularise science is to humanize science. □



tool for balanced and healthy growth of the country is totally ignored. The prevailing trend of lopsided growth has endangered both its survival and democracy today.



II

Science in Indian Media

In the towns and villages of the Third world, modern science and technology has in many ways become the new superstition, creating more bewilderment and wonder instead of comprehension.

Anil Kumar Agarwal

The media are not concerned with the mere presentation of science but with the presentation of spectacle.

Derek McNally

Propagating science through media has its roots in what is called 'science popularisation', a term that has over the centuries come to mean propagating the ideas and romance of science to masses. It is an activity consisting mainly of giving a series of lectures or demonstrations or even writing books often indulged in initially by great scientists of the time. Over the centuries, some well known science popularisers have been Humphrey Davy, Michael Faraday, T.H.Huxley, Nicolas Flammorion and K.E.Tsiolkovsky. In recent times, the names of eminent scientists like Arthur S. Eddington, George Gamow, J.B.S.Haldane, Margaret Mead, Fred Hoyle and Carl Sagan figure prominently as popularisers of science.

The British brought along with science this age-old tradition of science popularisation to India. Eminent Indian scientists like Mahendralal Sircar, J.C.Bose, P.C. Ray, Ruchi Ram Sahni and others carried this tradition forward in Kolkata and Punjab enlightening the Indian masses on the latest and exciting developments in science.

After the Independence of India in 1947, Meghnad Saha, S.N. Bose, C.V.Raman, D.S.Kothari and others carried forth the torch of science popularisation and spread it to other parts of the country. Particularly, the great physicist S.N.Bose was keen on bringing science to masses in their mother tongue. He urged Indian scientists to speak and write about science in their mother tongues. In 1948 he went on to found an association and even a magazine to popularise science among Bengalis.

On the other hand, Bose's contemporary Meghnad Saha



continued to write prolifically on various scientific issues of immediate interest to masses in the research journal *Science and Culture* which he himself had founded. He also used to give radio talks and interviews on scientific subjects which were close to his heart. In recent years, eminent scientists like J.V. Narlikar, D.Balasubramanian, M.S.Swaminathan, Yash Pal and P.M.Bhargava have been popularising science through lectures, books, and also newspapers and TV shows.

Science in Indian media

Meanwhile, news, views and features about science have been appearing sporadically in the Indian print media, i.e., magazines and newspapers of various regional languages, especially from the second half of the 19th century. It led to the creation of what are today known as 'Science writers' in regional languages. Lakshmi Shankar Misra, Shankar Balkrishna Dikshit, Ramendrasundar Trivedi, Kerala Verma, etc., were the pioneers in writing science

An Interview with Indian Kalinga Prize winner

Jagjit Singh: Self-censorship is very important for a writer!



'Let no one enter my class who has not read Jagjit Singh's article the previous Sunday!' This notice always hung at the entrance to the class of Prof D.P. Mukherjee, Professor of Economics at Lucknow University, Lucknow. "When I came to know this, I was really flattered. Thereafter I began to write science more enthusiastically and more regularly," said Jagjit Singh the first Indian to receive the Kalinga Prize for science popularisation, reminiscing those days of early 50s when he began

to write perhaps the first column on science in English in the *National Herald*. He had only a few months ago returned from London having met the great populariser of science, J. B. S. Haldane, whose writings he admired. "When I started writing science, I imitated Haldane's style," he admitted. Earlier, J. D. Bernal's *Social Functions of Science* had also made a mark on his mind as till then he had never thought of the impact of science on society.

Today, in his 80s, Singh is unable to read and write because of his failing eyesight. Nevertheless he continues to keep abreast of developments in science. Basically an M.A. in mathematics from Punjab University, Lahore (now in Pakistan), given the chance, he would have preferred to become an academician and not what he became—a Manager of Operations in the Indian Railways. Born at Amritsar, Punjab, on May 15, 1912, Singh's father was a clerk and administrator who had attended that historic meeting at the Jallianwala Bagh in 1919. Fearing arrest he was always on the move. Singh therefore lived under the guidance of his mother. He was poor in studies initially but later under the guidance of one teacher Puran Chand, who had the knack of explaining things, he became keen on mathematics. English also caught his fancy and later helped him in developing a style of presentation of science.

Shortly, mathematics became a passion for Singh. He could not shake it off even when he joined the Indian Railways. He began to apply the techniques of operational research to the

problems in managing railway operations and schedules. He wrote a number of research papers on how to make the existing operations more effective but his mathematical suggestions were never appreciated by his seniors. He tried writing a text-book on mathematics but it was a flop! Not more than ten persons read the book! His visit to the United Kingdom in 1949 when he met Haldane proved to be a turning point in his science writing.

Initially, when Singh started writing on science, Editors looked with doubt on his writings because he was then a Manager with the Indian Railways. But eventually his capability in delivering a readable article on science was recognised. "I usually write on a frontier of science topic which I have to educate myself in the first place," said he, "Having educated, I then go on to impart my understanding to the public. In fact writing of a scientific discovery is an exercise in self-education". Subsequently, he compiled his articles in book form. He published about eleven books, of which the most popular are *Mathematical Ideas: their nature and use*, *Modern Cosmology*, and *Some Eminent Indian Scientists*. Some books have been published abroad and some have also been translated into Japanese and Dutch.

Reacting to the common criticism against his writings that they are difficult to comprehend, Singh remarked, "If something is easy to read, it implies you already know what is written. The content is zero. On the other hand, if something requires an effort to read, it implies you are learning what you don't know. You are gaining knowledge, and knowledge is power!" In other words, Singh writes for specialised audience who already know some science. What about science for masses? He thinks "unfortunately, the growth of everyday language is not yet keeping pace with the growth of science".

Singh retired as General Manager, South Eastern Railways, in 1969. He has since then been leading a quiet life in his own bungalow at Friends Colony, a posh colony of South Delhi where India's top bureaucrats live. "Self-censorship is very important for becoming a good writer," said he "My own test of judging is: If I find my article okay after reading it the next day, I retain it. Otherwise, I throw it into a waste basket! I consider personal satisfaction to be the biggest reward in science writing." Such thoughts and tips on science writing and several interesting incidents that occurred in his life can now be found in his autobiography *Memoirs of a Mathematician Manque*. □

in their respective languages, namely, Hindi, Marathi, Bengali and Malayalam. As early as in 1818, popular science writing in Hindi was started in the bilingual (English-Hindi) *Digdarshan* published in Shreerampur, West Bengal, which was edited by an Englishman Clarke Marshman. In 1842, a Bengali magazine *Vidyadarshan* published a series of articles on science. Subsequently, regional magazines like *Marathi Dnyan Prasarak*, Tamil *Janavinuthini*, Telugu *Chinthamani*, Assamese *Arunodoi Sambad Patra*, etc., were the pioneers in publishing from time to time news, articles and features on science.

Today, science figures, if not regularly, quite often in most of the regional magazines and newspapers especially in Hindi, Bengali, Marathi, Kannada, Malayalam, Telugu, Oriya, and Assamese. Some languages also have magazines devoted exclusively to science; a few even aimed at children and teenagers. Unfortunately, most of these regional science magazines are dying today due to lack of finance, manpower, enterprise, direction and guidance.

Science writing began in an organised way in English in 1964 when the Council of Scientific and Industrial Research (CSIR), New Delhi, brought out a monthly magazine devoted to science called *Science Reporter*. Earlier, in 1952, a popular science monthly in Hindi *Vigyan Pragati* had also been launched. Shortly, in 1966, the *Times of India*, Mumbai, floated another popular science magazine *Science Today*. Even in those days, all these magazines were successful despite the scepticism aired in the media community that Indian audience is not interested in science and so science would not sell. In 1965, Invention Promotion Board (now National Research and Development Corporation), New Delhi, also launched *Invention Intelligence*, a magazine then devoted to invention and technology but today solely devoted to science and technology. Later, in 1971, NRDC also launched *Avishkar*, a Hindi popular science monthly.

Two decades later, in 1983, another magazine *Science Age* was launched under the auspices of the Nehru Centre, Mumbai. The Centre for Science and Environment, New Delhi, launched *Down to Earth* in 1991. This magazine is however devoted more to environment rather than science. Today, both *Science Today* (later changed to *2001*) and *Science Age* do not exist, and only four

science magazines, the CSIR owned *Science Reporter* and *Vigyan Pragati*, and the NRDC-owned *Invention Intelligence* and *Avishkar* continue to survive. In the meanwhile, computer magazines have been steadily growing in popularity. *Computers Today* and *Data-quest* are the two pioneering computer magazines still doing well at the stands.

Meanwhile, features, reports and supplements on science have been appearing sporadically in the major English newspapers or their Sunday magazines. Most often, they have been on the latest scientific developments in the West picked up from wire services or written by an Indian science writer. Jagjit Singh, Amalendu Dasgupta, Dilip M. Salwi, Harish Aggarwal, Ramesh Dutt Sharma, Gunakar Muley, Samarjit Kar, Amit Chakraborti, Pathik Guha, Niranjana Ghate, Bal Phondke, G.N. Mahapatra, D.C.Goswami, M. Nalini Mohan Rao and others excelled in this art of writing science for the masses in English, Hindi and other Indian languages. Nothing much on scientific developments in the country was however reported in the newspapers because it required science correspondents.

Science journalism

Comparatively speaking, science journalism is a recent phenomenon even in the western world. In 1926, J.G.Crowther became the first science correspondent of the British newspaper *Manchester Guardian*. A science-trained India-born Gobind Behari Lal went to the United States and established himself as a science correspondent of a US newspaper. In 1937, he even won the coveted Pulitzer Prize for his contributions to science journalism. Subsequently, Amalendu Dasgupta, Harish Aggarwal, W.S.Titus, T.P.Prabhu, etc, working as they were in various Indian newspapers, wrote on scientific developments in the country. Science was however just one of their beats and not an exclusive occupation. Eventually, Dr. K.S.Jayaraman, Anil Agarwal and Dr. R.Ramachandran joined as exclusive science correspondents in the Indian newspapers. In fact, the Press Trust of India started a separate science cell under the leadership of Dr. Jayaraman, which continues to supply features and stories on science to the Indian press to this day.

An Interview with Indian Kalinga Prize winner

Narender K. Sehgal: I started writing on science in a curious manner



"I started writing on science in a curious manner," says Narender K. Sehgal, the second Indian to bag the Kalinga Prize, with a smile. It so happened that in 1970 he returned from the U.S.A. with a Ph.D. in particle physics. He took a pool officer's job at Matscience, Chennai. In those days, Dr Alladi Ramakrishna was its Director, who always encouraged 'yes-manship' and forced the entire staff to sing to his tune.

"Myself and three of my friends could not tolerate his high-handedness," says Dr Sehgal, reminiscing, "We wrote a joint 30 page long cyclostyled letter of resignation with our grievances and circulated its copies to the concerned authorities. We're immediately sacked, not allowed to enter our rooms, the canteen where we took our food was closed, and the entire staff refused to talk to us!" He returned home to Jullunder and decided to bring the case to the notice of the authorities. But except for one, no newspaper published his letter exposing the high-handedness of the Matscience Director. That spurred him to launch his own magazine *Scientific Opinion* in 1972. His science writing career began.

"It was a single-man operation!" says Dr Sehgal, "I used to do hand-composing, print the pages on trade machine, dispatch copies to institutions and institutes, and so on." The response from the scientific community was good. Several scientists of Tata Institute of Fundamental Research and even some from abroad became paid subscribers to his magazine. Eminent scientists like Yash Pal, Satish Dhawan and Devendra Lal, policy-researcher like Dhirendra Sharma, science writer like Jagjit Singh became its subscribers. One American scientist offered to become its correspondent. The magazine was recommended for reading to science policy students. Even the *Nature* took notice of the magazine and asked him to write regularly on scientific developments in India.

"Although the magazine caught the eye of the scientific community," says Dr Sehgal, "It was a financial disaster. My parents were unhappy with me. I could not fulfil their expectations. Finally, I closed down the magazine and left for Somalia on a teaching assignment in 1976". Two years later, he returned to India as a Visiting Scientist at Space Applications Centre, Ahmedabad. On the recommendations of the Science Advisory Committee to the Prime Minister of India, the National Council of Science and Technology Communication was set up in 1982 and he was selected as its Principal Scientific Officer and then the Director. The aim of the Council was to coordinate the popular science activities taking place in the country and to promote them.

Till recently, as Head and Advisor, NCSTC, Dr Sehgal used to sit in the Department of Science and Technology's staid and inconspicuous building in Mehrauli adjacent to Qutub Hotel. Due to his initiative and drive, the NCSTC has today several novel science popularisation programmes to its credit. The TV serial on Indian achievements in science and technology *Bharat ki Chhap*, the short science question-answer programmes on TV *Kyon aur Kaise*, the long radio serials on the method of science and human evolution, namely, *Vigyan Vidhi* and *Manav ka Vikas* respectively, and the "Bharat Jan Vigyan Jatha" which brought the rural masses in direct contact with scientists and science, are some of its conspicuous contributions. Recently, on the initiative of NCSTC, Voluntary Blood Donation organisation has started a drive whose aim is not simply to obtain blood for the masses but also to educate the masses about the importance of blood for a healthy and balanced society. To sum up, the objective of NCSTC is to bring science at the doorsteps of the common man through both conventional mass media as well as unconventional media such as slide shows, folklores and songs, puppetry, etc.

Born on November 7, 1940, at Lahore (now Pakistan), Dr Sehgal had his schooling at Jullunder, Punjab. From the childhood he had known the intricacies involved in bringing the printed word to masses. As a child he had assisted his father in running his own Hindi magazine *Prakash* and a printing press. Later, he went to the U.S.A. and did Ph.D. in particle physics. Today, though retired from service, Dr Sehgal is still working out new ideas to bring science to the masses.

□



Thereafter scientific developments in India began to appear more frequently in the columns of newspapers and magazines. There was a phase in the late 80s and early 90s when some major newspapers also started publishing regular supplements on science. It appeared as though science had at last caught on in the Indian press. But, alas, most of the supplements folded up in due course! In recent years, science is just one of the beats of correspondents of most major Indian newspapers. Leave alone news, even features on the latest developments in science published in some western newspapers or magazines are straightaway reprinted in some major Indian newspapers! Today, the internet has further provided access to latest developments in science in the world. Some Indian newspapers cull out science stories from this latest source.

Today, only four major Indian newspapers have made consistent efforts over the years to bring science to the masses. The first place goes to *The Hindu* which has been publishing a regular supplement on science for more than 20 years. Although the supplement prepared and edited at Chennai contains a mix of both foreign and Indian material, it is brought out with science-knowing audience in mind and not masses. The second place goes to the *Indian Express* which started *Science Express* (now a part of the *New Indian Express* group) in 1986. Initially, *Science Express* was part of most of the city editions but later it was restricted to only southern city editions. Brought out from Hyderabad, it is aimed at science-interested persons. Kolkata-based *The Telegraph* has been bringing out the multi-coloured weekly science supplement *Knowhow* since 1994, with the objective of presenting only the

frontiers of science to science-interested audience. Finally, the *Deccan Herald* published from Bangalore has been bringing out every week a regular 'Science and Technology' supplement for the last few years. Dr. C.S.Shekhar, R. Shankar, Pathik Guha and Dr. K.Manjula have established themselves as Editors of these weekly science supplements.

Science in Indian radio

Science news, features, reports and interviews of scientists have been appearing by fits and starts, since the then Government-owned All India Radio (now Prasar Bharti's) was established in 1936. A systematic effort to include science in radio broadcasts was made in 1975 when science cells were established in some radio stations and science-qualified staff was recruited as science officers. These science cells set up in New Delhi, Mumbai, Kolkata, Chennai, Bangalore, etc, produced programmes on science in various regional languages, namely, Hindi, Marathi, Bengali, Kannada, Tamil, etc, respectively as well as guided youth, women and health, and family welfare divisions on science. However, due to certain policy guidelines, science was always given a step motherly treatment. Some AIR officers who went on to make a mark in science broadcasting are Dr. R.Sreedher, H.R.Krishnamurthy, Amit Chakraborty, Usha Bhasin, Aparna Vaish, Brij Mohan Gupta, Ratnabali Mitra, Jayant Erande, Dr Kishor Kulkarni and Dilip Mayengbam.

Today, the concept of science cells and science officer does not exist in AIR, although programmes on science continue to be produced and broadcast, systematically at some stations, by fits and starts at others and entirely on individual initiative at still others, leaving no room for coordination among various stations. In the meanwhile, in the late 80s and early 90s, on the initiative of the National Council for Science and Technology Communication, New Delhi, CEPU, the Central Education and Planning Unit of AIR, New Delhi, produced two long radio serials with an all India level team of script writers. These are the 13 episode *Vigyan Vidhi*, which talked at length about the method of science and its implications in daily life, and the 144-episode *The Human Evolution*, which traced the origin, history and development of man through the ages. *Vigyan*

An Interview with Indian Kalinga Prize winner

Prof J.V.Narlikar: Science should be popularised in regional languages



The eminent astrophysicist Prof Jayant V. Narlikar became the third Indian to receive the Kalinga Prize for science popularisation. His achievement is unique in the sense he is the first working Indian scientist to be bestowed with this honour. Presently the Director of the Inter University Center for Astrophysics and Astronomy located at Pune, he is very much occupied with frontline researches in cosmology but at the same time he has not shirked from the social responsibility of a scientist in making his subject of astronomy and

astrophysics understandable to the lay public. In addition to writing classic semi-popular science books on cosmology, namely, *The Structure of the Universe*, *Seven Wonders of the Cosmos* and *The Lighter Side of Gravity*, he has written on various issues of cosmology in the British magazine *New Scientist* and on science and astronomy in the Marathi media. Besides, he has written several science fiction short stories and novels, of which the most popular is *Return of Vaman* and *Dhoomketu*. The latter has been made into a children's feature film.

Prof Narlikar actively participates in discussions on science fiction clearly indicating his love for this genre of literature which is often scoffed at by working scientists. Obviously, working scientists do not like science fiction because one thing they often have never read one and secondly they have never written one during their life time! But Prof Narlikar has done both! He believes science fiction to be an additional mode for popularising science among the masses.

What inspired him to write science fiction? Prof Narlikar promptly says, "The writings of Arthur C. Clarke and Jules Verne!" But it was his Cambridge mentor Fred Hoyle, a Kalinga Awardee who initially inspired him to write on science and science fiction for the common man in the 60s. "My first article on science appeared in the British magazine *Discovery* in 1964. Subsequently, I wrote in *New Scientist* and *Science Today*." Although he wrote initially in English he had firm conviction that the excitement of science could be imparted to a layperson only in his mother tongue. Thus began his crusade to popularise science in Marathi and Hindi which continues till this day.

The reason why there is a good crop of science fiction writers in Marathi is because by writing science fiction himself Prof Narlikar has given the genre the status it deserves.

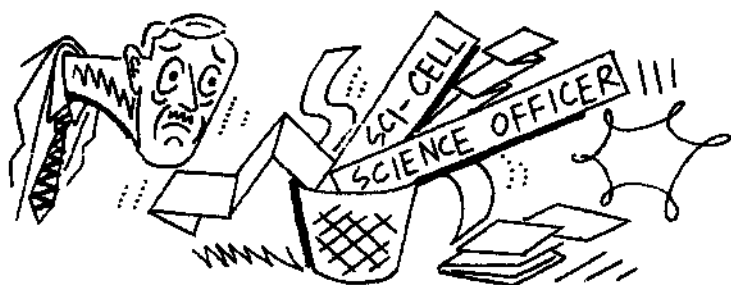
Prof Narlikar was born on July 19, 1938 at Kolhapur, into a family of mathematicians. His father, Prof. V. Narlikar, was also an eminent mathematician. Prof Narlikar had his early schooling and education in Varanasi where his father was a Professor. Every day in the morning his maternal uncle, who was a mathematician, would write down a mathematics question on the blackboard which was not rubbed off until it was solved by the young Jayant. After doing M.Sc. and Ph.D. from Banaras Hindu University Prof Narlikar went to Cambridge where he worked under the guidance of the eminent astrophysicist and science populariser Fred Hoyle.

At Cambridge, Prof Narlikar propounded the 'Steady State' theory of the universe. According to this theory, the universe is the same at all times, past, present and future. Matter in the form of stars, galaxies and other bodies is uniformly distributed all over the universe. New matter is created to fill any gap that arises due to the motion of a galaxy or other bodies. Although today this theory is not accepted in scientific circles due to the evidences discovered in the favour of the 'Big Bang' theory of the universe, Prof Narlikar continues to stick to his theory and claims that a firm case has not yet been made for the 'Big Bang' theory of the universe. Way back in the 70s, when Prof Narlikar had propounded his Steady State theory of the universe and had returned home to join the Tata Institute of Fundamental Research, Mumbai, he was hailed by the media as the 'Indian Einstein'. He has since then been a 'celebrity' and continues to pursue his researches in cosmology. For his contributions he has received fellowships, awards and prizes, including the prestigious S. S. Bhatnagar Prize and Jawahar Lal Nehru Fellowship. He has also received several awards and prizes for his popular science writings in Hindi and Marathi.

Modest and soft-spoken, Prof Narlikar says he conducts research or writes for his personal satisfaction - and for nothing else. Any particular experience with popular science? Prof Narlikar gave the example of the series of lectures on astronomy which he gave at Nanded, Maharashtra. The crowd at his lectures increased with every lecture so much so that on the last day of the lecture police was called in to keep the crowd under control !

"Had the crowd come only to see me on the first day," says Prof Narlikar with a smile, "it would have petered off after the first day, but, no, it went on increasing - indicating their interest in science and astronomy!" Prof Narlikar feels bad at Indian scientists taking science popularisation activity below their dignity. He himself takes pains to respond to letters coming especially from children and teenagers. □

Vidhi and *The Human Evolution* were broadcast in Hindi and other regional languages during 1987-88 and 1992-93 respectively. Special efforts were also made during the broadcast of these serials to attract school children in the age group 10 to 14 by announcing competitions and giving away kits and posters.



Similar serials have been produced from time to time by various radio stations in their own regional languages taking into account the local needs and aspirations. For instance, AIR, Bangalore produced the 13 episode *Nisarga Sampada* (Social forestry and nature education) series in collaboration with Karnataka Forest Department; another 13 episode serial on the human heart was produced in collaboration with the Cardiological Society of India; and so on. These serials drew considerable response from masses: the demand for their audio cassettes was enormous. AIR tried a novel experiment when a 'radio bridge' was created to give an on-the-spot running commentary on the Total Solar Eclipse of October 24, 1995. Radio commentators stationed on the path of the solar eclipse gave a running commentary on the eclipse as well as its scientific aspects. Similarly, AIR, Bangalore, produced a radio programme on the Comet Hayakutake when it was sighted in March 1996. 'Science-phone-in' programmes have also begun in recent times on AIR. In these programmes, listeners are invited to ask questions on phone which are answered in the same programme by an expert in the field. Since 1995, CEPU, New Delhi, has also been producing a monthly national programme on current affairs in science in English called *Radioscope*. Subsequently, its Hindi

version *Vigyan Bharati* has also been aired. In recent years, Vigyan Prasar has also sponsored a few serials of radio programmes, namely, *Choo Mantar*, *Paryavaran Calling*, etc, in Hindi, Bengali and Assamese.

Science in Indian television

Doordarshan and its Kendras have been broadcasting programmes on science aimed at school and college students since its inception in 1957. However, only one science programme called 'Vigyan Patrika' (Science Magazine) was aimed at the general public. It was telecast in black and white over DD regularly for four years from 1971 to 1975. DD's effort to bring science to the masses has been limited to three TV serials. The first is DD-Kolkata's immensely popular 56-episode *Quest*, the science experiment-based quiz programme, which was often telecast late in the night for almost eight years from 1984 to 1992.



The second is the 13 episode NCSTC sponsored *Bharat ki Chhap*, a programme on the growth of science in India from the Harappan times to date, which appeared every week in 1989. The third is the immensely popular science serial *Turning Point* which was first telecast once a month in English in 1991. It was also telecast in Hindi and other regional languages. Subsequently, several clones of this programmes have been aired from time to time on the DD. Some time ago, a similar programme *Imaging Science* appeared on the DD.

Besides, DD has been telecasting time and again western TV shows, sometimes dubbed and sometimes not, such as, *Expedition to the Animal Kingdom* on lives of animals, birds, insects and plants, Carl Sagan's *Cosmos* on space and astronomy, and others. A

An Interview with Indian Kalinga Prize winner

Dr D. Balasubramanian: Science is as much a part of our culture



"Science is as much a part of our culture as music, art, and others," says Dr Dorairajan Balasubramanian, the 1997 Kalinga Prize winner for the popularisation of science. "It needs to be imbibed and enjoyed like any other subject". But man in the street looks at science with fear and doubt and does not view it as a part of his culture. Even in the West people do not consider the need to know science as part of enlightenment. But the scene is slowly changing as more and more scientists

working in labs are taking to popularising science as a social responsibility. In India, there are very few scientists, merely a handful who could be counted on, who are making genuine efforts to popularise science among the masses. Dr Balasubramanian, more popular among his colleagues as 'Balu', is one of those handfuls. Having busy schedule as a researcher in the frontline field of research in molecular biology he has been popularising science through his articles, books and even TV. His writings touching upon a wide variety of subjects which reflect upon his incisive, scholarly and kaleidoscopic mind, not unlike that of a brilliant scientist.

Balu was born on August 28, 1939, at Sholavandan, Tamil Nadu, in a middle class family in which emphasis was on languages and learning. His father was a Government servant in Registration Department. He became interested in reading due his elder brother who had a deep knowledge of literature. Although he was free to choose his career, his grandmother was keen that he should join civil services and become a 'Bada Sahib' as per the values of the times! However, after doing B.Sc. from Madras University and M.Sc. in chemistry from Rajasthan University with the first position, he went to the United States and did Ph.D. in chemistry from Columbia University. In 1965 he returned home to join the faculty of I.I.T., Kanpur.

It was at I.I.T., Kanpur, that Balu's interest in science education was triggered off in 1972 by none other than Anil Sadagopal, a science educationist of eminence today. Sadagopal quit I.I.T., Kanpur, and took upon himself the task of school science education by trying innovative methods of teaching science in rural schools of Madhya Pradesh, where no labs were present! Inspired, Balu joined in Dr Sadagopal's endeavour. Every summer he would visit Dr Sadagopal's rural school, give lectures on science, help encourage children to do

experiments and even participated in creating a new curriculum of science teaching and in writing a book *Bal Vigyan* in Hindi.

Twelve years later when Balu joined the University of Hyderabad as a Professor and Dean, and could not give enough time for rural schools he joined the local science movement in Hyderabad. For years he was also the President of the Andhra Pradesh Jana Parishad and in 1987 he was the Chairman of the City Committee for Bharat Jan Vigyan Jatha. Meanwhile he had begun to write secondary school textbooks on integrated science under the auspices of the NCERT. All these years he had been writing an occasional article or two in some magazine or newspaper but the real break came in 1985 when the Hyderabad-based *Newstime* asked him to write a review of Carl Sagan's science fiction *Contact*, (now a major film). The Editor of the newspaper enjoyed the review so much that he asked Balu to write a fortnightly column 'Speaking of Science' which appeared every alternate Sunday in the newspaper. Subsequently, on Dileep Padgaonkar's invitation, he wrote a fortnightly column *Cosmos* in *The Times of India* for some time.

To date, Balu has been writing the fortnightly column 'Speaking of Science' for more than seven years in the Science page of *The Hindu*. "It has been a wonderful experience," exclaims Balu talking about his column. "I write for the educated and interested readers," continues he, "who don't need to have more than high school knowledge of science but I make all efforts to ensure that they get a contemporary outlook about science". Under the influence of wife Shakti Balasubramanian, an educational TV programmer, and Prof Yash Pal he has also written scripts and acted as a presenter in various UGC educational TV programmes aimed at postgraduate students, and also participated in popular science TV programmes like "Turning Point" and "New Horizons".

A fellow of several prestigious societies, a winner of several prizes and awards, and a visiting scientists to various institutes abroad, Balu has specialised in biophysics of eye lens transparency and cataract but claims that he is equally at home whether it is writing an article for a newspaper or giving a scientific presentation before a TV camera. Topics for his articles range from 'The Tao of scientific endeavour', 'The onslaught of scinglish' and 'Yagnas for rains cannot work' to 'Winning nitrogen from air', 'Smoking and risk' and 'Birds and bees', 'Bards and biodiversity'. In addition to text-books, he has authored two popular science *Genes and Means* and *Cats have nine lives*, the latter being a collection of his articles. Fond of works of Jacob Bronowski and Arthur C. Clarke and of books such as *Science Matters* (by Robert M. Hazen and James Trefil), he thinks that every attempt must be made to popularise science among youngsters. "We must build schools of science," says he emphatically, "just as there are traditional schools of music". □

weekly science quiz programme *Kudratnama* was also televised some time ago. Nowadays, DD is including a *Discovery Channel Block* containing some science in its daily programme. Other TV channels except *Discovery* fare no better. Some time ago, ITV channel telecast *Kasoati*, a science programme addressed to children and teenagers. Some regional Doordarshan Kendras have also occasionally produced some science programmes. For example, *Saithrakanthgam*, a fortnightly science magazine in Malayalam was produced for many years.

In so far as the coverage of science in the news is concerned, no appropriate infrastructure exists in DD to obtain it systematically and present it to the masses in a digestible format. Some Indians who have made a name in this area are M.M.Chaudhri, Shailendra Goel, Alope Sen, Partho Ghosh, Chandita Mukherjee, Dharam Parkash and K.P.Madhu.

Indianise science communication

To sum up, science does not figure as one of the main components of news and features in the Indian media despite the fact that to date four well known Indian science communicators, namely, Jagjit



Singh, Narender K. Sehgal, Jayant V.Narlikar and D. Balasubrimanian have won UNESCO's international Kalinga Prize for popularisation of science (For details, see boxes). Science becomes top news only when, in the words of British science communicator Derek McNally, it becomes a spectacle, such as, when a total solar eclipse occurs or when an Indian astronaut or spacecraft is launched into space or when an Indian scientific expedition reaches Antarctica—or when Indian scientists conduct nuclear tests!

It is rather strange then that even when science has become a

part of life of most Indians and its negative effects, like pollution, booming population, waste mismanagement, stress and psychological problems, etc., are being increasingly felt in all walks of life, Indian media chooses to remain silent over various public issues involving science. The easy path of taking news, features and other materials straightaway from western sources is not a solution to the problems created by science under Indian conditions because the politico/economic and social system, and culture and values of Indian masses are different from those of their western counterparts. There is therefore a strong need to develop a science communication system of our own which is more in tune with the needs, values and aspirations of Indian masses. In other words, science communicators need to be trained and recruited in all media and in all languages who will communicate science relevant to the Indian masses and not indulge in an abstract rhetoric of interest to a privileged few. Some science communication courses are already offered by the University of Pondicherry, Madurai Kamaraj University, Devi Ahilya University and Centre for Development of Imaging Technology but they are not enough. There is a need to put in more efforts. What follows in the pages of this book is a modest attempt in that direction.



III

Viewpoints, Problems and Proposals

Science is not a thing for a privileged few but fresh air for all that can remove the stink of superstition and obscurantism, prepare the citizens to feel at home with the technological environment, and pave the path for good living.

Kamlesh Ray

When a country slides into decadence, the media tend to concentrate on sensational trivialities rather than real science.

Desmond King-Hele

Why is the Indian media indifferent to science? What should be done to lessen or circumvent this indifference? What kind of infrastructure is required to bring more science to media? What should be done to create more science communicators? Are some questions that immediately come to mind. Answers to these questions will be best given by the persons who are engaged in bringing science to the masses. In the following pages are their responses, at times reflections, at times problems and perspectives, and at other times proposals to remedy the prevailing situation.

VIEWPOINTS : SCIENCE AND MEDIA

“Have you ever thought how an individual becomes interested in a subject?” Asked Prof M.M.Chaudhri, the then Director, Consortium for Educational Communication, New Delhi, “First, exposure to the subject. Then comes appreciation for it. Finally, he becomes interested in the subject and wants to learn it. Learning of science starts with appreciation of science! All of my science films, including the most popular TV serial *Turning Point*, are attempts to create an

Only three per cent space in newspapers devoted to science

A study of newspapers from July to December 1989 conducted by Energy Environment Group, New Delhi, in 1991, showed that only three per cent of space was devoted to science in six major English newspapers, namely, *Economic Times*, *Financial Express*, *The Hindu*, *Hindustan Times*, *Indian Express* and *The Times of India*. *The Hindu* ranked first among the six giving the highest percentage of the total news volume followed by *Financial Express*, *Economic Times*, *The Times of India*, *Indian Express* and *Hindustan Times*.

Among the seven well known magazines studied, *Frontline* ranked the highest in the coverage of science during the aforementioned period. It was followed by *The Illustrated Weekly*, *Business India*, *The Week*, *Sunday*, and *India Today*. *Famina* never carried any article on science. □

appreciation of science among the public." He could not have been more right. Appreciation and learning starts with exposure. Constant exposure.

If the public is constantly exposed to the wonders of science through various mass media, it would slowly begin to appreciate science: chances are, a certain percentage would learn, understand and do something in and about science. Prof Chaudhri was talking about science popularisation from his more than 25 years experience of making science films for the public.

"Science popularisation or dissemination is a side activity for the society," said Gauhar Raza, Scientist, National Institute of Science, Technology and Development Studies (NISTADS), New Delhi, "By and large, it has been progressing in fits and starts since the Independence of India due to the personal and disjointed efforts of some enterprising individuals. There is no concerted, committed and systematic programme to popularise science and inculcate the much needed scientific temper among the Indian masses".

Gauhar was talking from his experiences as not only the Joint Convener of the Bharat Jan Vigyan Jatha which went from village to village to popularise science but also as a serious researcher of the public understanding of science and a producer of several science films. "But I must submit in the same breath that," added he hastily, "— and, mind you, this observation is not a mere observation. It is based on several years of my research surveys :

Indians' urge to know science is very high! And they do keep on picking up bits and pieces of science from here and there..."

Short, bearded and dreamy-eyed Gauhar appears every whit a science activist. He continued, "Although the science popularisation scenario appears bleak at present due to shortage of funds and lack of clear-cut target audience, one certainly sees some signs of hope. By virtue of appearance of science on the *Discovery*, *Star TV*, *BBC* channels, etc, through the Idiot box, the people who matter, namely, marketing men, owners of the media, editors, producers and directors, etc, are slowly being sensitized to the need of science in the Indian mass media. A great hope for science!"

Science in Regional Languages

"Look! Science is very much culture specific!" said emphatically the late Surendra Jha, the pioneer in science popularisation in India. "Our culture, our needs, our themes, etc, are very much different from a western person's. Why should we bother about what the West is doing in science popularisation?" He paused and continued, "A person will accept science only when he thinks it to be his own and which can happen when he reads about science in his own language. When you write or present science in his own regional language, your analogies, examples, similes, etc, are likely to come from your own life and language. You cannot quote Shakespeare in your writings!..."

Unfortunately, a few months after the above interview, Jha passed away. He could not do much for science popularisation in regional languages. But what he said is absolutely true. Almost similar views are expressed at a down-to-earth level by another science populariser and broadcaster. "As a child I used to cram my lessons on science because they were in English which I couldn't understand," reminisced Ran Kishore Sahaya, "but one day when I read the same thing in Hindi everything became crystal clear to me! I understood science! Since then I am convinced that science should be brought to the masses in their own mother tongue". The fully illustrated and multi-coloured, now defunct Hindi wall paper on science *Vigyan Anveshan Sandesh* was his brain child for the common man.

The smallish yet beautiful campus of National Institute of Advanced Studies is at one corner of the sprawling Indian Institute of Science campus in Bangalore. In appearance like a chain of huts, its smart, vocal and brilliant Director, Prof Roddam Narasimha said, "Science will not percolate down to Indian masses, unless scientific research done in their neighbourhood and by their own countrymen is shown or told to them in their own language."

Media Houses and Mediamen

"If a major earthquake occurs somewhere, killing thousands of people, newspapers are interested in a science story on earthquakes! If a major flood occurs somewhere again killing thousands of people, newspapers are interested to know the scientific causes behind floods! If thousands die due to a plague, newspapers are interested to know its scientific background! Occasionally, a science story gets limelight in the newspapers due to some political issue in news. Newspapers' interest in science is based on its news value," said somewhat angrily Rajendra Kumar Rai, the Chief Editor of the Hindi science feature service, *Sampreshan*, and a prolific science writer, "If a politician does something bad, there are screaming headlines in all newspapers. On the other hand, if a scientist achieves something worthwhile, he gets just two lines that too in the inside pages of newspapers!"

"Throughout my career in the press, said Harish Aggarwal, a well known Hindi science writer, who was earlier with *Navbharat Times*, New Delhi, "the management and editor of the newspaper were not interested in science. I wrote on science on my personal initiative". Today, he is leading a quiet, retired life. How right he is, is clearly evident from the fact that today no Hindi daily has a 'Science Correspondent' on its staff! "Newspaper editors think it is more than enough to occasionally publish articles on science sent by outsiders," he said. He began writing regularly on science in 1953. "Although I was not offered any incentive, I started a weekly science column *Vigyan Jagat*," said he proudly. This column ran for the next more than 30 years upto 1985, a record of sorts! Thereafter he wrote occasionally on science in the newspaper till his retirement in 1990.

"In any newspaper," said P. Sundarajan, Special Correspondent,



The Hindu, New Delhi, “a political story gets the highest priority, second comes economics, third social happenings,...science comes much lower down the rung unless something dramatic happens. For instance, when the total solar eclipse occurred in India in 1995, it was a lead story which I wrote”. Smiling, he continued, “So much information floods any newspaper office that it becomes difficult for us to make a choice, space being the prime consideration. We then go for what is brought to our notice! If something spectacular happens in science, which often doesn’t, then it is a different matter. We go for it!” He continued, “There are allegations that we tend to sensationalise science stories.... Well, the reason is very simple. All of us journalists working here are, as it were, competing with each other for the first page of our newspaper. Unless our story is sensational enough, it would not appear on the first page!”

“One major myth about journalists is that they are know-alls. They know everything under the sun. But in reality this is *not* at all true!” said Sundarajan emphatically, “There is a strong need to educate journalists about the social, economical and industrial aspects of a scientific discovery or invention when it is announced. Unless these aspects are properly presented to him through a press briefing or handout, he feels lost, and so may not report on Indian science!”

Not Much to Report on Science

“There isn’t much to report on science every day,” said T.V. Jayan, who was then a New Delhi Correspondent of the *Deccan Herald* published from Bangalore, “Otherwise, our management would have

had a full time science correspondent. In fact, I've voluntarily taken other additional beats so that I will always have something to report. "But", he added, "the situation is likely to change in the next five to ten years. I anticipate more science to report in the coming years". At present, the *Deccan Herald* publishes 'Science and Technology' supplement every week.

"There is nothing earth-shaking to write about scientific developments in India," said Subhadra Menon, one of the former Correspondents of India's premier news weekly *India Today*, "But my Editors are certainly interested if Indian scientists have made breakthroughs in their fields". The magazine has been publishing a column 'Science scope' almost once every month since March 1996 when she joined its editorial staff. In fact, she started the column. Earlier, she had written on science regularly in *Frontline*. If her experience of the last more than two years in *India Today* is to be believed, good science stories generate as much interest and feedback as good stories on any other subject. But she feels she had to use her persuasive skills to convince Editors about the worth of a science story over a political or fashion story.

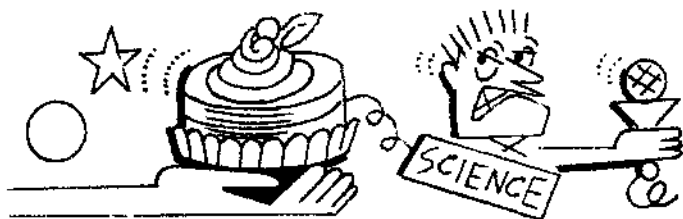
No Hunger for Science

"No hunger for science news exists because nobody in a newspaper is exclusively assigned the task of science reporting," said Dr. Alok Moitra, who handles the press in the reputed Indian National Science Academy, New Delhi, "Sometimes, we've literally to thrust science news down the gullets of reporters who handle science!" He strongly feels the need for science correspondents and editors in all major newspapers and magazines for inclusion of more science in the media. Another thing which would lead to more science in the media is to have regular columns on science and technology issues, he added.

Dr Moitra feels bad at the way all newspapers are being brought out nowadays. "The essential role of newspapers in educating and inspiring the youngsters has totally been ignored," lamented he, "The entire emphasis is on catching up with political news. For instance, nothing appears on the achievements of great Indian scientists and how they did research under trying circumstances. No profile of Indian research institutions appears either. There is

nothing to inspire our youngsters to take up science". This is especially true about the media in the northern India.

Some years ago, Dr Moitra was shocked to see the news of the death of one of the harbringers of the Green Revolution in India, Dr B.P.Pal, relegated to the seventh page of the *Times of India* while the death of a snake in Delhi zoo appeared on the right hand cover



of the front page of the same issue! "Obituaries may appear in science journals and magazines, and condolence meetings may take place in all institutes and labs," emphasised he, "but what really matters is how major Indian newspapers view our own leading scientists. If they don't glorify them, how would the common man know and respect them?"

Much Science Needs to be Reported

"Most of our science reporting," said Dr Lalitha Vaidyanathan, Special Correspondent, Press Trust of India, Mumbai, "is confined to research work done at scientific institutions, and not to novel, interdisciplinary work done by individuals on their own initiative". She has been working in the field of science journalism for the last more than 15 years after obtaining a Ph.D. in paleobotany. "There are a large number of individuals not attached to any institution," continued she in her modernised office on the first floor of an otherwise old building near Flora Fountain in Fort area, "who are conducting multidisciplinary research in various scientific fields. For instance, I know a flute-player who has done considerable research on various materials and has found bamboo to be the most suitable

material for making flutes. A Physical Research Laboratory scientist has developed a computer program for weaving textiles after seeing a textile exhibition. An architect is doing research on the houses built by tribals. Such enterprising individuals who are not officially attached to any scientific institution or lab but are doing excellent 'reportable' science have always been ignored by Indian correspondents".

Dr Lalitha is absolutely right. Several science stories go unreported because quite likely Indian correspondents are unable to judge their scientific worth. She added, "Unless there is a major breakthrough, the English media do not pick up our science stories. On the other hand, the regional press laps up whatever science we report !"

Speaking over a cup of tea in his neat, and somewhat lavishly furnished office, Dr K.V. Raghavan, then Director, Indian Institute of Chemical Technology, Hyderabad, continued, "I find the print media giving much attention to a few chosen scientific fields, namely, space, Antarctica and biodiversity and a few negative aspects of science, namely, environment and cruelty to animals. It pays no attention to so many other fields. Small yet important scientific developments almost never figure in the media".

Short, stout and bespectacled, Dr A.P. Jayaraman, P.R.O., B.A.R.C., also a popular science writer in Malayalam, was vocal about the problems of science writing, "There are several sciences which have today been reduced to orphan status. They have always been ignored by popular science writers. For example, much interesting stuff about anthropology remains to be written about in the media".

Science Potential Not Tapped

" Why can't some major science-related problems in our cities be taken up by media and then extensively debated and discussed in their columns? " asked Prof H.Y.Mohan Ram, who was earlier with the Department of Botany, University of Delhi, Delhi. He was talking about what the media should do about science to attract the attention of the masses. Indeed, only science relating to the daily life and problems of the masses would attract their attention. But he has reservations about the journalists who report on science. "With a

few exceptions, science reporters do not want to examine or study a subject on their own. They want readymade, cooked material or handout," said he, unhappily, "Even those who are popularising science are simply transferring scientific information from a foreign popular science magazine to an Indian magazine or daily. There is no hard-core science reporting based on what is appearing in standard science journals!" He has however observed one positive trend in some newspapers in recent years. "The Bangalore-based newspaper *Deccan Herald*, for instance, is reproducing important articles published in the reputed Indian science journal *Current Science*," he said, happily.

"Indian media gives publicity to Indian scientists and labs," said the eminent scientist Dr S.Ramaseshan with an amused grin, sitting in his small room adjacent to the library of Raman Research Institute, Bangalore, "but not to science!" This may especially be true about the media in southern India. A winner of several awards and prizes and a fellow of several prestigious societies, he is also the brain behind the new look of the prestigious Indian journal *Current Science*. "The media should learn to look at Indian science journals and talk to scientists, if necessary," said he, smiling, "So much science done in India is appearing in journals. Unless the media writes stories on science being done in India and communicates the excitement of doing science, how could people feel proud of science done in the country and youngsters be attracted to science?" But he added emphatically, "But the media is only interested in scandals in science!"

Distorted Science

"In the Hindi press," said Prof H.Y.Mohan Ram, "things are worse. Most Hindi science reporters want to relate every latest scientific advance with something mentioned in our mythological tales. The message they want to convey to readers is that scientific developments occurring today existed in ancient times or were known to our ancestors!" For instance, he went on to add, his work on sexual reversal on plants was reported to be akin to *Ardharishwar* - half male and half female Lord Shiva! "It is unfortunate but true that science is being used as a cover to prop up several anti-science ideas and superstitions in the Hindi press," said Vinod Kumar, Senior



Sub-editor, United News of India (UNI), who also brings out the regular science news magazine *Vigyanvarta*. Take the case of the **Hale-Bobb** comet. A majority of the press published stories in screaming headlines on the front page that 'An Indian knew about Hale-Bobb' when some astrologer claimed that Varahamihira had observed it in his day! "Who is this astrologer? What is his credibility? Where is the scientific evidence?" asked Vinod in anger.

Or, take the case of milk-drinking Lord Ganesha, the mass hysteria that occurred on September 21, 1995 all over the country. "When I wrote a story on the milk-drinking Ganesha, debunking the myth, giving all the science and logic behind the phenomenon," continued Vinod, "very few newspapers published my story!" Again, very few newspapers published his story against the so-called 'Mantra therapy' then being made part of treatment in Government hospitals in Delhi because it went against the local Government's policies. "To every science story that appears in the Hindi press, there are a hundred anti-science stories", added he in disgust.

"The Hindi press is interested in dubious science stories which glorify our ancient past and support the claim that we Indians were great at one time!" said Vinod with bitterness, "It is not interested in science stories that inculcate scientific temper. It wants to maintain the status quo in the country, and scientific temper is a threat to that!"

Prejudice Against Indian Science

"Any science news appearing in the electronic media," said Sanjay Tripathy, the owner of Pulse Media Private Ltd., New Delhi, "receives tremendous response from the public. It serves several purposes. First of all, the scientist's work gets highlighted. He feels recognised, his work understood, and his morale for doing research gets boosted further when the public sends queries about his work. Secondly, the public, including businessmen and industrialists, comes to know something that benefits it directly or indirectly. Thirdly, the public comes to know what scientists are doing in their labs with its own money. After all, scientists are doing research with tax-payers' money!"

Occasionally, and with considerable persuasion, Tripathy's film/video spots on scientific research done in India appear on TV news. Why should a science news need persuasion for inclusion in the main news on all channels? After all, if an Indian scientist makes a breakthrough or a low-cost import substitution product, it is as spectacular an achievement as an Indian winning an Olympic Gold. It shows clear apathy for science in the electronic media because of the non-science background of the mediamen. "Indian scientists have created several novelties or breakthroughs of interest to the common man," he remonstrated, "but the persons manning the news sections of the electronic media feel, first of all, that they are not of interest to the public. Secondly, they're unable to appreciate the importance of import substitution work done in the country. What's so wonderful about it? They ask without understanding its implications for the country. If some medical research is undergoing a trial, they again fail to appreciate the need for giving it as news and its significance to the people. Definitely our media men are prejudiced against research done in the country. So much good scientific work is being done in the country and so little percolates down to the public through the electronic media! An exclusive two to five minute 'Science news' section every week during prime time on all TV channels is the need of the hour!"

Science Stories Need to be Followed

"Most journalists are only interested in filing a story. They feel their

job is more or less over once their story is published in the newspaper," said Dr P. S. Datta, Principal Scientist, Nuclear Research Laboratory, Pusa, New Delhi, "I think newspapers, or for that matter, the media, can play a far bigger role in bringing scientific issues to the attention of masses and the concerned authorities so that appropriate action can be taken to set right any deteriorating situation".

"Is the job of journalists over once my work has been reported in the press?" asked Dr. Datta in anger, "journalists should visit the affected areas, talk to the residents and the concerned authorities, give their reactions in the press. In short, they should follow it up as they follow a crime story! If this water issue appears consistently in the press it certainly registers on somebody's mind, somewhere. May be, an NGO notices it and takes it up as a crusade, and something concrete is done to rectify the prevailing situation in the affected areas." He continued, "And, mind you, the situation is likely to become far worse than what has been reported in newspapers!"

Today, due to the reports in the press, Dr Datta receives calls from various health departments and NGOs asking for more details of his work. "Actually, my studies were conducted from agricultural point of view, whether there was enough water available for farmers in and around Delhi and whether the water was fit enough for agriculture," he said, "But now the implications on the health of the villagers have become the main issue".

Strange enough, Dr Datta's findings were noticed by a science journalist of the magazine *Down to Earth* when they appeared in an international geophysical journal and were highlighted over the Internet! Had they not been highlighted over the Internet, nobody would have cared to report his findings which should alarm every Delhite. In other words, so many such important findings of Indian scientists must have gone unreported all these years because few Indian science journalists look up important research journals!

Offhand Treatment to Science

Dr Sudhirendra Sharma, a young science writer and editor, who has more than a decade long experience in the print media, said, "Our newspaper managers don't take science seriously enough to make long-term investments in it. They think once they have appointed a

science correspondent or editor their job is over. He will take care of science. Occasionally when some disaster such as an earthquake or cyclone occurs, the science person is remembered and asked to deliver the goods! No systematic effort is made to build a bureau or team around him, which files science stories regularly so that reader's interest is sustained over long periods".

Dr Sharma emphasised the need of stories which follow a scientific project or research over days, weeks and even months so that it sustains the interest of readers and gets registered in their minds, and its importance and implications are not lost on them as it often happens in the case of a stray report. "If political stories are followed and repeated in the media," asked he, "why not science stories?"

Dr Sharma is a Ph.D. in environmental science. He has worked in *India Today* and was consultant science editor to *The Pioneer*. He continued, "All our magazines and newspapers are modelled on western magazines or newspapers. So they govern most of their policies and coverage. We don't think of our own problems, priorities, and needs. Most often, western media sources are exploited for science stories. Little attention is paid to research work done in India because that involves considerable investments in terms of time, money and resources. In the process, science always becomes the last priority. The general attitude of the editors is: if there is some space left somewhere in the magazine or newspaper, push in science there! Given the chance, science would be dropped at the first cue! In recent times, the regional press has become more favourable to science stories".

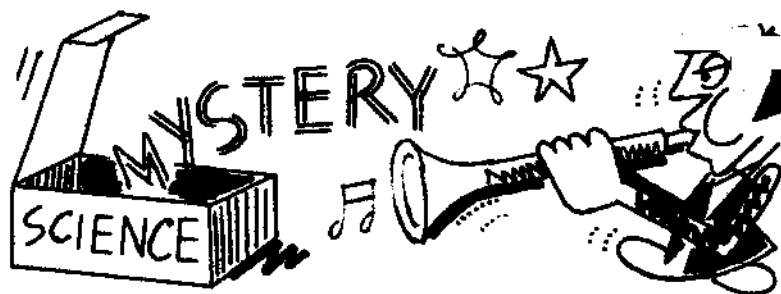
"Indian media houses don't have a consistent policy for science and technology," said Dr Radhakrishna Rao, the Bangalore-based freelance writer, who was earlier with the Indian Space Research Organisation. Speaking at his nifty bungalow in J.P.Nagar, Bangalore, he continued, "The result is that anything concerning science in our media houses is not taken seriously. There is no capable and qualified manpower to look after science news and features. Often, science stories have misleading headlines. Grammatical and spelling errors - not to speak of scientific ones - are rampant in them. The press releases of scientific institutes are also lifted *ad verbum*."

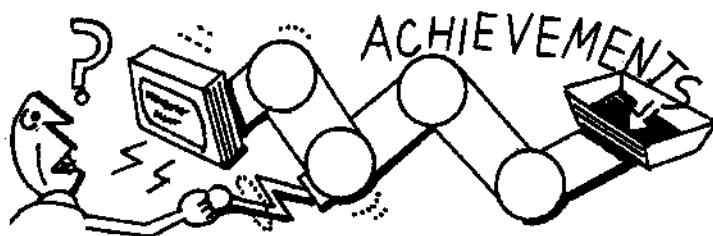
No Conception of Science

"Unfortunately, we don't have Science Editors in our dailies and magazines," says veteran Delhi-based Hindi science writer Gunakar Muley, "Most of our editors read some science article in *Time* and *Newsweek* and want from me something similar. I flatly refuse such requests. They also want some mystery because it fascinates people. I tell them that science itself is a fascinating subject."

"Sectors such as telecommunications, health, petroleum, etc, need considerable scientific inputs. But money allocated for R & D is not being spent in these sectors. The industry, on the other hand, does not bother about R & D in the country because it can buy technology from abroad. In other words, integration between Indian industry and R & D does not exist. The same gets reflected in the attitude of people towards science, of the media towards science," said bitterly Dr R.Ramachandran, one of the senior science journalists in India, earlier Science Editor, *The Economic Times*. He went on to add, "The media bosses take the commercially saleable products of science - for instance, a gadget which can do this or do that - for science! That's their perception of science, not as knowledge, or as an attitude towards life....! They don't feel the necessity of science stories in newspaper columns..."

"Everywhere technically illiterate persons are handling science," said Dr Ramesh Dutt Sharma, former Director, Publications and Information, Indian Council of Agricultural Research, New Delhi, who has been writing on science issues for the last 30 years. "I've





yet to feel satisfied about a TV or radio programme for which I wrote the script," he laments, "Something which I thought was important was always removed from the programme on the editing table!" To date, Dr Sharma has written scripts for more than 600 TV and radio programmes, has made a documentary film on the internationally famous agriculture scientist Dr M. S. Swaminathan and has produced four docudramas on the health and hygiene movement of Sulabh International.

Outdated Editors

"If our major English newspapers continue to ignore science, they would soon be outsmarted by upcoming smaller newspapers which would have better access to science because of the availability of cheaper communications and computing technologies," said Y.S.Gill, Chief Editor of the now defunct United Newspapers, Delhi. He warned, "Mind you, those who have purchasing power in the country want to know science because, today, 'High-tech' is the buzz-word!"

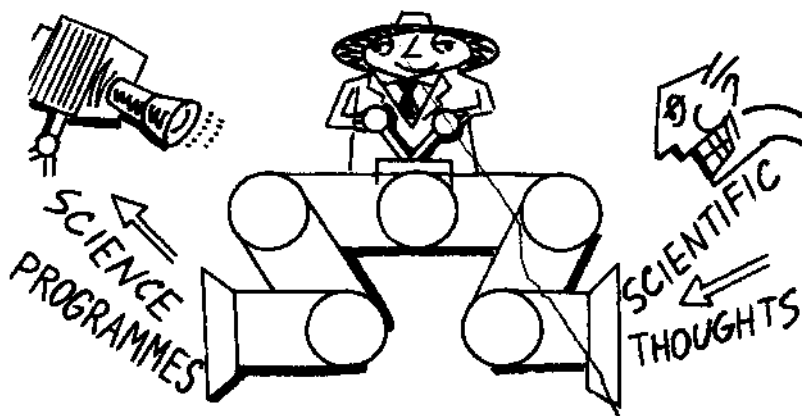
"No, no, it's not possible to bring a transformation in the mind-set of our Editors overnight," replied Sankarshan Thakur, Associate Editor, *The Telegraph*, New Delhi, "They still feel the masses are only interested in politics, sports, social issues, etc. The change in thinking will come gradually as old Editors retire and the younger generation takes over the reins of the newspapers. But the change is definitely on the cards. Science is likely to get more coverage in all newspapers in another five years or so".

Regarding the lack of science in Indian newspapers, the late Anil Agarwal, Publisher, *Down to Earth* and Director, Centre for Science and Environment, New Delhi, added angrily, "Most of our

newspaper Editors are absolutely outdated ! They give undue coverage to politics which nobody reads these days. For instance, American Editors always relegate politics to the eighth page of a newspaper! Besides, very few journalists opt for science. There is no commitment for science journalism!"

"If you're keen to have more science or have pages exclusively on science in newspapers," said M.K.Tikku, Assistant Editor, *The Hindustan Times*, New Delhi, "you have to sensitise our Editors and top management to various scientific issues". He added that some fora have to be created where editors and top management of newspapers are brought in contact with eminent scientists and are sensitised to the importance of science reporting in the country. "Top Indian scientists also have to take interest in this matter," he said emphatically.

Some years ago when the Indian Government had announced the liberalization policy Tikku had hoped science and technology issues would thereafter figure prominently in all media. To his utter dismay, they have taken the back seat while imported technology is entering the country in a big way! Instead economics received (is still receiving) a big boost in all newspapers because big business was involved. "All serious issues are being trivialized in all media,"



said he, smiling, "And science is the biggest casualty. Earlier, science was considered to be a prestigious beat. Today, the worst reporter gets the science beat!"

"Most Editors of newspapers think science doesn't sell and doesn't have sensational value," added the former reporter of *The Indian Express*, Mumbai, T. S.Gopi Rethinaraj, "Moreover, they think science dissemination is the responsibility of science magazines and journals, and not of newspapers".

Media Undergoing Change

"The media in India is undergoing a tremendous change," said Joseph Pinto, a Pune-based media consultant for various private companies, a newspaper columnist and a science writer, "Nowadays, corporate houses not only give advertisements about their products in newspapers but also consumer-orientated articles which would create demand for their products!" This change in the media can be seen from the large number of sponsored features and pages that frequently appear on various consumer goods in all the major newspapers in the country. "You can see all kinds of articles appearing in these sponsored pages trying to whip up the demand for consumer goods, whether motor cars, washing machines, or soaps," said Pinto, "But there is none on how does a motor car, or a washing machine, or a tube light works! I think it is of equal interest to people at large. Why is there no science article on the working of a washing machine along with others on its usage and market?"

Pinto's question is relevant in this modern, science-driven world when at least city- and town-bred consumers are keen to know about the working of the various gadgets they use. Sporting a goatee, Pinto is soft-spoken and articulate. "Whatever media houses may say," he said, smiling, "People at large are interested in science. Recently, an astronomy exhibition organised in Pune drew large crowds!"

"In a newspaper, there is always space shortage for various kinds of stories - not necessarily for science ones only", said Satish Chogtu. The fair skinned Assistant Manager of the Tamil daily *Dinamani* published in Chennai has a hoarse voice. "However, if the management decides to have an additional page exclusively

devoted to science, it has to be sustained by advertising revenue. Unfortunately, a science page does not attract enough advertisements. It is therefore not cost-effective for a newspaper". He went on to add hastily, "Nevertheless, if the Editor of a newspaper asserts the need for a science page, its management has to comply". *Dinamani* brings out an yearly special issue on health and medical sciences, he informed, an agriculture page already exists, and a health page was to appear soon in the newspaper.

Science Does Attract and Sell

"If somebody or a feature service sends me a science story, what is the guarantee that the written material is scientifically correct? How can I judge that?" asked Aroon Tikekar, Chief Editor, *Loksatta*, one of the leading Marathi newspapers published from Mumbai. It is indeed difficult for an editor with no science background to judge whether a piece on science is authentic or not. Tikekar has found a way out. He does not depend upon stray articles on science submitted by anybody; he asks eminent scientists or science writers to write regularly for the newspaper. In this manner he gets authentic material from a credible source as well as an exclusive science story which a newspaper of *Loksatta's* standing desires.

Non-science background could be the reason why Tikekar does not want to take any chances with science. Kumar Ketkar, a postgraduate in science, who was then the Chief Editor of *Maharashtra Times*, the other leading Marathi daily published from Mumbai, is every whit sure about science. Moreover, the inclusion of more science in his newspaper has led to an increase in its circulation.

When Ketkar took up the Editorship some years ago, he removed the page marked 'Science' at the outset. Instead he scattered science stories all over the newspaper. In fact, he began to publish science stories with multi-colour photos and editorials on the front pages, a revolutionary move in the Indian media by all standards! For instance, he wrote editorials on the priority claim of J.C.Bose's invention of wireless and the Bharat Ratna Award for the aerospace expert A.P.J. Abdul Kalam. Often, he selects the latest happenings in science published in international journals like *Nature* and *Science* and

reports them in the newspaper with colour photos.

"Every other story or report reaching the news desk has a strong component of science," Ketkar said, "which has always been ignored but needs to be highlighted. I now ensure that this component is properly taken care of." The circulation of the newspaper has gone up over the last few years because science is a popular subject especially among youngsters. "We don't encourage negative news on science, such as, failure of a medical operation," continued he, emphatically, "We don't have science columnists. We collect science news by keeping in constant touch with scientific institutions. Every week we publish 4 to 5 stories on science!"

"Except for some days or weeks when political stories get considerable coverage and readership," said Kalpana Jain, Special Correspondent, Times of India, New Delhi, "my stories related to health and medicine have a large following among the readers. My editorial colleagues respect my work and envy the large readership of my columns!"

VIEWPOINTS & PROPOSALS : INDIAN SCIENTISTS

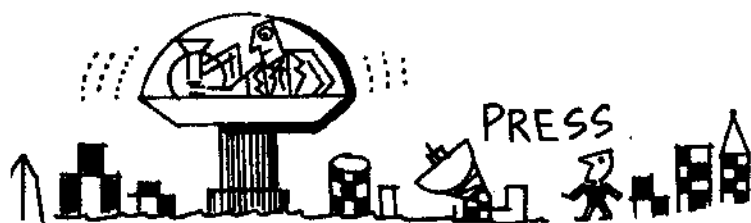
Indian Scientists Don't Talk

"If there is nothing 'Indian' in a science story, it does not justify reporting for an Indian audience," said G.S.Mudur, New Delhi-based Science Correspondent of *The Telegraph* published from Kolkata. He has a point because unless an Indian can identify with a scientific subject he would not feel it to be his own. Mudur therefore takes considerable pains to ensure that Indian aspect of any scientific discovery is covered in his reports and features which appear in *The Telegraph* and its weekly science supplement *Knowhow*. Indian science journals, conferences and meets, and personal contacts with scientists and Government officials are the main sources for his reports and features on Indian science. "Unfortunately, Indian scientists often don't cooperate even in providing the basic information on a subject," lamented he, "The main reason for their reluctance to part with information, apart from a previous bad experience with the press, is not because it is classified but they are not sure how they would be viewed by their seniors, peers and rivals — essentially internal politics!"

"Due to professional jealousy and internal politics," added Shankar, the Editor of *Science Express*, Hyderabad, "Indian scientists often don't talk about their research and always suggest to talk to their Heads or Directors. But, then, these Heads or Directors are often not found in the town!"

"We don't want easily accessible information on science which P.R.O.s or self-publicising scientists of various Government departments or institutes are trying to peddle to us," said Kalpana Jain, Special Correspondent, *The Times of India*, New Delhi, "We're interested in inaccessible yet newsworthy information, for that we've to tap our own contacts and sources. Besides, we want exclusive stories, and not what everybody is writing about in their newspaper columns". Jain was talking about how she digs up information on science for her stories concerning scientific science and environment. "The biggest problem is that genuine scientists don't come forward and talk to us about their work!" she complained, and went on to ask, "How do you expect we have good stories on science then?"

"Indian scientists have to come out of their ivory tower, if more science in India has to appear in the media," said P.Sundarajan, Special Correspondent, *The Hindu*, sitting in his partitioned office in New Delhi. He suggests, "Every three months or so, journalists should be invited to labs and told about the research in progress. We can't keep a track—in fact, we don't have time to keep a track—of all that is happening in science in the country".



Sitting in his elegant office filled with books and reports on the first floor of the Centre for Science and Environment's beautifully designed and well maintained building in New Delhi, India's leading environmentalist the late Anil Agarwal said in anger, "One peculiarity of our scientists is that they expect a reporter to be an expert in their field. If he knows their field, they talk. Otherwise, they treat him badly. How can our scientists be so presumptuous and arrogant?"

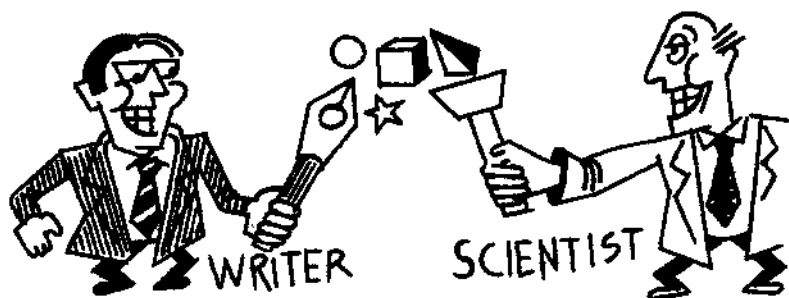
Scientists Do Not Write

"In India, scientists at large are not interested in popularising science," said Gauhar Raza, Scientist, NISTADS, New Delhi, and science activist and film-maker. "It is only when they lose interest or become powerless in research that they take to science popularisation because it fetches them some name and publicity and some additional income!"

"In Kerala, real bench scientists are not writing on science," said A. Jayakumar, the young dhoti-clad Assistant Editor of the popular science magazine *Science India*, Kochi, "Journalists and science writers are only popularising science through the various media. I don't think this is a healthy sign. It needs to be checked. Young scientists should be encouraged and trained to write on science related issues. In order to make real scientists write," continued he, "We plan to organise a workshop for training them in media skills".

"The trouble with scientists writing popular science is," said the deceptively boyish looking Deputy City Editor of the leading Kolkata daily *Bartaman*, Rup Kumar Basu, laughing, "if he is a physicist, everything is physics for him ! If he is a chemist, everything is chemistry for him ! I therefore simply use my common sense in judging the suitability of a science piece. If I feel satisfied with the story, I take it that my audience will also be satisfied". An M.A in Bengali he is very interested in science. He edits the weekly science page *Bigyan-Bichitra* of his daily which has the second largest circulation in West Bengal.

"Scientists are unable to write for a housewife," said Anil Barua, Chief Editor, *Dainik Asam*, Guwahati, sitting in his small



office in the otherwise sprawling complex of the Tribune building, "When they write, their target audience is always other scientists!"

"Top-class scientists should write popular science articles in the print media in collaboration with science writers, with bylines to both," said Dr. Pushpa M. Bhargava, the former Director, Centre for Cellular and Molecular Biology, Hyderabad, and presently, Director, Sukriti Consultancy. A scientist of eminence who has also been writing in the media in recent years, Bhargava was talking about the problems that often handicap a top-notch scientist with, such as, lack of writing skills, shortage of time, etc. The only solution he could suggest was a collaborative effort.

Scientists Not For Regional Languages

"We're keen to highlight the scientific research done in our labs which has a direct bearing on the daily life of a common man," said H.R.Krishna Murthy, Station Director, All India Radio, Bangalore, "but we receive no encouragement from any quarters, whether from scientists or P.R.O.s. It requires personal contacts and considerable persuasion to make scientists talk!" This is rather surprising coming as it does from a Bangalorean because Bangalore is dubbed a 'science city', several scientific institutes and organisation have headquarters here.

But Krishna Murthy cannot be wrong. He is one of the few committed science programme producers in India who have

been active in the field for more than 20 years. "Moreover, it is extremely difficult to get scientists who can talk science in Kannada," added he.

"Often, I don't get scientists who write fluently on science in Hindi," lamented R.K.Sahaya, Editor of the science wall magazine *Vigyan Anveshan Sandesh*, who used to sit in the C.S.I.R. Headquarters on Rafi Marg, New Delhi. "They often indulge in transliteration - translating word for word their English into Hindi! Besides, I find scientists unable to express themselves in mere 350 words needed for a story in the wall magazine!"

Prof A.K. Bhatnagar of Department of Botany, University of Delhi, Delhi, thinks that scientists, science teachers and students often ignore vernacular magazines and never write for them because they do not consider them upto the mark. "But they do not realise," he said, "these small magazines have a large following and, moreover, their readers are the ones who need to know science to rectify several misconceptions and superstitions existing in Indian society." An articulate, courteous and soft-spoken person, Prof Bhatnagar added, "Scientists and science students are not able to get into media because they have pre-conceived ideas both about science and media. In addition to proper training and guidance required to rectify those ideas, they need considerable patience which no training or guidance can impart to them!"

Scientists Don't Know How To Talk To Media

"Scientists don't know how to talk to media," said Srinivas Bhogle, Head, Information Services and Systems, National Aerospace Laboratory, Bangalore. "Sometimes, they talk too much, and sometimes too little! There is a need to train scientists in this art of talking to media". Bhogle could not have been more right as most often journalists complain about the lack of communicative scientists. But, then, what is the remedy? "A few scientists, say, about half a dozen, should be selected from every research institute or laboratory and given exposure to media, even imparted some hands-on training in a media house," continued he, "They should know the various policies of the institute or laboratory, in short, the official line. In other words, they should be the official spokesmen and should be free to talk to media". Bhogle himself

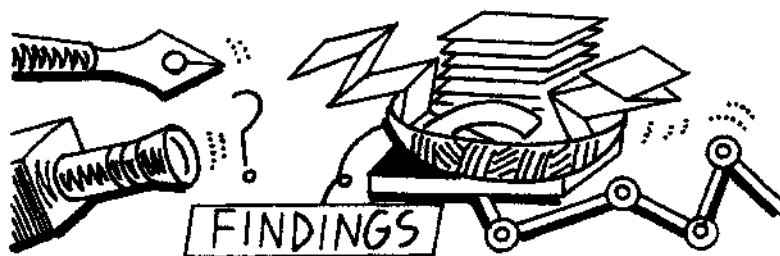
has availed the NCSTC media fellowship and has rubbed shoulders with mediamen for three weeks in *The Hindu* at Chennai.

Medium in height and build, and articulate, Bhogle went on, "In these days, when labs have to generate revenue and compete in international markets, they cannot help ignore the media. They should use the media, as the Centre for Developing Advanced Computing (CDAC), Pune, has done, to bring their products and processes to the notice of buyers".

"There are plenty of good science teachers available," said Prem Kumar Aman, Producer, Audio Visual Research Centre, Hyderabad, "but very few who could speak science in the language of the layman. Considerable time and energy is spent in training them to speak in layman's language".

Dr. Someswar Bhowmik, Research Scientist, Educational Media Research Centre, Kolkata, added, "Most of the science teachers who are our experts talk to the camera as though they are addressing a class of students! They give lectures! Their research and writing is also classroom-oriented!" He felt the need for 'middle men' who could convert the thoughts and ideas of these experts into worthwhile science programmes.

Similar views were aired by Fokiya Akhtar, Producer, Educational Media Research Centre, Jamia Millia, New Delhi. "Most often, our experts are bound by books," she said, "If something is shown in a different way, they consider it not exact science, even wrong science!" She also felt that the experts should



be knowledgeable about media. "They should know the limitations of the media as well as its potentials and possibilities," she said emphatically. She felt the need for workshops which would open their vision. A graduate in science, Fokiya said, "Once I understand a scientific concept, I like to make it visually very interesting and present it in a manner different from that given in a textbook. My efforts are directed at making my viewer understand the concept visually at one stroke. But I am often handicapped by subject expertise and poor equipment and facilities".

Scientists Scared of the Media?

But, why are Indian scientists at large afraid of talking to the press about their own scientific findings? Dr P.S. Datta, Principal Scientist, Nuclear Research Laboratory, Pusa, New Delhi, who had earlier also worked for the UNESCO, said, "First of all, I know what to tell the press and what not to! Secondly, scientists are scared because often they have not done experiments themselves! They are therefore not so sure of the findings! I have full faith in my findings because I do experiments with my own hands!"

Is Indian Science Not Worth Reporting?

"Have Indian scientists done anything spectacular which is worth reporting?" asked Dr A.S. Paintal, Director, Centre for Visceral Mechanisms, Vallabhbhai Patel Chest Institute, Delhi. He was responding to the question as to why science was not often being reported in the media. "I think," he added, "newspaper correspondents have always done their best in reporting science. Take the AIDS awareness campaign, for instance". He was perhaps talking about his past experiences with correspondents when he was the Director General, Indian Council of Medical Research, New Delhi. "We should try to highlight great scientific achievements of ours and not our blunders," said Dr Paintal "because anything that appears in the media has considerable effect on our youngsters". He himself shuns publicity unless he is sure of his work.

"Science writing is not like political writing," said Vithal Nadkarni, Special Correspondent, Times of India, Mumbai, with a flourish, "That any whoop or blurb by a politician will

reported in the press. Scientists have to do something worthwhile which we can report."

"It is like a girl complaining to her father that nobody in the street looks at her!" joked Dr Dattaprasad A. Dabholkar, Director, Shriram Institute for Industrial Research, Delhi, "The girl should look at herself in the mirror and ask herself why nobody looks at her! Our scientists should do a similar exercise; assess their own achievements and evaluate whether they deserve media attention". Dr. Dabholkar is an industrial scientist with several patents and original research contributions to his credit.

No System Available To Highlight Science

"We've no system to push scientific work done by our colleagues into the media," said Dr Mayank N. Vahia of Cosmic Rays and Space Physics Group of Tata Institute of Fundamental Research, Mumbai, "We assign a scientist to take care of media as and when we hold an exhibition or lecture but, under normal circumstances, we've nothing to offer to the media". Dr Vahia is a Cosmic ray physicist who was involved in setting up the exhibition to celebrate the Golden Jubilee of T.I.F.R. in 1996-97. "Even during the Golden Jubilee celebrations, nothing much was written about T.I.F.R. and its scientific contributions despite sufficient advance notices given to the press about our functions and lectures," he lamented. In addition to indifference to the media, he went on to add, "TIFR scientists consider talking to the media as self-publicity rather than bringing science to the masses!

"In these days when funding and projects are dependent upon the image of a laboratory in the media," said Dr K.V.Raghavan, the then Director, Indian Institute of Chemical Technology, Hyderabad, "we need scientists from our own labs to deliver what the media wants. Any agency which can impart media skills to our scientists is welcome." Revenue-generation has certainly brought a sea change in the attitude of several science managers because unless the technologies developed by a laboratory or organisation get media coverage, nobody, especially technology-buyer, comes to know about them. It is high time that Indian labs pay attention to this important, and

today much ignored, aspect of technology dissemination and transfer.

Nothing Wrong With The Media

"Exposure to media has helped me understand its problems," said Dr. R.S.Nadgauda, a senior scientist at National Chemical Laboratory, Pune, whose work on laboratory propagation of bamboo has received international and national acclaim. It did so when her report on reducing the propagation time of bamboo in the prestigious science journal *Nature* was commented upon in the editorial pages of the journal in 1990. And when *The New York Times* published a report on the same on the front page and the BBC gave a news coverage, the entire Indian media woke up to the discovery made in the country! Every other day, her telephone started ringing as some or other Indian journalist wanted to write on her research contributions.

"After the initial enthusiasm," Dr Nadgauda reminisced, sitting in her neat, clean, and sophisticated laboratory, "we began to feel bored as day after day I and my colleagues had to explain to media persons what we've discovered and done in our laboratory. But in any case, it was a learning experience for us as we've to explain everything about our work from scratch. We began to learn and appreciate the requirements of the media. In fact, as we began to receive queries for our work from all over the world, including India, we began to appreciate the tremendous role that the media plays in popularising a subject at the cutting edge of science". She went on to add hastily, "Today, many people know about bamboo only through our work!"

Be that as it may, one important fallout of this media exposure for Dr Nadgauda is that she has realised her social responsibility towards her countrymen. She has begun to write popular science articles on her specialised subject in the local media. "Why should I expect media persons — or for that matter our countrymen to know and understand what we've found," asked she, "when the scientists next doors don't know and understand what we're doing in our laboratory?" Her sympathies have also crossed over to the media persons. "Our scientists don't know how to present their findings to the media,"

she added, "That doesn't mean something is wrong with our media!"

How Scientists Talk to the Media

How do CSIR scientists interact with the press? "It is an unwritten law that no scientist is allowed to speak directly to the media," said T.D. Nagpal, the then Head, Unit for Science Dissemination, CSIR Headquarters, New Delhi, and went on to add, "He can do so only in the presence of the liaison officer of the concerned CSIR lab. We take this precaution so that exaggerated or tall claims do not appear in the press which will embarrass CSIR."

"Of the small per cent of agricultural scientists who do research," said Ratan Prakash, the Chief Public Relations Officer,

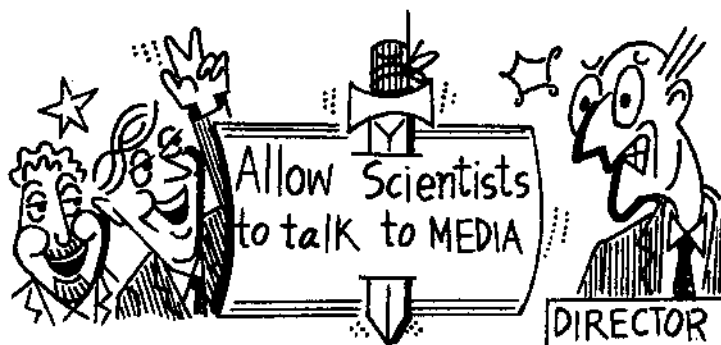


Indian Council of Agricultural Research, New Delhi, "Hardly one per cent are media-conscious and interested to bring their research findings to the notice of the public". For facilitating better liaison he sits next to the Director General, ICAR, in the British-style 'Krishi Bhawan', "There is no system, or rather no need, to spot scientists whose findings need to be brought to the notice of the public," he said rather off handedly. Often, senior scientists under whose guidance in research is in progress keep the higher-ups and the D.G., ICAR, informed about any research breakthrough made in their respective departments. "If any research finding is worth reporting," he said, "I issue a press release in consultation with the D.G." Photographs taken by the photographer attached with that

institute/lab are also provided with the release, if need be.

Guidelines for Talking to the Media Required

"Often, we don't know what the media would be interested in, or when we should send them press releases, and so on," said Subhash Gangakhedkar, Senior Scientist, who looks after publicity for Indian



Institute of Chemical Technology, Hyderabad, "I think there is a strong need for well-defined guidelines for P.R.Os. These guidelines should advise on what to write, what not to write, what should be the form of presentation, how often stories should be sent to the media, etc."

Articulate, soft-spoken, philosopher-like, biochemist Dr P. M. Bhargava, went on to add emphatically, "Scientists should be allowed to speak directly to the media, but, what they say should be based on scientific facts. If some scientist speaks nonsense to the media, he or she should be hauled up! It should be total freedom with accountability!" During his tenure as the Director, CCMB, Hyderabad, he claims he gave total freedom to his colleagues. Added his colleague, Chandana Chakrabarti, who was also earlier working at CCMB, "A law should be created to correct Directors of labs or scientific organisations who don't allow scientists to speak about their research work to the media".

OBLEMS & PROPOSALS: REGIONAL LANGUAGES

Sponsorship Available

cept for a few major publishing houses in Maharashtra," said mar Kadam, Chief Editor, *Mahavrutta*, a feature service in rathi in Mumbai, "nobody is willing to pay for a science feature vice in Marathi". He was talking about his experiences in seminating science through his feature service which is sent to small, medium and big newspapers of Maharashtra. He runs a ture service on Ayurveda in collaboration with an Ayurvedic ist and a science service feature by adopting articles published i Marathi science magazine brought out by an NGO. "Any Tom, ck or Harry cannot handle science. Even translations need owledge of science. Moreover, there is a need for credibility in cience story," said he, "Which means there is a need for isiderable investment in manpower, time and money. And if ody is willing to pay for science, who would start such an erprise? I therefore pick up readymade interesting science stories ilable in Marathi from this NGO magazine and supply them to newspapers in Maharashtra at my cost. It serves the purpose, l that is all that matters, isn't it?" He went on to add hastily, "Of rse, if an industrial house sponsors such a science service, it uld be a commercially feasible proposition".

ence-related Events Not Reported

f course, science-related events do occur in Ratnagiri," said rish Damle, Assistant Editor, *Ratnagiri Times*, one of the oldest l leading newspapers of Ratnagiri, a small coastal town in harashtra, "But nobody comes forward to inform us about these nts. As a result, most of these events go unreported in the press. sides, the local geography, fauna, flora and marine life are never tten about. There is therefore a need for a local science forum ich not only informs us about science-related events but also vides us news and features on local events, flora and fauna."

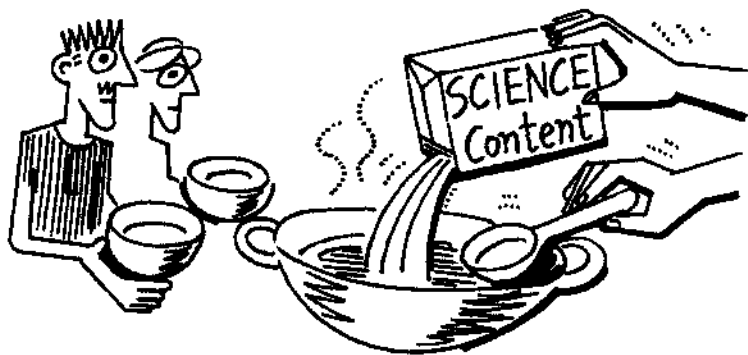
Ratnagiri Times has been carrying a fortnightly science umn *Vaigainik gappa-tappa* (Science gossips) by a local lege science teacher Dr Pramod Kokate for the last 15 rs. However, there is no special effort to include science he pages of the newspaper. Why? "We carry science stories

in our columns as a social responsibility," said Damle, "We don't get business due to a science story. For instance, no private company is ready to sponsor a science column as it does for a sports story. Besides, people will read our newspaper for science only if we publish science consistently for at least five years."

"There are no writers on science available here. The local persons can only teach science," said Vinayak P. Somni, News Editor of the rival newspaper *Ratnagiri Express*, "We're always looking for features on science because our readers demand them by letters. We're interested in publishing one full page on science every week! But we get no science from anywhere. No PTI line is available here; and UNI rarely provides science. We're particularly keen on stories dealing with industrialisation and pollution".

Science Needs To Be Diluted

Bearded, young and smart B.V. Diwadkar, Assistant Editor, *Dainik Sagar*, published from Chiplun, a small moffusil yet industrial town near Ratnagiri, Maharashtra, added, "The availability of science news or features does not necessarily mean we can publish them straightaway. In addition to translation problems, we've to ensure that the science content is diluted enough to suit our semiliterate



audience". He went on to add that his newspaper is ready to subscribe to a regular science feature service.

"In Kerala, people are aware of—but not knowledgeable about—science! No layman is interested in science for the sake of science," said Jyotir Ghosh, Chief Sub-Editor, *Matrahoomi*, Calicut. "It is only when a scientific issue becomes controversial that a large number of stories appear in the print media". He was



talking on a hot-line between Calicut and Kochi. "Now-a-days, traditional system of medicine is popular in the entire Malayalam press," he continued, "Correspondents from moffusil places send reports on the traditional medicinal knowledge of tribals which are often highlighted in box items. And more often than not these reports spark off controversies as some issues are scientifically challenged and debated!"

Institutes Not Interested

"When an Indian nuclear reactor became 'critical'," said Prashant Dixit, former Senior Correspondent, *Loksatta*, a Marathi daily published a report claiming that the reactor had gone phut! The person, who translated the press release from English, took the word 'critical' for health!" Indeed, lack of good knowledge of English can lead to such blunders. "Why does the Bhabha Atomic Research Centre, or for that matter any scientific research institute, not provide their press releases in Marathi or any regional language?" asked he, and continued, "It would definitely lead to more reportage of science events happening in the country".

“All the media-oriented activities in Indian scientific institutes are geared to English media,” said Chandrasekhar Patwardhan, and asked somewhat in anger, “Nobody bothers about Marathi, or for that matter any regional language media! Why?” Young and boyish, Patwardhan has been, in addition to writing and reporting on science, handling Pune’s leading newspaper *Sakal*’s science supplement for the last more than ten years. He has raised a very pertinent issue. When a majority of the masses know only regional languages, why are Indian scientific institutes catering to the needs of the English media only? In fact, in comparison with English reading audience, the audience of regional languages is much larger.

“What we need is a nodal agency,” Patwardhan went on to add, “which could collect, select and disseminate information on science suited to local interests and needs after translation into Marathi among various media houses in Maharashtra. Or, to avoid repetition, a central nodal agency should be created which provides science information in different regional languages to their respective state media houses. Such a nodal agency should work under the guidance of a team of well-known scientists and science communicators to have the stamp of authenticity and credibility”. Patwardhan could not have been more right!

Terminology and Related Problems

“There are reservations of about 5 to 10 per cent scientific and technical terms commonly used in popular science written in Kannada language,” informed M.A. Sethuraman, a veteran science



writer in Kannada, who is also an active worker of Karnataka Rajya Vigyan Parishad, Bangalore.

About 10 years ago, an experts' committee of Mysore University sat over the subject of scientific terminology in Kannada and brought out a glossary of the terms. "10 per cent words in the glossary are technically not correct but they are still in use," added Sethuraman, "Some of them are simply Kannada equivalents!" The subject of terminology figures uppermost especially when science writing in the regional languages is in question. There is a need to introduce new words or simplify the old, difficult words in all Indian regional languages so that reader friendly scientific words come into usage and science is understood by the common man.

"I can't understand why a commonly used English word like 'heart attack' cannot be used in explaining a medical case history, for instance," wondered Suhas Vidvansh, Duty Officer of All India Radio station, Ratnagiri, Maharashtra. He was talking about his experiences while producing science and health related radio programmes. "Our biggest problem is inaccessibility to well known experts in various science and medical fields who are not available in our town," added he. Ratnagiri is about 300 kilometers away from Mumbai.

"Some guidelines for correct scientific terminology is a must," said Dr Anil Lachke, Senior Scientist, National Chemical Laboratory, Pune, who writes on science in Marathi in several reputed Marathi dailies like *Sakal*. Dr Lachke's problems are understandable because being a scientist involved in research and having received formal training in science in English he is at loss for scientific terms in Marathi. "Terminology is always a problem at the back of the mind of any scientist who writes in regional language," he said.

Similar issue was raised by Dr A.V.Kulkarni, a tall, scholarly-looking person who teaches physics in a local college at Chiplun, a small industrial yet scenic town in Maharashtra. "There are some fanatic science writers here who claim that scientific terminology in pure Marathi should be used even for writing popular science articles and no commonly used English scientific terms should be used!" he exclaimed, a bit annoyed. "Then, a lot of scientific mistakes creep in our published articles due to bad proof-reading

by non-science staff of the publishers," continued he in anger, "That really puts one off science writing because it gives you a bad name —and in a small place like Chiplun that matters!"

"Exact words for scientific terms in Malayalam are not available," said Dr B.Sathyanathan, Technical Officer, School of Environmental Studies, Cochin University of Science and Technology, Kochi, "Dictionaries are not upto the mark, not even standardized!" As a scientist who writes occasionally on environment and ocean issues, he was narrating his own experiences. "Also, computers with keyboards in Malayalam are not available in scientific institutes," he continued, " Naturally, we have to face enormous problems in order to write for the media". Soft-spoken and scholarly-looking Ramesh Jadav is Resident Editor, *Janmabhoomi*, Mumbai. Due to the shortage of science writers, most Gujarati newspapers and magazines publish translated science articles appearing in foreign media," he informed and added hastily, "Of course, we've terminology problems in translating science stories into Gujarati. A good dictionary of technical terms in Gujarati is also badly needed. Besides, there are not very many good translators of scientific articles".

Lack of Primary Sources

Young, articulate and enterprising, Dr Manoj Patairiya, a prolific science writer in Hindi with a Ph.D. in science communication, knows where the shoe pinches. " A Hindi science communicator, or for that matter any regional science communicator, does not have easy access to primary sources in science, i.e., journals, annual reports, newsletters, bulletins, books, etc," said he, "Obviously, he has to depend upon secondary and tertiary sources which are often not authentic for the simple reason that persons with no science background translate or produce these sources. As a result, the science presented in annual reports, newsletters, bulletins, etc, gets distorted and subsequently affect science coverage in magazines and newspapers!"

Need To Create Writers

"Creating good science writers in Assamese is a major problem we face," said Prof Kulendu Pathak, the former President, Assam Science Society, Guwahati. A Professor of physics in the local

Cotton College and also associated with a publishing house, he feels that most Assamese science writers write as though they are writing technical reports. But, then, how can this situation prevailing in most of the regional languages be remedied? He suggested the creation of a national level body or consortium which would select at least four best books on popular science (and also science fiction) available in English every year, negotiate their copyright for translation into all major Indian languages, get them translated by the best regional writers and make them available in the respective states.

"After all, a good writer is created only when he knows what good writing is," said Prof. Pathak. He asked, "Without reading excellent popular science books, how can good writers be created?" Certainly, such translated popular science books (and also science fictions) will not only create good writers but also generate interest in popular science among the masses.

"We use our Vigyan Parishad's popular science magazine *Vigyan* as a training ground for budding science writers," said Prof Shiv Gopal Misra, a former Professor at Allahabad University and the present President, Vigyan Parishad, Allahabad, who has won

Only six per cent listenership for science broadcasts

In the following are the main findings or suggestions of the Audience Research Unit of All India Radio (now Prasar Bharati), New Delhi, for radio broadcasts on science aired by All India Radio :

- * There is only six per cent listenership for science broadcasts of A.I.R. It amounts to about seven lakh listeners all over India.
- * Science programmes hardly figure in the list of radio programmes of listeners except those related to health and medicine.
- * Science programmes should primarily aim at providing hard, factual information on common problems of day-to-day life, including medical information.
- * Science information should preferably be conveyed by taking up real life happenings, explaining the scientific rationale behind them, and also suggesting suitable solutions.
- * Audio medium is often not suitable for 'class room' type of teaching.
- * Long serials such as 'Human evolution' do not sustain interest over a long period of time. □

awards and prizes for not only Hindi science writing but also Hindi literature. He himself has trained as many as 40 science writers who were his research students. He further added with a sparkle in his eyes, "I can proudly say that all eminent Hindi science writers had been associated with the Parishad at some time or the other!"

Prof Misra is however disappointed with the present science writing scene in Hindi. "Today, nobody wants to take pains to write something novel. The same subject is written in various forms in different magazines and newspapers," he lamented, "Classics in popular science needs to be written, if the status of science writing has to improve in Hindi or in any other language, for that matter."

PROBLEMS & PROPOSALS : PRESENTATION AND OTHER RELATED ISSUES

Science Should Read Like Literature

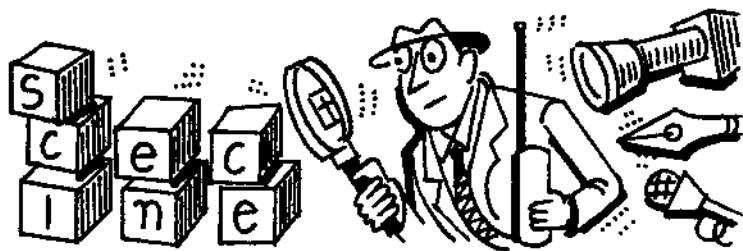
"When writings on science would read like literature," said Prof. S. Sivadas, sitting in the veranda of his beautiful cottage amidst the idyllic setting of the neat and clean town of Kottayam, Kerala. "People would read science". He himself puts in every effort to make his writings on science sound like literary pieces. For his contributions, especially for popularising science among children, several popular science and literary awards have been bestowed upon him. "I make science sour and sweet," said he, explaining his way of writing on science for children, "full of puzzles and riddles so that science goes straight to the heart of my readers". Now retired and a full-time writer, soft-spoken Prof Sivadas was earlier associated with *Eureka*, the Kerala Sastra Sahitya Parishad's children's magazine. He also writes a children's science column in *Malayalam Manorama*. "The base of my writings is science but they impart enjoyment of literature," said he emphatically. Almost similar views were expressed by another doyen of science writing in Bengali, Samarjit Kar. "Unless science is presented like literature and unless it is written taking into account the local needs of the masses," he said, "it is *not* likely to be read and appreciated." A person who holds the unique record of writing on science every week without fail in the prestigious Bengali magazine *Desh* for 24 years from 1968 to 1992, his words have great significance.

Connect the Reader

"I find that people at large are much interested in diseases and their cure," said Rup Kumar Basu, Deputy City Editor of the Kolkata daily *Bartaman*. A huge idol of Lord Ganesh presides over the small reception of his office. "That's why I give more medical stories in my weekly page. Sometimes, of course, if there occurs something newsworthy in science, such as, a solar eclipse, or Kalpana Chawla in space, etc., medical stories receive lesser space. Even in science, I prefer to publish stories that border on curiosity. Moreover, I don't give detailed stories on science. I just try to give an idea of the subject. I think that's enough to trigger off their interest in science." Dr Subodh Mahanti, presently working in Vigyan Prasar, an autonomous organisation set up for taking up large-scale science popularisation tasks, is a serious science populariser; he has something different to say about presentation of science stories. "Suppose an article on some research findings about banana is published somewhere. You will find that nothing is mentioned about how the new findings will affect its production, its quality, its export potential and economics, etc. In short, the connectivity to the reader is often missing!" In other words, said he, science writers or journalists do not do proper home work. The root cause for this unholistic treatment of subjects in media can be traced to their training, he added. "Scientists are often not interested in music, art or literature," he said, "Their narrow specialisation makes them narrow-minded, confined to their field of work, unconcerned about the society and the world at large. Their narrow specialisation gets reflected in their writings or reports". The quantity of science entering our media, said Dr Mahanti, is fairly okay but it is lacking in quality: "After reading a piece on science, one's interest in the subject is not kindled. One is not inspired to do something about it!"

"People read science stories, if they have some background or are aware of science," said T.D.Nagpal, then Head, Unit for Science Dissemination, C.S.I.R. Headquarters, New Delhi, "For instance, a story on the reduction of the flowering time of bamboos will interest only those who know how long the flowering time of bamboo is, how the reduction in the flowering time will help in improving them genetically and in increasing their production, and finally will affect their business economics. Similarly, high yielding

rose oil or opium-less poppy, which CSIR scientists have developed in their labs, do not interest people at large because they do not affect them directly". How does he estimate the popularity of a science story? "The press clippings, what else?" replied Nagpal. "The number of newspapers all over India that pick up a science story!" He proudly mentioned three science stories of CSIR which had record press clippings: (1) Leather missions (135 clippings); (2) Safety kit for two wheelers (125 clippings); and (3) American patent on *Haldi* challenged (121 clippings). "I think these stories got more coverage in the press," he said, "because they concerned people directly".



Investigative Journalism Required

"We've always been singing praises of science produced in India in the name of science popularisation. It is high time we outgrow this! We should now have a critical appraisal of science produced in the country!" said vociferously D.S.Bhatnagar, the former Chief Editor, *Invention Intelligence* and *Avishkar*, two popular science publications of National Research and Development Corporation, New Delhi. "Our young boys and girls should go for investigative science journalism," added he, "visit our labs, talk to our scientists, find out what they have done and report it! There is name, fame and money in this, which everybody wants these days!"

Remove 'Science' and Add Visuals

Friendly and soft-spoken, Dr R.Sreedhar, the then Station Director, All India Radio, Bhopal, said, "Let's remove the word 'science'

from all science programmes, so that people at large do not switch off their radios due to the fear of science. But at the same time, train the staff of all Divisions in matters of science, so that they can produce their programmes whether it is about youth, women, family welfare, health, or sports, laced with science". A winner of the NCSTC National Prize, he is the brain behind several radio science serials. He emphasises, "Today, every aspect of life has a component of science. I think this component of science needs to be highlighted through all programmes".

Dr Vasant Gowariker, a Pune-based scientist of national eminence, who was earlier Secretary, Department of Science and Technology, New Delhi, and the then Vice Chancellor of the University of Poona, Pune, agreed with Dr. Sreedhar, "There should not be pages or supplements in newspapers or magazines exclusively marked 'Science'. They sound as though they're meant for 'Restricted readers only' and so they're often skipped! Science stories should be made a part of the main newspaper because science is a part of our daily lives. That is the only way people will read science".

Sitting in the huge British built Vice-Chancellor's office in the University of Poona's lush green campus at Ganeshkind, the bearded academic asked softly, "Why not popularise science through pictures rather than mere words?"

"Today, newspapers need more visual information, namely, pie charts, photos, and graphics, to tell a science story rather than mere textual information," added Sumit Ghoshal, a freelance science writer who has worked in various Mumbai dailies, "There is more need to provide visual material along with the text."

More Variety of Interests Needed

The walls of Prof M.M. Chaudhri's former small office in Consortium of Educational Communications, New Delhi, were adorned with paintings and posters which he himself had made! He was the first Director of the India's best science TV show *Turning Point*. A person interested in painting, theatre and music, he said, "A filmmaker has to have an interest in everything because good background music, for instance, can impart an exhilarating feeling to something

scientific being shown on the screen. This feeling can have a lasting effect on the viewer's mind." However, he emphasised that it is only a good script which can make or mar a science film, other factors such as camera work, direction, acting, etc., being equal. "In fact, in so far as directors, technical staff, actors and equipment are concerned, there is no dearth in the country," Prof Chaudhri continued, "What we do lack are good script writers who can conceive of presenting science in novel ways. Unfortunately, in the last 50 years of Independence, we've concentrated on buying



hardware only but not in building software, in creating a band of good script-writers in science! Besides, Indian producers don't know science and are not script-writers like their counterparts in the West."

No Science-packed Programmes

"Most of our science films (or video films) give mere scientific information," said Atul Kumar, the young New Delhi-based science film-maker, "That's not enough! Science films should depict the romance of science!" Romance of science? "The excitement of doing science—fun, curiosity, finding on your own... The attitude of looking at the world and life with fresh, open mind because science exists in all walks of life... The trials and tribulations of a scientist trying to unearth a small brick of knowledge. That's the romance of science!" said he, gesticulating.

"Not the subject matter, it is how you conceive a radio programme which is most important," said Usha Bhasin, the then Executive Producer, Central Education and Planning Unit, All India Radio, New Delhi, "I believe in creating interactive and participatory

programmes in which the audience also has a say". She was talking about the production of science programmes for radio. Her own half an hour radio magazine programme on science and technology news and views, *Radioscope*, which is broadcast every month, is very popular among the listeners. "*Radioscope* gets considerable feedback from the listeners," said she with pride.

"I never make science information packed programmes," said Bhasin talking about her style of presentation, "I always intersperse science with narration. Besides, I always aim at making my programmes short, crisp and informal. But I find one problem while working with scientists and science academicians. They are sticklers for definitions and cannot conceive of putting the same idea into different words or ways!"

"The approach of Indian TV producers towards science is not to show science as an exploration or discovery but to tell about science," said the scholarly-looking and bespectacled Jai Chandiram, the then Director, Electronic Media Production Centre, Indira Gandhi National Open University, New Delhi, who has earlier worked with the Doordarshan and is keen on science programmes. "There is a need for a change in the mindset of our script-writers, producers and directors," she added, "Our science programmes often made for school and college students are mostly laboratory-oriented and not home-or environment-oriented. As a result, simple yet interesting science which one comes across daily and one needs to know more about gets hidden behind dull laboratory scenes! How *can* you popularise science in this manner?"

'Edu-tainment' Programmes Needed

"We should aim at producing science programmes which entertain as well as educate children," said Dharam Parkash, Reader, Central Institute of Educational Technology, New Delhi. "The key word is 'Edutainment'! It is the need of the hour!" He was talking about science films and videos aimed at children produced in various centres all over India. But, why do no Indian science programmes appear on TV during the prime time except during the educational broadcast time, early morning and afternoon every day except Saturday and Sunday? He went on to add, "Somehow, we've not been able to

produce quality science programmes that also fascinate and entertain people!”

Dharam Parkash is a veteran in the field of making science programmes for children. He has been associated with the film and TV medium since 1972 and has to date made more than 150 science programmes aimed at children, of which a few have won international honours. “The biggest challenge we encounter in making science programmes is how to convert scientific ideas and concepts into interesting visuals,” said he. What are the problems often faced while making a science programme? “First of all, our experts go too much into depth and details often not wanted in visual presentations,” continued he, “I have always to fight with experts! Very few are able to bring the subject down to the level of the children. Moreover, I very often find that they are not excited about their subject and as a result they are unable to communicate ‘excitement of science’ through their scripts. Quite likely, this lack of excitement has roots in our school education”. He lamented, “I don’t know why when we think of science, we always think of serious-looking scientists in white gowns doing something in their labs. Why can’t we think of simply creating wonder in the mind of children about science? The other day I saw an elephant swimming in the sea—for the first time—on a TV channel. It was a marvellous, fascinating and wonderful experience for me. Can’t we create a similar experience for science in a child?” He left the question hanging. Perhaps, he is working hard to find out the ingredients for such a science programme.

Media Skills Required

Disappointed by students with science degrees, the young film-maker K.P.Madhu, presently with the Consortium for Educational Communications, New Delhi, does not employ them for making science films. “Science students basically lack communication skills,” said he emphatically, “Actually, all throughout their studies, communications is given the least attention. No teacher bothers about grammar or spelling of language let alone fine expression!” He therefore always encourages arts graduates to make science films because they have better communication skills and secondly their science presentation can be understood by the common man.

“Science students often mess up a production because they try to give all their specialised knowledge often not required in a film!” said he, shrugging his shoulders. Incidentally, Madhu happens to be a post-graduate in science.

Where’s Indian Carl Sagan?

Dr Kiran Karnik, the then Managing Director, Discovery Channel, New Delhi, had something else to say about science films. “In these days of personality-oriented programmes on the TV,” he said, emphatically, “sustained effort should be made by our media and scientific community to purposely train, nurture and create a science personality like the late Carl Sagan who could disseminate science effectively among the public.”

Home Work For Conferences Required

To date, the XV International Conference of Genetics held in New Delhi in 1983 was the first, and the last, conference held in India which received a tremendous media coverage. What was the secret behind such an overwhelming response to a scientific subject which was till then obscure? “Home-work!” said Prof. A.K. Bhatnagar forcefully. Three months before the conference, he and his team organised almost every other week a press meet with Drs M.S.Swaminathan, K.L.Chopra and H.K.Jain, the organisers of the conference. The importance of genetics, its applications, societal impact and future prospects, which were based on the abstracts that were received for the conference, were told repeatedly to media persons. Prof. Bhatnagar and his team also personally met the Chief Editors of all major newspapers and the Director Generals of A.I.R. and Doordarshan, requested them to send their reporters for the conference and asked them if they would need any extra facilities for the reporters. Press handouts and background information on genetics, its discovery, its discoverers, a brief history of its development, latest advances, old and new applications, future problems and prospects were prepared and handed over to media persons in advance.

This advance material made media persons familiar with the subject and its importance to the people. Some even used it for preparing features and articles after talking to other geneticists.

Besides, every day, at 4 PM, a press conference was called and an eminent geneticist was asked to address the press. He gave not only details about his own work but also a brief idea of the important things mentioned during the day. Even one week after the conference a 'Thank You Dinner' was also organised. The recommendations of the conference were then handed over to media. No wonder, the conference was so well covered in all media!

Basically a researcher and a teacher in the Department of Botany, University of Delhi, Delhi, Prof. Bhatnagar edits the Department's in-house magazine *Botanica* and writes on various aspects of science in newspapers and magazines. A keen wildlife photographer and a social worker, he has also motivated and guided several botany students to write on science, of which some have today made a name.

Dr. Chopra, the convener of the Genetics conference, had selected him as the Press Information Officer because he had experience both in research and writing. "The success of genetics conference has stuck on to me," Prof. Bhatnagar smiled, "Even today I am offered the job of press secretary by various conference organisers. The first tip I offer to any organiser is to have a media-friendly title for the conference. For instance, a conference like 'International Symposium on Enzymes in Organic Synthesis' does not gell with reporters. Because they don't know what enzymes are, they ask, 'What are their public utilities?' though enzymes have diverse applications in foods, detergents, leather to genetic engineering!"



VIEWPOINTS: SOURCES AND OTHER RELATED ISSUES

Potential Of NGOs to be Tapped

"For reasons unknown to me, our NGOs (Non-Governmental Organisations) do not provide the latest scientific developments to the press," said Vinod Varshney, Special Correspondent, *Hindustan*, New Delhi, one of the largest circulated Hindi newspapers in India. He was talking about his latest report on terminator gene which, if activated, creates infertile plants and which would have tremendous implications in agriculture, if brought into use. "It was by sheer accident that I met a person from an NGO who gave me information on terminator gene and its implications on the life of an average farmer in India," said he, "Otherwise, I could never have reported such an important story. In fact, I wrote the first story on it a few months ago. Only recently, a major English newspaper has reported on this. I wish our NGOs could feed us latest scientific developments in the country from time to time in form of press releases because their scientific work has tremendous social implications which interests everybody".

"We're not science-biased but we do publish features on science regularly," said Anil Barua, Chief Editor, *Dainik Asam*, Guwahati, "We often send reporters to investigate the status of water, drainage, hygiene, etc., in the city. But I think NGOs can play a vital role in providing information on such science-related issues that continue to plague Guwahati".

"I often find scientists not writing on local science-related public issues," complained young Anuradha Rajkumari, Sub-Editor, *The Sentinel*, Guwahati, "In fact, there is no agency which provides material on local issues and themes concerning science. Science communicators should join hands and form an agency which supplies local science related news".

No Dearth of Indian Science Stories

"No dearth of science stories on the Indian front !" said the Delhi-based Indian correspondent to the U.S.science journal *Science*, Pallava Bagla, scoffing at the people who say there is no science

worth reporting in India, "It's simply a question of working hard. If you dig deep enough, there's always a story!" To vouchsafe for his statement, he proudly claimed that he had reported 40 stories on Indian science in the last year or so in the prestigious *Science*.

"In fact, some stories were major breakthroughs made by Indian scientists which they themselves never thought they had made!" continued Bagla, "They had simply done research, reported in some obscure journals and forgotten it until I contacted them and reported their work in *Science* for the first time in the world! Subsequently, my reported stories figured in the Indian media. Even an Indian scientist wrote a full length book on the subject!" The well known DNA finger printing work on Tiger-Lion done by Dr Laljee Singh, which gave a clue to 'genetic pollution' in tigers for the first time in the world, is one such story. The second is about rivalry among siblings discovered for the first time in the world in a species of plants by a scientist working at University of Agriculture Sciences, Bangalore.

"As our biggest problem is Indian science stories," said Dr Deb Kumar Mitra, the then Assistant Editor, *KnowHow*, in the air-conditioned, ultra modern office on the second floor of *The Telegraph* building, Kolkata, "And this is a chronic problem for all Indian journalists, why can't a central body, a sort of news gathering pool, be raised which collects scientific developments occurring in all parts of India and provides them at one place every week or fortnight? Even if some items are highly technical, we won't mind because we can contact the concerned scientists or technologists



and talk to them to write stories in a popular vein. It will be a handy information guide for all journalists and will lead to more Indian science in all our media”.

Libraries, Conferences And Home Pages

“The kind of investments required to get a story from Indian labs is high,” said Pradeep Bhattacharya, Editor of the now defunct United Newspapers, Delhi, “We cannot afford it. We wish Indian labs were on-line so that we could obtain information and photos directly from them!”

The freelance Bangalore-based science writer Dr Radhakrishna Rao said, “Libraries of our institutes are not well-maintained. We lack the information base. We need networks of information disseminating centers”.

“There is a need to set up full fledged information centres in universities and laboratories to provide information on latest research done there,” suggested R.Shankar, the scholarly Editor of *Science Express*, a weekly supplement of the *New Indian Express* devoted exclusively to science prepared at Hyderabad and circulated all over Orissa and Southern India. He complained about the lack of science news received from Indian universities, institutes and labs and also the lack of communication on the part of Indian scientists.

Over the years Shankar has found another rich source of science stories. “I and my staff make it a point to sit through week-long seminars and conferences,” said he, “It often pays rich dividends ! We get a rich haul of exclusive science stories!”

In the last two years however, access to science stories has undergone a sea change due to the Internet. “Through the Internet,” added Shankar, “we can have access to anything—any event, conference proceedings, backgrounders, and much more — on science happening any where in the West. Of course, Indian labs and universities have yet to make their presence felt on the Internet!”

“Scientific organisations, institutes and labs should design their home pages on the Internet carefully,” said P.Shekar, Editor, Science and Technology page, *The Hindu*, sitting in his air-conditioned, partitioned office in one of the wings of the classy old style Kasturi

Building on Anna Salai, Chennai, "Otherwise, home pages are likely to go waste. Moreover, scientists should be allowed to write about their own findings in these pages so that we could pick them, investigate and publish stories in our pages". He was talking about his experiences with the Internet to which he and his two young colleagues have an easy access. "It has now become easier to know what American scientists at Rochester University are doing in their labs rather than their counterparts in India! Using fax, e-mail, etc, we can get information on any scientific event in the West within five minutes but *not* from India," he added with a smile.

Science Experts Missing

"Suppose the story 'The monsoon has arrived in Delhi' has been announced by the Meteorological Department. After some showers, rains vanish for weeks. Naturally, a radio programme explaining the science behind the absence of the monsoon would interest every Delhite. But when we look for an expert meteorologist to comment on this subject, nobody is willing to do so! Similarly, when an earthquake hit Jabalpur, nobody was ready to comment on its occurrence. How can you make a radio programme on a hot, topical subject without the necessary expertise?

"Take another case. While conducting research on the longest day in a year somebody found out that there were six longest days in Delhi in 1997. However, we could not identify a single expert in Delhi who could explain this anomaly convincingly. We often encounter problems while checking on strange scientific facts," disclosed Ratnabali Mitra, the then Programme Executive, Science Cell, All India Radio, New Delhi. "Getting experts on science subjects when we need them is a recurring problem." Ratnabali has been in the business of broadcasting science programmes for the last more than 15 years. A winner of awards for her books and radio programmes, she said, "There are today enough script writers who can write on science but there are not very many who can impart the excitement of science through voice only."

Today, there are about 500 science script-writers on the panel of All India Radio, of whom only 20 can deliver good scripts, and hardly a few can write a play involving scientific issues.

Timing of 'Turning Point' serial unsuitable

Soon after the now popular science serial *Turning Point* hosted by several film personalities, was put on the air, a small preliminary survey conducted by the Audience Research Unit of Doordarshan, New Delhi, claimed:

- * There is a need to evolve a media strategy to bring the telecast of *Turning Point* to the notice of the interested audience.
- * The time of telecast of the serial needs to be changed as the audience is busy with other things at that hour.
- * The number of items shown in the serial should be reduced. There is a demand for more indepth coverage of items being shown.
- * Initially, the items shown should be simple, taken from immediate environment or surroundings, and then complex ones about specialised science subjects should be shown. □

PROPOSALS : NEW POLICIES AND STRATEGIES

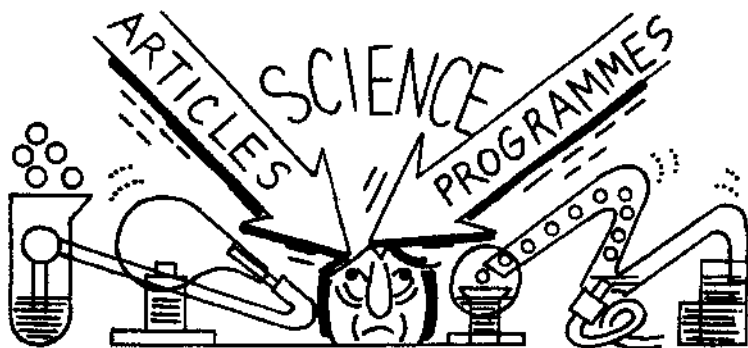
Science Dissemination as Mandate

"Science dissemination should be the mandate of all our scientific organisations," said Kiran Karnik, the then Managing Director, Discovery Communications India, New Delhi, while throwing light upon why scientific developments in the country go unreported in the media. He spoke with the conviction of someone who has worked for more than 20 years in different scientific organisations. "For instance, it is one of the mandates of the United States' NASA (National Administration for Space and Aeronautics) to disseminate information on space activities. So, anything you want to know about space, the NASA and its experts would readily provide you with information. But not ISRO (Indian Space Research Organisation)! There is a hush-hush atmosphere. Nobody would be willing to tell you anything and would advise you to contact its Chairman or some such bigwig. That's why the media is unable to disseminate information on space activities of interest to the public. For instance, the abandonment of INSAT-1D some years ago could easily have been used as a peg to discuss all space related science to the lay reader because he is interested to know why, for instance, stock exchanges or telephones in remote areas are not working."

"Every Indian scientific organisation," added Dr A.P.Jayaraman,

the then newly appointed Public Relations Officer of the Bhabha Atomic Research Centre, Mumbai, "should at any time engage two per cent of its staff to science popularisation activities. Secondly, it should be made mandatory upon scientists to produce a fixed quota of articles/programmes on science till their retirement. Thirdly, science popularisation activities should also be a criterion for judging the scientific output of a laboratory or division". Obviously, Dr Jayaraman means business and does not believe in 'lip sympathy' often shown towards science popularisation by Indian scientists at various public foras and meets.

In addition to the need for professionalism among P.R.O.s of Indian scientific organisations, Dr Jayaraman said, "There is an urgent need for a manual containing guidelines/protocols, etc., for the visits



of science communicators to laboratories". He further added, "We should have public awareness programmes on television in which people affected by the negative effects of science should be asked to react".

Bulletins and Newsletters Do Help

"Till a few years ago, our bulletins and newsletters were of interest to doctors only," said Sandhya Janorkar, the then Corporate Communications Manager, Glaxo India Ltd, Mumbai, "but not so today. Media is more keen on them. Our reports on medicine and health are picked up regularly by newspapers. In fact, we have now begun to design our bulletins and newsletters taking their interest

into account. After all, our purpose is to disseminate information on new medicines, new techniques and health issues to a wider audience”.

Janorkar added, “We’ve also made some inroads into satellite channels”. Her bulletin and newsletter serve as examples for all P.R.O.s to follow. They should re-design and re-pack the information in their bulletins and newsletters in such a manner that it attracts the attention of media persons, in addition to professionals in the concerned field. If the same information is made available in regional language or languages, it would easily be lapped up by the local regional media which is always short of information-related material.

Science Shows Need Proper Marketing

The resounding success of *Turning Point* should have inspired several other companies to make science serials. Why did this not happen in India? Instead, *Turning Point* was closed down. Why? “First of all, for any science serial to attract sponsorship,” answered Prof M.M. Chaudhri, former Director, Consortium for Educational Communications, New Delhi, “it has to become visible to the sponsors. In other words, it has to run a marathon race before it gets noticed. Although *Turning Point* ran a marathon, it was not properly marketed and so it always lacked a sponsor. Besides, there are very few Indian corporate houses willing to sponsor a science serial on a long term basis”.

Shalendra Goel, Producer, Shally Suman Productions, New Delhi, has produced a majority of episodes of *Turning Point* on Doordarshan. For some episodes, he was awarded the Mobius Prize (Prix Mobius) at the 12th International Festival of Science Films held at Eiffel Tower, Paris, in 1995. An year earlier, the Doordarshan also received the Jules Verne Prize (Prix Jules Verne) at the same festival for broadcasting the same science serial. But, today, the same serial is off the air because it is unable to get a sponsor! “The reason for this tragedy is,” said Shalendra, more popular as ‘Shally’, “the science programmes are no more in the commissioned category as they were earlier. They are all in sponsored category now”.

In the commissioned category, the Doordarshan commissioned a few competent producers to make episodes for *Turning Point* which were broadcast at prime time. Because the serial was

broadcast at prime time, private companies were ready to sponsor it. But, today, the scene has undergone a sea change. First of all, the Doordarshan is not ready to give the prime time slot for the broadcast of the serial and secondly it has shifted *Turning Point* to sponsor category. As prime time is not allotted for the serial, nobody is willing to sponsor it. "It is very strange that," said Shalendra, angrily tapping his pipe, "a serial which has put Indian science film-making on the international map, a serial which was nominated five times for the (aforementioned) Prize, has no takers!"

Short, balding and greying yet ever smiling, Shalendra said, "Making science films is not lucrative. A small producer like me cannot afford it! Everybody talks about subsidies for science films but none is forthcoming. How will science films then be produced?" About 300 science stories were produced for the serial over three years. "*Turning Point* had a dedicated viewership especially in the Southern and North-eastern parts of the country," he said. As the serial appeared in evenings or on Sundays, some schools used to record it and play it during school hours.

Having won international acclaim, *Turning Point* is very much in demand in several western countries. "But there is no infrastructure," said Shalendra, "to sell it abroad in a systematic manner. In fact, the serial is so much in demand in schools and colleges that if its cassettes are produced, they could sell in millions all over the country and generate enough revenue for the next episodes of the serial. Several million more viewers will also be exposed to the intricacies of science!"

A philosopher by temperament and looks, Dr H.R.Kidwai, Director, Mass Communications Research Centre, Jamia Nagar, New Delhi, said, "Our biggest limitation is funding. There is thoughtless talk about more science films or quality science films. But the funding agencies forget that the maintenance of a studio and equipment and production of science films are most expensive propositions." Video cassettes of the educational and science films produced at this Centre and others located all over India are sold in the market but nobody knows about them! "There is no aggressive marketing to sell the cassettes and plow back a part of the generated revenue to make good science or educational films," he states bitterly.

“Why no science film dubbed in different regional languages and relayed by various Doordarshan Kendras all over India is produced?” asked K.B.Gopalam, a Hyderabad-based science broadcaster and script-writer, “The resources for such a programme could easily be shared to reduce the expenses.” Is anybody listening?

Need for Legislation

“We’re somehow trying to break even,” Naazish Hussaini, one of the Executive Producers of *Star TV* channel then in her small partitioned office in Andheri, Mumbai, “We don’t have enough surplus available to produce science programmes”. Petite with short hair, Naazish was one of the brains behind the most popular science TV show *Turning Point* when she was with Doordarshan, New Delhi. It was expected that she would advocate for science TV shows on *Star TV*. “Today, all sponsorships for programmes are dependent upon their popularity ratings,” she lamented, “And as science programmes do not come high up on popularity ratings, it is difficult to get sponsors for them”. Does it mean science programmes would never appear on the small screen? What about western countries? How do science programmes appear on television there? “In the West,” she replied, “they have a legislation that every channel has to have a particular percentage of programmes devoted to science”. Does it mean India should also follow the West and resort to legislation so that science programmes appear on the small screen?

Need for Science Channel

New Delhi-based script-writer, science populariser and director of science-films, Rakesh Hallan was emphatic, “An exclusive TV channel devoted to education, including science, is a must. Unless and until such a dedicated channel is available, no good science films will ever be produced. It’s obvious. Proper funding will of necessity follow”.

Private Agencies Should Produce Programmes

“Private agencies should be given slots to produce radio programmes on science,” boomed Amit Chakraborty, the then Station Director of All India Radio, sitting in his office in the airy Eden Gardens area of Kolkata. He knows better because he has been making and

broadcasting science programmes over AIR for more than 20 years. Apart from the magazine programme on science called 'Oniisha' (Discovery) he has participated in various national level science radio serials like 'Human Evolution', 'Method of Science', and has himself produced several serials in Bengali on science and self employment, sex education, blood donation, etc. "Quality science communication is our major problem," he emphasised. An author of several books on science aimed at children, he teaches classes at Jadavpur University to improve the quality of science communicators in Kolkata.

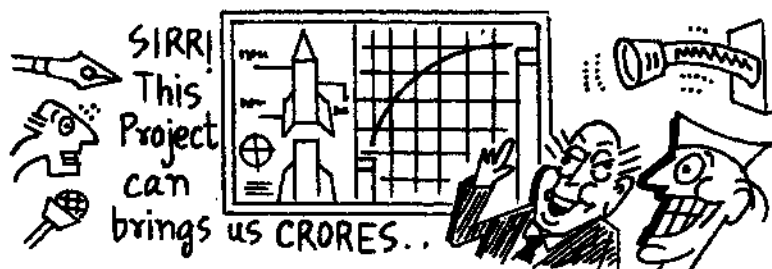
Media Consultants And Open Days

"It was only when my Director hired the services of a media consultant," said B.L.Parashar, former Head, Information Division, who was then looking after the publicity of the Central Road Research Institute, New Delhi, "that CRRRI came into news. Every month 12 to 15 items on various activities of the institute began to appear in the press". Earlier, the press highlighted the activities of CRRRI only occasionally. Subjects such as road accidents, road safety, pollution, road geometry, etc, which affect everybody, were thereafter often written about in the press.

"Another idea which I tried and which, surprisingly, met with considerable success," Parashar continued with pride, "was the conference on transport, road safety and pollution issues which I organised at CRRRI in 1992 on the occasion of golden jubilee celebrations of CSIR. Eminent journalists from newspapers, science writers and CRRRI scientists were brought face to face to discuss and debate issues of public importance. Those public issues and CRRRI activities received immediate attention in the press".

Organisation of such conferences could be another mode of highlighting scientific issues of public interest in the media. Given the lack of proper infrastructure, resources and manpower in their own establishments, Indian scientific organisations and labs should work on these ideas for more media coverage of their activities and achievements.

M. Chakravarty, Scientist, C.G.C.R.I., Kolkata, said, "We prefer Open Day's for publicising our Institute's achievements. During the



Open Day when the doors of our Institute are thrown open to the public, we also invite media persons and provide them with material to write about our achievements. Often, our Institute then gets good coverage in all media”.

Novel Ideas for Science Communication

“ We’ve not developed the language of masses and politicians,” said Dr G. Thiagarajan, an eminent scientist and science manager, who was then Director, Committee of Science and Technology in Developing Countries, Chennai. Former Director of Central Leather Research Laboratory which is next-doors to his present office, he is much exposed to media. “A politician understands the importance of science only in terms of returns to the investment made in science,” he said in his authoritative tone, in his small yet posh office of COSTED on Gandhi Mandap Road in Adyar, “You’ve to give an economic angle to a scientific project in order to educate him about science!” He should know because as a science manager he has been hobnobbing with politicians for the last so many years. “In so far as Indian masses are concerned,” he went on to add, “we have to pick up science communicators from among them. We have to cultivate and nurture them so that they understand the situation and problems of the masses and write in their language”.

“To give science writing a respectful status,” suggested Dr V. G. Bhide, an eminent scientist, who was earlier Deputy Director, National Physical Laboratory, New Delhi, and Vice-Chancellor, University of Poona, Pune, “it should be recognised as

a genre by literary societies such as Maharashtra Sahitya Sammelan". May be, giving science writing a recognised literary status would spur eminent scientists and even literary giants to write on science. Would it lead to better and more effective science writing? Dr Bhide's suggestion needs to be tried and tested.

Rajendra Kumar Rai, Chief Editor, *Sampreshan*, a science feature service in Hindi, New Delhi, has a unique scheme up his sleeve. "As several Government agencies are spending a large amount of money on various science popularisation programmes," said he, "why can't they use half of their budget for a year in providing computers free to at least 100 potential science writers all over the country? These computers could further be in a network and connected to the Internet. All science writers will in this manner be in touch with each other and the Internet, which will, I'm sure, lead to more stories on science in media. Don't you think so?"

PROPOSALS : NEW SCIENCE MEDIA EXPOSURE PROGRAMMES

Wanted : Science Communication Courses

Popular Science in the Mass Media is the only Indian book available on the subject. Its author is Mohan Sundara Rajan, a popular science writer, who was earlier with All India Radio. Today, he lives in Bangalore and keeps himself busy with several projects dealing with media. "Indian journalism or communications courses need to be upgraded," said he, "It is high time science journalism is given due importance in these courses". He is occasionally called to lecture on science writing at local institutes but he feels that is not enough exposure to the subject. "Western science has always been portrayed in our media because we get readymade material from the West," added he, "But, then, those western stories highlight problems of science faced there. What about our own problems created by science? We've so many of them but we're unable to pay attention to them because we don't have our own science writers or journalists. One method of producing science writers and journalists is by giving substantial exposure to science in all journalism courses".

Dr P.M.Bhargava, an eminent biochemist, the former Director of C.C.M.B., Hyderabad, and science populariser, who keeps an

eye on science in Indian media, said, "There should also be refresher courses for science writers every two years so that they could update their knowledge about all fast developing frontiers." In his elegant book-lined Sukriti Consultancy office in Secundrabad, not far from two reputed Indian labs, he added, "I find 80 percent of medical science information appearing in the media to be unreliable!" But he is not one to keep quiet and watch a situation develop. He has set up an organisation called MARCH to rectify the situation. MARCH encourages doctors to write on their specialised fields and helps them get their articles published in the media.

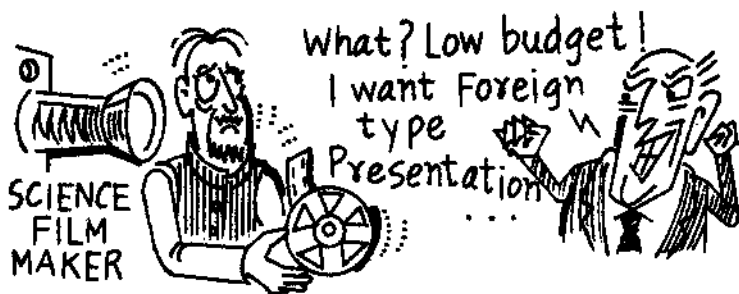
Dr Bhargava's efforts are worth emulation. But the leading Hindi science journalist Vinod Varshney, Special Correspondent, *Hindustan*, New Delhi, who regularly attends press conferences, lectures and seminars to report on scientific activities, comments on Indian scientists. "Our scientists or even science teachers," lamented he, "don't know how to conduct a press meet. They go on haranguing on their specialised subject without giving a thought to the needs of the press. For instance, they should know that due to busy schedule no correspondent can attend a press meet for more than half an hour. Whatever of importance they have to say they should say it within the first fifteen minutes. I think they need some training in this respect". Fair enough scientists too need some exposure to media.

Science Communication Not A Career?

Fair-looking and articulate, Nagesh Hegde is an I.I.T. Kharagpur engineering graduate and has been writing regularly on science in the columns of *Sudha* for several years. Presently engaged in bringing out an encyclopedia on science by a publisher in Bangalore, he spoke at length about the science writing scene in Kannada. "We lack skilled science writers," he lamented, "We need to correct this lack of writing skills amongst science students at college and university level!"

Working then on a documentary on the Indian monsoon at the editing table of the Shally Suman Productions, New Delhi, the science film script-writer and editor Atul Kumar, who was a part of the *Turning Point* team, said, "Science film-making does not figure in the list of careers of our science students. It is high time it is

brought to their notice. In fact, 'science film appreciation' should be made a part of every course concerned with TV and films. More workshops, get-togethers, seminars, etc, on science films and also their festivals should be organised not only to create awareness of this film genre but also to bring at one platform the talent in the field



so that their problems could be discussed and sorted out.” He himself has learnt all the skills of making science films right in the studio and on the editing table. But he is keen that some regular course devoted exclusively to science film-making be made available to interested students.

Science Degrees - Not Media Skills?

“Most often, the key persons manning the educational media centres and the experts are ignorant about media itself, its potentialities and limitations,” said Rakesh Hallan, New Delhi based script-writer and director of several educational science films, and continued, “They are often college and university teachers who have somehow got into media. As a result, they make undue demands upon film-makers without understanding or appreciating budgetary and technical considerations that make or unmake a science film. For instance, without understanding how much money, resources and skilled manpower go into making science films shown over the *Discovery* channel they suggest us to follow their presentation style!”

Slim and tall, with streaks of grey in his beard, Hallan specially emphasized the need for science qualified media persons so that

they could discuss various aspects of presentation of science with the subject experts. Otherwise, the latter dominate and cram the film with unnecessary science which spoils the presentation and defeats the very purpose of making a science film.

A producer of more than a dozen programmes on various disciplines of science, Yogesh Kumar of the Electronic Media Production Centre of IGNOU, New Delhi, was keen to become a communicator of science very early in life. He therefore took to learning the techniques of communication after doing graduation in science. He complained, "Unfortunately, even for jobs in communication media, a higher degree in science is often desired. Skills in communicating science, which are a must for doing the job well, are never given importance. As a result, Ph.D.s in science are selected for the communication posts where they prove to be failures in due course". Despite his communication skills and talent, he has suffered due to lack of a higher degree in science. This could have been circumvented had there been appropriate degree courses in science communication.

Science Exposure Programmes Required

In his spacious office built during British times, grey, bearded and philosopher-like Prof G. Padmanabhan, the then Director, Indian Institute of Science, Bangalore, said, "If you talk about research in cancer, Indian journalists immediately ask: whether a cure for cancer has been found?" He smiled as he went on: "Journalists at large don't know the process of scientific research. They need to be educated about it before they take up science beat". In recent years, however, a distinct change is beginning to appear in Indian media houses as more and more youngsters with science background are taking to journalism. In fact, a few students from Indian Institute of Science have already become Science Correspondents, he said proudly.

The young and dynamic Prashant Dixit, the then Correspondent of *Loksatta*, also felt that the first thing that should be done to increase the quantum of science in print media is to orient Indian journalists to science. "Just as the Defence Ministry organises every three years an exposure programme in which 45 journalists from all over India are invited to attend a one and half month course,

given lectures on defence and warfare by experts and shown around various Defence departments and important Defence installations,” said he, “a science body such as the Department of Science and Technology should initiate a science exposure programme to Indian journalists selected on an all India basis.”

Vijay Kuvalekar, the Editor of *Sakal*, the Marathi daily published from Pune agrees with Dixit. Under his Editorship both science and science fiction are given considerable attention in *Sakal*. In addition to a regular supplement on science every Saturday, science fiction stories are often published in the daily. Said Kuvalekar, “Say, a three day workshop organised by a central body meant exclusively for Indian journalists should serve the purpose - sensitising journalists to various intricacies and issues in Indian science and scientific research”. He also went on to add that journalists should have easy access especially to Meteorological and Astronomy Departments which regularly issue news bulletins on weather and night sky so that they could be improved upon keeping in mind the interests of the masses.

How do western countries tackle this problem? At present, two special, fortnight-long programmes, one in Europe and the other in the United States, are organised by leading scientific institutes to expose working journalists to scientific research by actually allowing them to work in labs and rubbing shoulders with scientists. Pallav Bagla, former Assistant Editor, *Science Reporter* and presently Correspondent, *Science*, is the first Indian science writer to attend the Marine Biological Laboratory’s ‘Science Writing Fellowship Program’ at Woods Hole, U.S.A. “It’s a very fine, and at the same time a very tight programme!” said Bagla, reminiscing about the programme, “From 8 O’clock in the morning to 12 O’clock in the night, we interacted with scientists and top class science communicators. We’re even asked to work in a lab so that we know how a scientist does research, how he interacts with his colleagues, how he writes his research papers and then interacts with the media. The program allowed us to peep into a scientist’s mind. It is one of the major channels that brings science from labs to media houses. I wish such exposure programmes were conducted in India to improve the quality of science reporting in the country”.

Workshops For Regional Writers

What about a similar programme in India? Dr Manoj Patairiya, Principal Scientific Officer, N.C.S.T.C., Department of Science and Technology, New Delhi, a well known science writer in Hindi, has already started an innovative all India level scheme to create more science writers in regional languages, which is the need of the hour. "In the first phase of the scheme," he says, giving the nitty-gritties of the scheme called 'Enhancing Science Coverage in Mass Media' which was initiated in 1994, "workshops are arranged to train and identify local talent who can write on scientific issues. In the second phase, four of these 'local' science communicators, who can write on local issues, be it a village, town or city, are further selected for participation in an advanced workshop training course at the State level. Finally, in the third phase, four of these 'state' science communicators will be selected from every Indian state for participation in an advanced workshop training at the national level." Dr Patairiya continued with pride, "Today, the programme is in progress in the first phase in most of the states and in the second in a few states. We have today trained a large number of science communicators in various Indian states who can write on local problems and issues. In fact, a large number of scripts for radio and TV in various languages are now ready for production!"

This scheme appears to solve three major problems in science communication simultaneously. First, it will train a large number of science communicators in various languages in different states. Second, it will produce science communicators who know the local science-related problems and issues. And third, it will identify talented science communicators from different states who need further specialised training. This is a welcome scheme of the aforementioned body because dearth of skilled science communicators familiar with local conditions and problems is a major problem today.

PROPOSALS : SCIENCE MEDIA RESOURCE CENTRES Science Media Centres Needed

"Nothing! Simply nothing!" exclaimed M.Somashekar, the then Science Correspondent of *The Business Line*, whose office was then on the fifth floor of the towering Indra Prakash building on

Barakhamba Road, near Connaught Place, New Delhi. He was responding to his own fictitious question: "What would you do if at 7 PM today it is announced that an Indian scientist has won the Nobel Prize?" He went on to add, "Because at 7 PM, no library in the neighbourhood is open. If I go to the I.I.T.-Delhi's library, some distance away, which is open throughout the night, I won't be able to come back and file a detailed story on the scientist on time. In other words, I won't be able to write a story on the Indian scientist because I've no easy access to information on him!"

The only answer to his problem appears to be the creation of Science Media Centres in some metropolitan cities of India. At such a centre, somebody would be available to give correct information on the Indian scientist, his place of work, e-mail address, telephone and fax numbers. Of course, such a centre could have multi-purpose uses, one important use being a place where scientists and journalists could interact.

Leading science journalist Vithal C. Nadkarni, Assistant Editor, *The Times of India*, Mumbai, often faces the problem: how to verify various scientific claims of individuals. "It is always possible that some outstanding work has been done in India which a person like me is unable to judge and report on," said he, "I therefore always bank upon peer-reviewed journals". Other than this problem, which is likely to occur from time to time to every science correspondent, he claimed he faces no problem in so far as accessibility to science information is concerned. Well equipped with Internet, fax, e-mail, etc, he travels extensively in the country and regularly writes stories on science which appear mostly in Mumbai and Ahmedabad editions of TOI.

Whereas science journalists feel the need for a centre which could guide them in many ways in filing authoritative and authentic reports and features, science film-makers talk about the need of something similar to solve their own problems. "The need is for a national resource body which provides at one place not only information on experts available in various disciplines of science, script-writers, model-makers, animation and graphic experts, etc, but also provides facilities for the production of a science programme," said Sunil Kumar Das, a young producer of the Electronic Media

Science & Technology coverage in Newspapers and Magazines

A study of science and technology coverage in print media was conducted by Vineeta Singhal, National Institute of Communications, New Delhi, in 1995. Ten newspapers were scanned for the period July to September 1994 and March to May 1995. It was found that the newspapers devoted only 1.6 per cent of their total printed area to science and technology. *The Hindu* gave the maximum science coverage and *Jansatta* gave the minimum coverage. Subject wise, Health received the maximum coverage (40.1 per cent) followed by Biological sciences (15.9 per cent), Technology (8.4 per cent), Weather (8 per cent), Environment (6.6 per cent), Agriculture (6.4 per cent), Space (5 per cent), Energy (4.2 per cent) and the rest (5.4 per cent).

A six month study of magazines showed that they devoted more space, about 4.9 per cent, to science. Magazines such as *Frontline*, *The Week*, *Rashtriya Sahara*, etc, carried regular features on agriculture, environment, health and technology. Subjectwise, Health (40.8 per cent) again received maximum coverage in magazines, followed by Environment (24.4 per cent), Agriculture (9.4 per cent), Technology (6.2 per cent), Space (4 per cent), Biological sciences (1.9 per cent), Energy (1.5 per cent), and the rest (11.8 per cent). □

Production Centre of Indira Gandhi National Open University, New Delhi.

As a producer of more than two dozen science programmes and also a winner of the 9th CEC-UGC Video Festival, Das was speaking about the problems he encounters in making science programmes. "For instance, the aforementioned body should have a library of film footage on any subject which can be had on demand. Or if necessary, it could act as a co-ordinating body among various film production centres and provide us the necessary footage. It would save considerable amount of time, money and headache for any producer. It would also avoid duplication of work." His colleague, Yogesh Kumar, further added, "Such a body should also have a laboratory and workshop where models on science could be made on order. It should also contain an animation facility". Prem Kumar Aman, Producer, Audio Visual Research Centre, Osmania University, Hyderabad, added, "Model-making is also a problem. To get the right man to build a science model is sometimes very difficult.

Besides, there is a need for all science film producers to come together, meet and discuss the problems we face so that some remedial solutions could be worked out". Gopal Saksena, the then Director, Commonwealth Educational Media Centre for Asia, New Delhi, who produced every week *Vigyan Patrika*, a 30 minute black and white science magazine in Hindi for Doordarshan in the early 1970s, agreed with his young peers, "Even today, a stock shot is exorbitantly costly. The need is for an archive where stock shots are easily available at nominal prices". In fact, in those days, he used to produce his programme based on the available visual material rather than choosing a subject of interest and then shooting it!



IV

A Blueprint for More Science in the Media

Scientific information is reported, interpreted and assimilated differently in different cultures.

Anonymous

Everyone must write popular scientific articles in his own way.

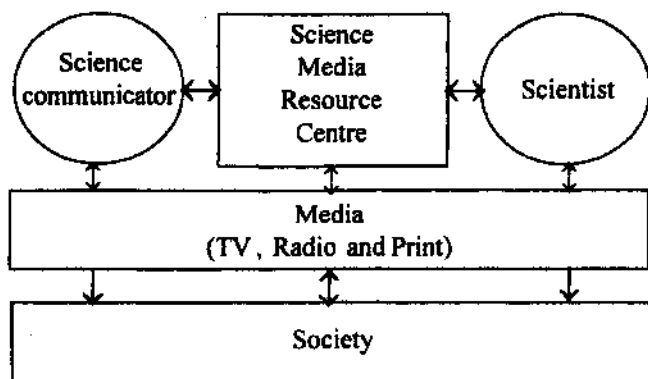
J.B.S.Haldane

In view of the various problems faced by science communicators, media persons and scientists from time to time, there is a need to create an appropriate infrastructure which provides equipment, services and facilities to tackle them. Besides, there is also a need for grooming more science communicators. In the following pages is given a blueprint of the kind of infrastructure that is required in the present millennium for more skilled science communicators and for more interesting and useful science, including local and indigenous science, in the various media of a developing country like India.

(i) MEDIA RESOURCE CENTRES

(a) Science Media Resource Centre

Often, science communicators lament the lack of access to latest developments in science, especially scientific research done in India, due to lack of good libraries, absence of internet facilities, and lack of knowledge of, and access to, Indian experts in relevant fields. There is then also a need for a place where communicators and scientists could informally meet and discuss problems of mutual interest.



There is also a need for conducting full-fledged or refresher courses/seminars/workshops for communicators as well as scientists; full-fledged courses for communicators to not only teach the latest communication methodologies but also keep their scientific knowledge up-to-date; and refresher courses for scientists for gaining media skills and understanding various media.

The centre should also collect 'Science in the Media Fund' for more science in various media. It should also bring out from time to time directories of science communicators, experts, proceedings of science communication seminars/conferences, etc. It should also have a small guest house where visiting communicators or scholars could stay. Above all, there is a need for a centre where expert advice and guidance in any matter concerning science communication is readily available. In other words, such a centre should become the hub of activities concerning science and media.

A science media centre should serve the following purposes:

- * To assist communicators in identifying experts in a particular scientific field and provide their names, addresses, phone numbers and other details. These experts should be willing to talk to communicators at a short notice.
- * To assist communicators in providing background material about any scientific field. It should not only provide up-to-date references to articles and research papers in a scientific field but also provide photocopies of the relevant material.
- * To provide photos of scientists, scientific events, facilities, institutes and labs.

- * To collect 'Science in the Media Fund' from various labs, institutes and organisations as well as corporate houses, industrialists, trusts and foundations, and distribute it among media persons for sponsored columns on science in newspapers and magazines and producing radio programmes and TV shows on the science. This fund should be given to media persons on condition that half the profit from their work should be plowed back to the Fund.
- * To act as a meeting ground for communicators as well as media managers and scientists.
- * To conduct science communication—related courses and workshops aimed at communicators as well as scientists.
- * To organise seminars and conferences on science communication—related themes.
- * To have limited publishing activity.
- * To have internet facilities.
- * To have limited guest house facilities for visiting communicators.
- * It should provide valuable expertise and guidance in any matter concerning science and media.

In view of the aforementioned purposes, a Science Media Centre should have the following resources, facilities and equipment:

- * A library subscribing to the latest - and much consulted - science journals, popular science magazines and reference books. It should remain open round-the-clock.
- * A photo library-cum-archive containing photos of scientists, scientific events, facilities, institutes and labs. It should remain open round-the-clock.
- * A computer system to keep track of journals, magazines and books and also to maintain an up-to-date record of articles and research papers.
- * A well equipped conference room for holding meetings, seminars, courses, workshops, etc.
- * A D.T.P. publishing system for bringing out directories, notices, conference proceedings, etc.

- * It should have a few computers exclusively for access to internet.
- * A small cafeteria and lounge.
- * A two-room guest house facility.
- * An administrative office fully equipped with modern communication equipment such as fax, photocopy machine, modem, etc.

A Science Media Centre should have the following to essential staff:

- * Director
- * Assistant Director
- * Documentation Officer
- * Documentation Assistant

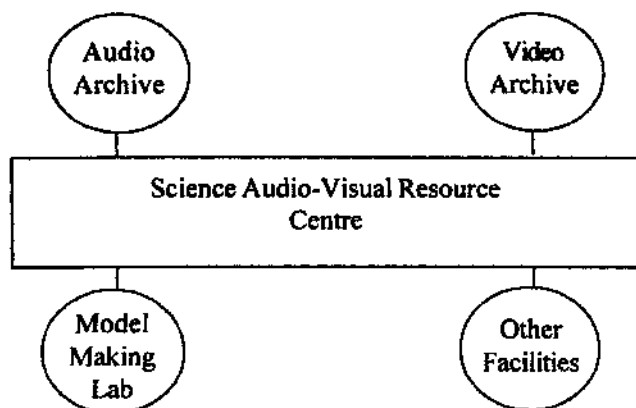
The other staff could be hired as and when required for short durations to do specific jobs.

(b) Science Audio-visual Resource Centre

At present, science communicators in the audio-visual media are handicapped by the absence of a centre which would assist them not only in identifying experts in various diverse not necessarily scientific fields but also in providing pre-recorded audio-visual material and a model-making laboratory. It should also be able to give expert advice and guidance to science communicators. Besides, such a centre should also act as a meeting ground for different strata of professionals associated with the audio-visual media.

The purpose of such a centre should be as follows:

- * To contain a fully equipped model-making laboratory in which models of any kind could be made or built on order. Models of plaster of Paris, wood, plastics, etc, could be built here.
- * To contain a video archive of science films. It could therefore provide footage of science films to any outsider on order. Such an archive would save considerable duplication of work.
- * To contain an audio archive of science programmes. It could therefore provide to an outsider pre-recorded voices of eminent scientists, science communicators, or anything related to science, including voices of wild animals.



- * To be able to identify experts not only in various scientific fields but also in script-writing, model-making, technical work, etc.
- * To be able to provide latest material, including references, on any scientific subject on demand.
- * To act as a meeting ground for communicators as well as media managers and scientists.
- * To conduct science communication-related courses and workshops aimed at communicators as well as scientists.
- * To organise seminars and conferences on science communication related themes.
- * It should organise every year a festival of science films and audio programmes at an all India level.
- * To have limited publishing activity.
- * To have internet facilities.
- * To have limited guest house facilities for visiting communicators.

In view of the aforementioned purposes, a Science Audio-Visual Resource Centre should have the following resources and equipment:

- * A fully equipped model-making laboratory.
- * A video science film archive also containing a screening studio.
- * An audio archive related to science and scientists also containing a studio.

- * A library subscribing to the latest and much consulted science journals, popular science magazines, and reference books.
- * A computer system that not only keeps track of video and audio programmes, journals, magazines and books but also maintains an up-to-date record of programmes, articles and research papers.
- * A well equipped conference room for holding meetings, seminars, courses, workshops, etc.
- * A D.T.P. publishing system for bringing out directories, notices, conference proceedings, etc.
- * A few modem-equipped computers exclusively for access to internet.
- * A small cafeteria and lounge.
- * A two-room guest house facility.
- * An administrative office fully equipped with modern communication equipment such as fax, xerox machine, modem, etc.

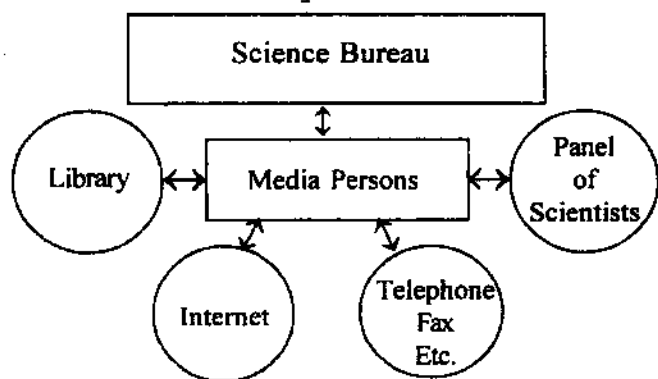
As both these centres are essentially for science communicators for bridging the gap between scientists and communicators and as both have certain common requirements such as library, administrative office, internet facilities, conference room, DTP publishing system, guest house, cafeteria, etc, they could be combined into one centre and named as 'Science Audio-Visual Media Resource Centre'.

(ii) SCIENCE BUREAUS

Major Newspapers

Most major Indian newspapers badly need science bureaus, if more coverage of science, especially science done in India, has to appear in their columns. A science bureau should have the following objectives:

- * To provide up-to-date coverage of science done in India.
- * To provide up-to-date coverage of science done elsewhere outside India.
- * To cover events related to science that take place in scientific research and academic institutions, museums, cities, towns and even villages.



- * To cover science-related conferences/seminars/workshops/exhibitions.
- * To give coverage to Indian scientists, technologists, engineers, inventors and entrepreneurs.
- * To address science-related affairs and issues.
- * To contact scientists, technologists, engineers, science teachers and entrepreneurs for special stories/reports on science.

The bureau should therefore have the following exclusive staff and facilities:

- * Science Editor-cum-Correspondent (Incharge)
- * Sub-Editor-cum-Correspondent
- * Production Assistant-cum-translator (for regional newspapers only)
- * General Assistant

The bureau should have its own library, a small collection of reference books on science, which subscribes to a few major science journals and popular science magazines. The library should be managed by the General Assistant who also maintains a clipping file on science or science-related news items. Besides, the bureau should have its own latest communications equipment such as a telephone, a fax, a computer with modem and internet facility. It should also have on its panel a team of scientists belonging to different disciplines who could give immediate advice and guidance to the science communicators over controversial subjects.

Medium newspapers

Medium newspapers should have at least one correspondent exclusively for science. He should have access to Internet and a small exclusive library on science containing reference books, a few select science journals and popular science magazines.

Small newspapers

Small newspapers should ensure that science is one of the beats of only a particular correspondent on the staff.

All science matters should be addressed to him. This correspondent should not only report on science but should also be in touch with the local science fora, scientists, science teachers, etc, for procuring news and material on science.

(iii) SCIENCE BROADCASTING DIVISION

Prasar Bharti (All India Radio) needs a 'Science Broadcasting Division' located at New Delhi if science is to be given more coverage over radio all over India. This division should restrict itself to programmes made only in Hindi and English. In addition to an advisory committee, it should have three 'Science Consultants' consisting of two leading scientists and one leading science communicator, who could be consulted any time for their opinion on any science news or programme submitted for broadcast.

The division should have the following objectives:

- * To provide up-to-date coverage of science done in India.
- * To provide up-to-date coverage of science events outside India.
- * To cover events related to science that take place in scientific research, academic institutions and museums all over India.
- * To cover science-related conferences/seminars/workshops exhibitions held all over India.
- * To give coverage to Indian scientists, technologists, engineers, inventors and entrepreneurs living anywhere in India.
- * To address science-related affairs and issues that concern Indians.
- * To guide other divisions on science-related programmes.

Science, Plague and Media

In September 1994, a plague epidemic hit some areas of Maharashtra and Gujarat. Thousands of persons left the affected areas and acted as carriers of the disease to other states. At one stage it appeared as though the entire country had come under the grip of plague. Whereas both the Government-controlled television and radio were restrained in giving news and information about the plague, the print media played it up, creating unnecessary panic and alarm everywhere, even as far as Delhi and Haryana. It was an unprecedented event in the history of post Independent India.

A team of researchers, Gauhar Raza, Bharvi Dutt and Surjit Singh of National Institute of Science, Technology and Development Studies, New Delhi, conducted a study on this unique event in a resettlement colony of Delhi, Mangol puri, and the neighbouring industrial town of Gurgaon in Haryana. They found that 57.5 per cent of the residents of the area came to know about the developments about plague through television; 20.1 per cent through inter personal communication; 10.8 per cent through newspapers; and 4.1 per cent through radio. However, comparatively speaking, more Delhites came to know about plague through radio rather than newspapers. More important, the researchers concluded that a larger number of persons absorbed scientific information on plague more readily than they would have had under normal circumstances because it was of immediate value and a threat to their lives. The researchers concluded, "the public could by no stretch of imagination be termed 'mythical', 'superstitious', 'unscientific' or 'unhygienic' in their daily life. It is only in the absence of access to required information and proper civic amenities that they resort to extra-scientific structures of thought and 'unhygienic' acts". □

- * To also produce a weekly 'Science bulletin', a programme on news and views in science.
- * It should act as a coordinating agency for programmes only among all of its regional science cells.

The division should therefore have the following staff and facilities exclusively:

- * Science Director
- * Science Producers (two: one English, one Hindi)
- * Science Correspondents (four: two English, two Hindi)
- * Production Assistants (two: one English, one Hindi)
- * General Assistant (one)

Science Director, Producers and Correspondents should be qualified in science but at the same time should be equally well versed in media skills. They should not be promoted or transferred or asked to do any other duties not related to science.

The division should have its own library, a small collection of reference books on science, which subscribes to a few major science journals and popular science magazines. The library should be managed by the General Assistant who handles correspondence and also maintains a clipping file on science or science-related news items. Besides, the division should have its own exclusive vehicle, latest recording and communications equipment, and internet.

(iv) SCIENCE CELLS

All India Radio stations located in all state capitals badly need science cells (about four exist to date) to take care of science coverage in regional languages over radio. In addition to an advisory committee, they should have three 'Science Consultants' consisting of two leading scientists and one leading science communicator, who could be consulted any time for their opinion on any science news or programme submitted for broadcast because the credibility and authenticity of a scientific work is often difficult to assess.

The cells should have the following objectives:

- * To provide up-to-date coverage of science done in India.
- * To provide up-to-date coverage of science done elsewhere outside India.
- * To cover events related to science that take place in scientific research and academic institutions, museums, cities, towns and even villages in the state.
- * To cover science-related conferences/seminars/workshops/exhibitions held in the state.
- * To give coverage to Indian scientists, technologists, engineers, inventors and entrepreneurs of the state.
- * To address science-related affairs and issues occurring in the state.

- * To regularly produce 'Voice of the People' kind of programmes in which people of all walks of life of the state are interviewed for comments on various science-society issues.
- * To feed the Division at Delhi with important science news and programmes occurring in the state and even supply specific programmes, etc, on demand.
- * To advise and guide the various other cells, such as women, family welfare, children, etc, on programmes containing a strong component of science to avoid repetitions and over-simplifications.

Every cell should therefore have the following staff and facilities exclusively:

- * Science Producer (Incharge)
- * Science Correspondent (One; regional language)
- * Science Correspondent-cum-Translator (One)
- * Production Assistant (One)
- * General Assistant (One)

Every cell should have its own library, a small collection of reference books on science, which subscribes to a few major science journals and popular science magazines. The library should be managed by the General Assistant who also maintains a clipping file on science or science-related news items. Besides, it should have its own latest communications equipment such as a telephone, a fax, etc, and access to internet.

'Environment Cell' and 'Technology Cell' should also be added as environment and technology, which are both location-specific, are playing a bigger role in the world today.

(v) SCIENCE PROGRAMME DIVISION

The Doordarshan needs a 'Science Programmes Division' located at New Delhi if science needs to be given more coverage over television all over India. This division should restrict itself to programmes made only in Hindi and English. In addition to an advisory committee, it should have three 'Science Consultants' consisting of two leading scientists and one leading science communicator, who could be consulted any time for their opinion

on any science news or programme submitted for broadcast because credibility and authenticity of a scientific work is often difficult to assess.

The division should have the following objectives:

- * To provide up-to-date coverage of science done in India.
- * To provide up-to-date coverage of science outside India.
- * To cover events related to science that take place in scientific research and academic institutions, and museums in the country.
- * To cover science-related conferences/seminars/workshops/exhibitions held in the country.
- * To give coverage to Indian scientists, technologists, engineers, inventors and entrepreneurs living in the country.
- * To address science-related affairs and issues that concern Delhites.
- * To produce a weekly 'Science News', a programme of news and views in science.
- * To act as a coordinating agency for programmes only among all of its regional science programme cells.
- * To be consulted on science by all the other divisions.
- * To be consulted for approval of science programmes submitted to the Doordarshan channels.

The division should have the following staff and facilities exclusively:

- * Science Producer (Incharge)
- * Science Correspondents (four: two English, two Hindi)
- * Production Assistants (two: one English, one Hindi)
- * General Assistant (one)

The division should have its own library, a small collection of reference books on science, which subscribes to a few major science journals and popular science magazines. The library should be managed by the General Assistant who handles correspondence and also maintains a clipping file on science or science-related news items. Besides, the division should have its own exclusive vehicle, latest recording and communications equipment, and access to internet.

(vi) SCIENCE PROGRAMME UNITS

The Doordarshan Kendras located in all state capitals badly need science programme units to take care of science coverage in regional languages over television. In addition to an advisory committee, they should have three 'Science Consultants' consisting of two leading scientists and one leading science communicator, who could be consulted any time for their opinion on any science news or programme submitted for broadcast.

The units should have the following objectives:

- * To provide up-to-date coverage of science done in India.
- * To provide up-to-date coverage of science done elsewhere outside India.
- * To cover events related to science that take place in scientific research and academic institutions, museums, cities, towns and even villages in the state.
- * To cover science-related conferences/seminars/workshops/exhibitions held in the state.
- * To give coverage to Indian scientists, technologists, engineers, inventors and entrepreneurs of the state.
- * To address science-related affairs and issues occurring in the state.
- * To produce 'Science and People' programmes in which people from all walks of life in the state are interviewed for their comment on science-society issues.
- * To feed the Division at Delhi with important science news and programmes occurring in the state and even supply specific programmes, etc, on demand.

Every unit should therefore have the following staff and facilities exclusively:

- * Science Producer (Incharge)
- * Science Correspondent (One; regional language)
- * Science Correspondent-cum-Translator (One)
- * Production Assistant (One)
- * General Assistant (One)

Every unit should have its own library, a small collection of reference books on science, which subscribes to a few major science journals and popular science magazines. The library should

be managed by the General Assistant who also maintains a clipping file on science or science-related news items. Besides, it should have its own latest communications equipment such as a telephone, a fax, and access to internet facility.

(vii) SCIENCE AGENCIES

For science to appear in various media there is a need for several types of agencies which would provide the related material, services and facilities. The abysmal lack of these agencies is mainly responsible for the absence of science in all the Indian media. The creation of following types of agencies, which may be private or Government owned, is most urgently required. These agencies could even be run by a Science Media Centre.

(a) Agency that supplies science-related photos/graphics

A good, colourful photo or graphics accompanying a science presentation always attract the attention of the reader/viewer. It may induce some to read or view the presentation although the subject may not be of interest to them. However, science-related photos or graphics are not easy to procure.

Lifting pictures and graphics from books and magazines is also not an easy proposition because it involves expensive photographic equipment. Major newspapers have their own staff photographers.

But these press photographers take photos only of a science event such as inauguration of a science conference or of a lab, a chemical plant, or release of a newly emerging technology or product or award ceremony of scientists. Science communicators do not have access to such photographs for their stories on a topical subject or event leave alone photos of viruses, solar cookers, satellites, species of trees, insects, animals or birds, and so on.

Graphics giving facts and figures about science subjects, such as, earthquakes, cyclones, hail storms, diseases, etc, are also not available. The need is therefore for a science photo agency which could supply photos and graphics at a short notice to a science communicator on demand for a suitable fee.

Scientific knowledge of Indians

To ascertain scientific knowledge of Indian populace and its sources, two major surveys were made at Allahabad, Uttar Pradesh, during two important Hindu religious festivals, when thousands of Indians from all parts of the country gather at the city which is situated at a point (Sangam), where two major Indian rivers, namely, Ganga and Jamna, meet. The survey was conducted by researchers Gauhar Raza, Surjit Singh, Bharvi Dutt and Jagdish Chander of National Institute of Science Technology and Development Studies, New Delhi, during the *Kumbh Mela* (festival) in 1989, and then, six years later, during the *Ardh Kumbh Mela* in 1995. The scientific knowledge of the populace was surveyed in four areas, namely, astronomy, geography, health and hygiene, and agriculture. The studies indicate that though exposure to media and education play an important role in enlightening the populace on scientific matters these two factors are not sufficient enough to do so. The need is to use the third factor 'cultural medium' to bring science more effectively especially to the illiterate and tradition-bound populace. The studies also indicate that for 43.7 per cent populace, print medium was the source of scientific knowledge; for 47.7 per cent, radio was the source; for 42 per cent, television was the source; and finally, for 32.8 per cent, interpersonal communication was the source. □

(b) Agency to conduct workshops to impart media skills to scientists, P.R.O.s, and science communicators

Scientists are not able to communicate their findings to the media because they are prejudiced against the media and also because they lack necessary skills to communicate their findings to media. In the scientific community, communicating science in the media is taken to be self-publicity and not social service! It is also considered to be the privilege of scientists in authority and power only. The need is to change these biased notions about media among scientists so that science created in labs reaches masses through media. Besides, Indian institutes and organisations lack well-trained P.R.O's.

Studies conducted in the United States and Australia indicate that scientists, who have been exposed to media somewhat and understand their problems and priorities, are more amenable to them. An agency that conducts short term refresher workshops and seminars for imparting media skills to scientists and P.R.O.s in their labs, institutes and organisations is therefore a must.

(c) Agency to supply videos of science news and features

Science news and features rarely appear on Indian television. The reason for this absence of science is that nobody is exclusively looking after science in Indian television houses. Nevertheless the is need for an agency which can supply videos of latest developments in Indian laboratories and institutes at a short notice and negotiable fee.

Such an agency could also have an archive of science films and videos which could be bought/hired by any film-maker for a negotiable fee. It could also have an archive of science films containing updated facts and figures on natural phenomena, such as, earthquakes, cyclones, ozone hole, greenhouse effect, El Nino, which occur time and again. Similarly, films on reoccurring issues such as cruelty to animals, conservation of forests, plants and animals, disaster management, pollution control, etc, should be made by the agency and supplied at a short notice to various media channels for a fee.

(d) Agencies that act as intermediaries between scientific institutes and media

At present, most scientific institutes and organisations have no infrastructure or manpower to cater to the demands of the media. That is why no scientific achievement or breakthrough made by them gets reported in the media. From writing a press release on a scientific development to conducting a guided tour of a lab, these institutes and organisations need to be professionally advised. This task is important, and in recent years Indian science managers have begun to realise its importance, because it is often through the media that users of a technology can be reached.

Agencies to act as media consultants to these institutes need to be created all over India.

(e) Agency to supply science features in graphic form

Thanks to audio-visual medium, the stress is nowadays increasingly on visual presentation in the print medium. Unfortunately, science articles often lack attractive and interesting visuals due to the absence of agencies which can supply good coloured photos and

special grants, fellowships, etc, to write classy popular science books on subjects of their choice.

(viii) COMMUNICATION PROGRAMMES

The present need is not simply to create a base of well trained and up-to-date science communicators but also to make scientists and science teachers understand the importance, potential and limitations of all media. Conversely, media men, artists and photographers also need to be exposed to the importance of science and its potential as an interesting, challenging and socially important task. Full-fledged communication courses apart, the need is for a variety of part-time and refresher courses and workshops aimed at science communicators, scientists, science teachers, media persons, artists and photographers as well as exposure programmes for journalists and media investors. The courses, workshops and exposure programmes should be as follows:

(a) For training science communicators

At present, Indian universities give importance to courses exclusively devoted to science communication or journalism. Journalism courses conducted by some universities and private institutions do give some exposure to science journalism but it is often restricted to a few lectures in the whole course. A local science journalist or writer is asked to deliver the lectures on the subject. But the treatment is often cursory and superficial. As a result no student is motivated to take up science journalism as a career.

Full-fledged one year course on science communication

The need is for a full-fledged one year course on science communication/journalism. Apart from teaching and giving hands-on training about various aspects of mass communication and journalism, the course should contain the following elements:

- * The need for science communication in modern day society.
- * How science communication differs from communication in other subjects such as politics, economics, etc.
- * History of science in the world, with special reference to India and the Third World.

- * Science policy in India and the Third World vis-a-vis some western countries, China and Japan.
- * Impact of science on society.
- * Science communication in India and the Third World.
- * Sources of scientific information.
- * Varieties of science communication.
- * Analysis of science presentations in all media in India and the Third World.

These potential science communicators should also be given some exposure to lab and rural conditions so that they know the problems that scientists face and the needs of people at large.

(b) For keeping science communicators up-to-date

Scientific knowledge has been expanding at such fast pace that it has become difficult for a science communicator to keep himself up-to-date in one field not to speak of all. Moreover, these are also days of interdisciplinary scientific research. A science communicator should have an idea of developments in several fields which would eventually enrich his own work. He should therefore be kept informed about the latest in at least some major fields of research, if not all.

Annual refresher seminars for experienced science communicators

Every year, a one-week seminar should be organised for science communicators who have been in the field for more than five years.

The seminar should contain lectures and discussions on the following themes/issues:

- * Latest major developments in various fields of science in the preceding one year.
- * Latest trends in science communication.
- * Major science stories in the preceding year, their analysis and highlights.

Annual workshops for budding science communicators

Every year, a two week workshop for budding science communicators should be organised. The aim of the workshop should be not only to impart writing and presentation skills but also to sensitise them to various scientific issues and expose them to various new avenues of science communication. The workshop should contain the following elements:

- * Introduction to various aspects of science communication
- * Latest trends in science communication
- * Impact of science on society
- * Sources of scientific information
- * Analysis of science presentations in all media
- * Writing and presentation skills

(c) For science exposure to media persons

Most often, media persons, whether editors, correspondents or freelance writers, do not give coverage to science partly because they do not understand its importance, partly because they are scared of handling science and partly because their bosses do not encourage them to pursue science stories. On the other hand, correspondents frequently complain that scientists do not talk to them for reasons of their own. There is therefore an urgent need to sensitize media persons to science, its importance and the various public issues involving it. Also, the mutual mistrust that exists between media persons and scientists needs to be removed.

Annual science exposure programme for media persons

A two week science exposure programme that removes the misconceptions about science, scientific research and scientists needs to be organised every year in a reputed scientific institute or lab. A select group of about 35 science-interested media persons should be exposed to the intricacies of science. The programme should be composed of lectures, demonstrations and visits to scientific establishments and labs. Every day during the programme media persons should have lunch and dinner with the local scientists. They should also work in a lab. The programme should have the following themes:

- * Science, scientific method, and the process of scientific research
- * Management of scientific research in India
- * Information accessibility in Indian research organisations
- * Major science policies of Indian Government
- * Major scientific fields in India and the West
- * Major public issues involving science in India and the West
- * Three day laboratory demonstrations of scientific research
- * Visits to scientific research labs

Annual science and media meet for media managers and owners

In addition to exposing communicators to science, there is also a need to emphasise the importance of science in public and world affairs among chief editors/directors/producers, top management executives, and owners of various media houses because, after all, they guide their policies. The need is therefore to hold an annual science and media meet for the top echelon of the media world. It should be an annual one day meet on a science and media theme. Top Indian scientists should be invited to participate in an informal discussion with the media people on the theme.

(d) For media exposure to scientists and science teachers

Scientists need exposure to various media to remove their misconceptions about them and their working. Whereas scientists work for years on a project to produce a technology or one brick of knowledge, media persons are bound by schedules and have to produce a presentation or a report within a few hours! There are likely to be errors under such working conditions. Besides, their science stories are often chopped off or deleted at the eleventh hour due to pressure of space or time. Scientists therefore need to understand and appreciate the problems of media persons. Scientists and science teachers also need to know what the media want if they want to work for them. Every medium, whether newspaper, magazine, radio and TV has its own demands.

Annual workshops for imparting media skills

Scientists, including lab P.R.Os of scientific institutes, as well as science teachers who often make science presentations in newspapers and magazines and over radio and TV lack the skills of using these media. Considerable time and energy is therefore wasted by media persons on giving them an idea about media and repackaging their presentations. Yearly two week workshop should be organised in every scientific institute or university to impart media skills to scientists and science teachers.

The workshop should contain the following elements:

- * Various types of media, their advantages and disadvantages
- * Selection of a theme for presentation
- * Sources for scientific information
- * Writing for various media, namely, print, radio and television
- * Different types of presentation
- * Tapping the market
- * How the media work
- * Major public issues involving science
- * Analysis of major science stories
- * Visits to media houses
- * Visits to rural areas where development projects are in progress

(e) For science exposure to artists and photographers

Often, science presentations lack informative, interesting and beautiful visuals and graphics. Due to their background and interests, most artists and photographers, who draw graphics or take photos, have no idea of science, are sometimes not interested in science, and are even scared of science. There is therefore a need not only to create among them an appreciation for science but also to sensitise them about various social aspects of science, including science education.

Annual seminar-cum-workshop for artists and photographers

An yearly two week seminar-cum-workshop should be held for a group of 20 select science interested artists and photographers at the national level. This seminar-cum-workshop should cover following aspects of science with hands-on training on how to draw a graphic on a science subject:

- * What is science
- * How scientific research is conducted
- * Effects of science on society
- * Various aspects of science education
- * How a scientific illustration/graphic/photo is different from an ordinary one
- * How a scientific illustration/graphic/photo should be drawn/taken
- * Sources for a scientific illustration/graphic/photo
- * Equipment required for scientific illustration/graphic/photo
- * Workshop on drawing a scientific illustration or taking a scientific photo

(ix) FELLOWSHIPS

(a) Science-Media Fellowships

There is an urgent need for scientists to interact with media and for media persons to interact with scientists. Such interactions between these two professions would shed the barriers existing between them and lead to a better mutual understanding of each other's professions and problems. The need is therefore for instituting Science-Media Fellowships which would create conditions for healthy interactions between scientists and media persons. These fellowships with a tenure ranging from minimum one month upto six months should provide an opportunity for any media person to spend time in the lab of a scientific institute or university of his choice or for any scientist in a media house of his choice. During the tenure, whether one is a correspondent or a scientist, one must produce a particular number of science stories for the media of his choice. For instance, if a scientist goes and works in the 'Science cell' of Prasar Bharti (All India Radio) he must produce a particular number of radio programmes on science. Conversely, if a newspaper reporter spends time in a research lab he must file a particular number of science stories on the activities of the lab.

(b) Fellowships for studying science-media relationships and the public understanding of science

At present, there is an abysmal lack of research studies on science-media relationships and the public understanding of science except

for some studies conducted on the coverage of science in the media. The relationship between media and science is not likely to remain the same in the years to come. The public understanding of science is also likely to vary over the years and from region to region. There is therefore a need to institute fellowships with tenures ranging from one year to three years to conduct studies on various aspects of science and media relationships and the public understanding of science. The applicant could be a science communicator, a scientist or a media person with some field experience. The only condition of these fellowships should be the production of booklets on the conducted studies so that the findings could come to the notice of all.

The broad themes of these studies could be:

- * The coverage of science in various media in various languages: quantitative as well as qualitative aspects.
- * Scientific temper and the media
- * Scientific terminology in various languages and its development
- * Creation of 'Manuals of style' for various languages and media
- * Internet and media coverage
- * Public understanding of science and the media
- * The role of P.R.Os in propagating science through media
- * The popularity of science communication courses
- * The need for science bureau

(c) Fellowships for youngsters for gaining basic experience

It has often been observed that aspiring youngsters, even scientists, below thirty five years of age keen to gain experience in the field of science communication are unable to do so as media houses have no provision to train inexperienced science communicators. Such youngsters need an on-the-job experience from six months upto two years in a media house. The need is therefore to institute at least twenty 'Science communication fellowships for the young', ten for print media and five each for radio and TV, at an all India level, so that they could work in a media house of their choice, know and understand the media from close quarters, and establish their own career in the field.

(d) Visiting Fellowships for travel abroad

To keep abreast of the latest developments in the western world there is a need to send young science communicators there for training, etc. When they return, they have to give at least five lectures in different parts of the country to share their experiences and knowledge with other science communicators. Two science communicators in the age group 25 to 45 years should be selected every year for a minimum period of three months to visit media houses in a western country.

(e) Visiting Fellowships for foreign media persons

Foreign science communicators and media experts, both from the developed and non-developed world, should be invited to give at least five lectures in different parts of the country so that local science communicators become aware of state of the art in the field. Besides, an exchange of ideas and knowhow would lead to more effective strategies for the development of science communication in the coming century. Every year, two foreign science communicators or media experts should be given fellowships for a brief visit of about 15 days in India.

(x) MANUALS, PROTOCOLS AND GUIDELINES

One of the reasons why science is unable to enter various media in a big way is the confusion that prevails in the minds of science communicators, scientists, P.R.Os, media persons, etc. about various issues. There is therefore a need for manuals, protocols and guidelines to clarify their doubts at various stages of science communication. The following types of manuals, protocols, and guidelines need to be prepared:

(a) Media protocol for scientists

Media persons often complain about the lack of cooperation of scientists in bringing science to the media. This lack of cooperation range from talking about their own or their laboratory work to clarifying scientific concepts in their own field of research ! Scientists have their own reasons for not talking to media persons. In addition to internal politics and the previous bad experiences with the media, within the scientific community there is a stigma attached to

Only 0.6 per cent listeners prefer science

According to a survey conducted by All India Radio's Audience Research Unit in 1993, only 0.6 per cent of the listeners residing in the North-East region of India prefer science programmes. Comparatively, 89.3 per cent of the residents prefer news; 48.6 per cent prefer talk/discussion/interview; 41.7 per cent prefer film music; 35 per cent prefer sports; 24.3 per cent prefer agriculture; 19.2 per cent prefer school broadcast; and so on. □

scientists who talk to the media. It is believed that they want cheap self-publicity at the cost of science! Obviously, in such a milieu, the importance of communicating science to the masses, where media is simply a vehicle, gets lost. The need is therefore for a clear-cut protocol for all grades of scientists—from research scholars to Directors—for talking to the media.

Media persons want to talk to scientists for one or more than one following reasons:

- (i) Clarifying a scientific subject or concept or a doubt.
- (ii) Seeking scientific explanation for a phenomenon or a theory or a law or working of a gadget or an equipment.
- (iii) Seeking an opinion on a non-scientific subject (or participation in debate/discussion/forum).
- (iv) Seeking an expert opinion in a scientific field not related to his own field of specialisation.
- (v) Seeking an expert opinion in his own field of specialisation.
- (vi) Seeking information or clarifying doubts in his own field of specialisation.
- (vii) Seeking information on the work being done in his own laboratory or institute.
- (viii) Interviewing her/him as a scientist-personality for her/his contributions/awards/honours, etc,
- (ix) Interviewing her/him as a part/head of a team whose work is to be highlighted.

All scientists, whether junior or senior or Director, should be given free permission to talk to or write in media in all the first five

categories of inquiries from the media persons. Proper guidelines should be worked out in detail for restrictions for the last five categories of inquiries (v to ix). Naturally, the Director of a lab would have fewer restrictions. But, be it Director or a research scholar, he should be held accountable for whatever appears in the media under his name. Freedom to speak to or write in the media should for a scientist must come with responsibility. Any scientist giving irresponsible statements should be penalised openly.

This 'Media Protocol for Scientists' should be clearly drafted and circulated among scientists. Every scientist when he joins a lab/institute/organisation should be given a copy of this protocol for his information.

(b) Media guidelines for P.R.Os

P.R.Os of scientific labs or organisations are often selected from the cadre of scientists. They are therefore often ignorant about the working of media and their interests. They should therefore be trained for the job. Besides, they should also have clear-cut guidelines from the concerned authorities, be it the Director of the lab or the Director-General of the organisation, about dos and don'ts. The guidelines, which may differ from organisation to organisation, lab to lab, or Director to Director, may advise on the following issues:

- (i) Major policies of the lab/institute/organisation.
- (ii) Major programmes of the lab/institute/organisation.
- (iii) Major thrust areas of the lab/institute/organisation.
- (iv) Major products, programmes and achievements that need to be highlighted in the media.
- (v) Main spokespersons for the lab/institute/organisation in addition to the Director and P.R.O. (these may be select individuals trained or known for talking to the media).
- (vi) Policies and programmes on various lab/institute/organisation oriented science issues that emerge from time to time.
- (vii) Policies and programmes on various public-oriented general science issues that emerge from time to time.

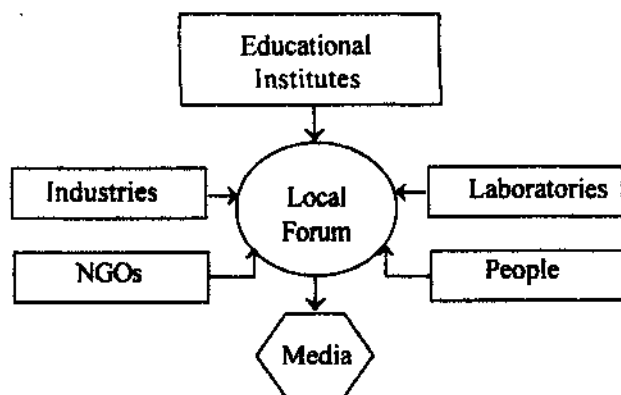
Every P.R.O. should draft these dos and don'ts in consultation with the Director/Director General and keep them ready for consultation as and when required.

(c) Manual for journalists/science communicators' visits to labs for P.R.Os

The visits of journalists/science communicators to labs can cause embarrassment especially to the concerned authorities leading to bad blood between journalists and P.R.Os. There is therefore a need to lay down clear-cut guidelines, rules and regulations for their visits to labs. As the facilities, knowhow, equipment, and the extent of secrecy differ from lab to lab and from authority to authority, every lab, institute or organisation would have its own guidelines, rules and regulations. A P.R.O. should make his own 'Manual' containing the guidelines, rules and regulations in consultation with the scientists and concerned authorities.

(xi) LOCAL BODIES/FORUMS

The media, especially print media, in towns (and even cities) is keen to cover science-related events such as science exhibitions organised by schools, colleges and universities, science lectures by experts, science seminars/workshops/conferences, etc, but it is often not informed about such an event by the concerned persons or scientists. For various reasons, including sheer indifference or allergy to media, scientists or science teachers often do not knock the doors of media persons for securing their attention. Such science related



events therefore often go unreported in the town media unless some enterprising communicators and P.R.Os do some spadework or some local politician is involved in the event.

At the same time, media persons do not come to know the emerging science-related problems in the region. They also do not know whom to contact and obtain some authentic information on the local problem, if it is brought to their notice. Thirdly, they also lack guidance on publishing science stories.

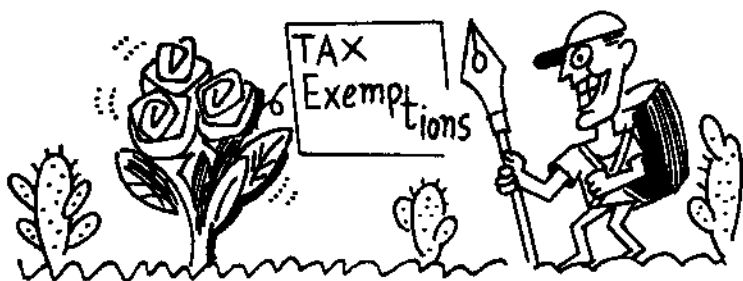
The need is for some science interested individuals in towns and villages to form a local science body or forum or club which would keep the local media informed about science activities taking place in the town and its neighbouring regions. A local NGO or welfare organisation can also fit the bill. The objectives of such a town-level science body should be as follows:

- * To feed in advance the local media with information on the forthcoming science-related events in region.
- * To keep the local media informed about emerging science-related problems and issues in the region.
- * To provide the local media with names of experts, etc, who can speak or write on a local science-related subject, problem or issue.
- * To collect background material related to any science-related subject, problem or issue for the local media persons.
- * To provide articles, features and news on science subjects of local interest.

(xii) INCENTIVES FOR INDIVIDUALS

Science communicators and scientists need special incentives to write on science for the following reasons:

- * Science communication is a specialised art, a blend of science and communications.
- * Communicating on science requires more research, efforts and knowledge than those required in communicating on politics, fashion, films, etc.
- * Comparatively speaking, science communication is at present not a lucrative profession vis-a-vis the aforementioned others.
- * Scientists doing research in laboratories do not write when they



should as experts in their subjects.

- * Science communication is looked down upon with in the scientific community.
- * At present there are not enough outlets for science communication in various media.

Incentives given in the following paragraphs are meant to encourage not only science communicators but also scientists to communicate their findings in media.

(a) Special marks for science communication activities in Confidential Reports

Scientists often ignore science communication because they know they would not get any extra benefits from it in their careers. But if science communication secures some marks in their Confidential Reports, they would certainly pay some attention to it and those having a flair for communication would certainly try their hand at it.

(b) Special tax exemptions on income from science communication

If there is a tax exemption on whatever income accrues from science communication activities, there would definitely be more inputs in the field by not only science communicators and scientists but also media persons, media managers and owners.

(c) Accreditation for science communicators

Accreditation provides special concessions for travel and accommodation, etc, to working journalists. Unfortunately, very few

science correspondents in India are provided with accreditation concessions. There is a need to make these concessions available to science communicators as a matter of right.

(d) Special access to main libraries/internet facilities

Access to main libraries or internet facilities is one of the major barriers to science communication because they are the basic sources for a majority of science communicators. Special cards for issuing books, even reference books, and journals, etc, should be issued to science communicators. Access to the local internet facilities should also be made easier. For this purpose, identity cards for science communicators should be issued by the concerned authority in the field.

(xiii) REGIONAL LANGUAGES

In any discussion on science and media relations, the problems that confront regional language media persons and science writers are often not given much importance, although regional language media is today expanding in a big way especially outside metropolises and cities. Though the problems faced in regional languages in so far as science is concerned is touched upon frequently in this book, a few suggestions given here will go a long way in improving the situation of science in the regional media.

(a) Media Manual of scientific and technical terms in all regional languages

In all regional languages, including the national language Hindi, science communicators can be divided into two camps, one puritan and the other non-puritan. The puritan camp followers claim that all scientific and technical terms should strictly be in their concerned regional language. All science communicators should follow the standard, Government approved terminology of scientific and technical terms in their language (if it is available). The non-puritan camp followers claim that there should be no hard and fast rule; scientific and technical terms in English should be adopted in the regional language because a common man knows and understands them. Often, heated debates take place about the usage of scientific terms among these two camp-followers in the media;

egos clash, reputations are staked, and so on. However, nothing concrete emerges. Only the field of science communication suffers. Disenchanted, some science communicators give it up! There is therefore a need for a 'Style Manual for scientific and technical terms' in all regional languages. This style manual should be evolved in consultation with science communicators, media persons, scientists, local readers/listeners/viewers from different parts of the state, and the local language experts taking into account the day-to-day needs and vocabulary of the common man.

It should contain the following things:

- * English term and its equivalent language term
- * Exact pronunciation in the regional language
- * Its different shades of meanings and their usages.

The manual should also give clear-cut guidelines on how to use or when to adapt new English scientific terms; how to avoid controversies in language; how to minimise, if possible, the use of scientific terms; and so on.

(b) An agency to supply science features in all languages

Indian newspapers or magazines receive material for publication in their pages from several sources, namely, their own correspondents and writers, freelance writers and press agencies. Very few major Indian newspapers can afford to have correspondents or editors exclusively devoted to science. Some have correspondents who also look after science stories. Often, most Indian newspapers rely on both national and international press agencies such as PTI, UNI, Reuter, etc, for science news. Stray features on science received from outsiders appear in supplements published on weekends or Sundays. Small newspapers especially in mofussil towns and villages cannot even afford press agencies and stray science articles from outsiders. Another problem that also dissuades many a newspaper editor from publishing stray pieces on science received from science communicators is their authenticity. The need is for a science feature service especially in all regional languages which can provide authentic text as well as photos about science. There is a felt need for the creation of such an agency at national level. Under the guidance of eminent scientists and science communicators, this agency should supply science features in English which could be

Less than 3.2 per cent science over Doordarshan

During the year 1996-97, science programmes formed less than 3.2 per cent of the total composition of programmes broadcast over Doordarshan's National Network. Included under the 'General Information' category and clubbed with environment, legal and consumer affairs, science should definitely form less than 1 per cent of the total composition of programmes. The percentage of science could be slightly more in programmes broadcast over regional Networks and Local Kendras. □

simultaneously translated into various regional languages for newspapers all over India. Such a centrally governed agency would save a lot of duplication of work, for instance, in identifying themes, experts and photos. Of course, most desirable would be the creation of such agencies at state levels which could supply science features to newspapers/magazines taking into account the local needs, priorities and aspirations.

There is also need for instituting fellowships of the type mentioned above exclusively in every language. It is a task which could be taken up by state level science bodies. Or, a particular percentage of the above fellowships should be reserved exclusively for communicators in regional languages.

Besides, the science communicators in English language have access to the best material available in the West for inspiration as well as authenticity but a regional science communicator has nothing to look forward to. He is therefore unable to improve his tools of communication and presentation. The need is to translate into regional languages the best popular science books (as well as science fiction) produced in the country and the world. Such books would also help in creating interest in science among regional language audiences.



Recommendations

No paper or magazine is known to have gone out of business for publishing science.

Kamlesh Ray

What the public understands and appreciates, it is more likely to support.

Carl Sagan

In the following pages are recommendations which are numbered and divided into various categories, namely, infrastructure, content, manpower, policy, and finance. They are arranged in an alphabetical order, and not in the order of their importance.

GENERAL

These recommendations are applicable to all media - print, radio and television.

I. INFRASTRUCTURE

(1) Advertising and marketing is a must

Science presentations, whether in print, radio or TV media, are not properly advertised and marketed. The result is that the masses simply don't know that science programmes are regularly being shown on radio and TV channels and their cassettes are also available on sale. For instance, the University Grants Commission manufactures and sells educational (including science) video cassettes at a price in the range Rs 100 to Rs 150 but a common man, or for that matter, a cable operator is unaware of it.

**Media do not give importance to scientific temper
- Hindi media more receptive to science**

'Monitoring the Media for Science and Technology' was a three year study conducted by Mass Communication Research Centre, New Delhi. Print and electronic media were monitored for three months in 1987 and two months in 1989. Two broad questions were examined : (a) How is science reported in the mass media? and (b) What is the place of science vis-a-vis the print, radio and electronic media?

Apart from sparse coverage of science in all media, the study shows that media did not take any interest in promoting scientific temper among the masses. Besides, one of the major—and somewhat unexpected—finding of this study is that science is dealt with more comprehensively in the regional Hindi press than in the national one.

**Some of the important findings of the study are as follows:
Quantitative**

(1) Only 2.2 per cent of space was devoted to science in ten English newspapers.

(2) Only 1.95 per cent of space was devoted to science in six Hindi newspapers.

Qualitative

English Press

- * Science related coverage was usually event-oriented.
- * The emphasis was not on scientific proceedings but on participation of VIPs during the coverage of national and international meets on science.
- * Science coverage was highest in the news.
- * Background science information was minimal or lacking in all science stories.
- * Science stories assumed a certain level of understanding of science.
- * Only major controversial scientific issues received coverage. The reporting was always tilted in favour of official line.
- * Working scientists contributed minimally to science coverage.
- * Science news concerning government departments, ministries and scientific establishments received relatively more coverage than science movements and NGO efforts.
- * Editorials and letters to the Editor on science related issues were scarce.

Hindi Press

- * Relied on freelance writers than their own correspondents.
- * Comparatively speaking, science reporting was more detailed and provided more background information.
- * Headlines were usually sensational and somewhat misleading.
- * People's movements and alternative science movements found a definite place in the science coverage.
- * Science-related coverage was in-depth, diversified, interesting and specially aimed at the masses, in regional, not national, Hindi press.
- * Policy matters concerning science were covered in depth and details in regional, not national, Hindi press. □

Though it is claimed that science programmes are being regularly advertised over All India Radio, the need for aggressive advertising and marketing of science presentations in all media remains.

(2) Agencies required

(a) Training scientists in media skills: Most scientific institutions lack properly trained Public Relations Officers who have the skills of communicating scientific research to the media and are well versed with media interests. Indifference towards media among scientists can also be traced to their lack of exposure to media skills. There is therefore a need for agencies which can train P.R.O.s and willing scientists in the art of science communication. Every institution should host such workshops or courses at least once every two years.

(b) Collecting and supplying science news in the country: Often, access to scientific developments in the country is not easy partly because most Indian research institutes don't have well trained P.R.O.s, partly because newsletters, bulletins, in-house journals, etc, are not freely circulated and partly because Indian scientists hesitate to talk to the press. If an agency could simply collect at one place all scattered information (even if it is highly technical) and supply it to interested parties every week (with names, addresses, telephones and fax numbers of the concerned scientists), much more Indian science would enter the media.

(c) Supplying photos on science: A photo agency that specialises in maintaining a photo library on photos related to science and technology and in supplying them at a nominal rate to science communicators is required. It should also maintain photos of major scientific events and scientists of other countries.

(d) Publishing classics in popular science in regional languages: Most regional science communicators have no idea of what is a good popular science presentation, especially in the print media because nothing much is available. The need is therefore to set up an agency which selects every year four best titles available in popular science, negotiates for their copyright, etc, translates them into various regional languages, and provides them to the concerned

states for mass consumption. Even some renowned science communicators should be given special facilities and grants to write classic popular science books in their languages.

(e) Supplying science features in all languages: Most regional newspapers are starved of science news in their columns because no agency supplies them science in their own language. Every Indian state should have its own agency which supplies science news in their language to all media in the state. Ideal would be the creation of a central agency, which, in consultation with scientists, selects science news and feature items, translates them into regional languages, and supplies them to the respective media of the state. Such a central agency would save duplication of efforts.

(f) Supplying videos of science news and features: Agencies that supply videos of science news and features to various TV channels are badly required because no TV channel, including the Doordarshan, has an exclusive division looking after science programmes.

(g) Supplying science in graphic form : Much scientific information can be attractively and interestingly presented in graphic form. It can also be used as fillers by newspapers and TV.

(h) Media consultancy for scientific institutes : The lack of proper infrastructure and manpower is responsible for the poor coverage of Indian science in the media. This inadequacy can be taken care of by media consultants who would guide Indian institutes on how to highlight their findings for various media.

(3) Annual lectures on science to be instituted

Scientific organisations/institutes, corporate houses, industries and even media houses should institute a series of annual lectures on various frontier areas of science which are of considerable relevance to the society and the country. These annually held lectures should be of national significance and delivered by learned academicians and experts in their respective fields. The lectures should raise issues of national importance in so far as the status of science, scientific research, science education, scientific temper, etc, is concerned. Efforts should also be made to ensure that these science lectures are covered by various media.

(4) Collaborations to be sought for topnotch or genuine scientists

Topnotch or genuine scientists often don't have the inclination or time or flair for writing on science but have knowledge of and access to the relevant material. Media houses should encourage such scientists to write in collaboration with their own professional writers, who may or may not have science background. Such presentations may have joint bylines.

(5) Competitions need to be organised

In order to encourage, identify and spot talent in science writing, broadcasting, film-making, cartooning, illustrating, etc, there is a need to hold annual competitions at state and national levels. Respondents should be asked to submit their best work of the year, and prizes should be given in different categories for three best entries.

(6) Courses on science writing, journalism and popularisation

New courses dealing with science writing, journalism and popularisation should be immediately introduced at all major communication centers, universities and departments.

Apart from imparting communication skills to students, these courses should have at least a two month interactive session in a scientific laboratory as well as a village. By knowing scientific research and the problems of scientists first hand they would know how to interact with them when they become media persons. On the other hand, a first hand experience of village conditions, culture and values would enable them to know how to tune science to their needs.

(7) Curriculum on science communication

Interactions of science with history, sociology, futurology and economics should be a part of the curriculum of any science communication course so that a student gets a proper perspective on science, society and industry relations in the past, present and future.

(8) Directory of science communicators

A consolidated all India directory of science communicators

Subject and Package Preferences of Indian Public

A small survey of the Indian masses regarding their interest in science and media was conducted by Dilip M. Salvi and Bharvi Dutt (*Science and Culture*, Sept-Oct 2001). It showed that their preference of scientific subjects were as follows:

- (1) Health/medicines/medical care
- (2) Nature/environment
- (3) Computers
- (4) Wildlife
- (5) Agriculture
- (6) Space
- (7) Gadgets/machines/vehicles
- (8) Mathematics
- (9) Astronomy
- (10) History of science
- (11) Experiments
- (12) Ancient Indian science and scientists
- (13) Biographies of scientists.

Among these subjects, their first preference was for:

- (1) Health/medicines/medicalcare
- (2) Nature/environment
- (3) Wildlife
- (4) Computers
- (5) Agriculture
- (6) Space
- (7) Mathematics
- (8) Biographies

The surveyed masses also preferred science packed in different forms for presentation on television in the following order:

- (1) Features/documentaries
- (2) Quiz
- (3) News items
- (4) Interviews of scientists
- (5) Talk shows
- (6) Stories/dramas.

The need is therefore to produce more documentary/feature-oriented science programmes, science quiz programmes and short science news shows. 'Difficult-to-grasp' and 'irrelevance-of-science' - the two images that made science unpopular among the population - should be taken into consideration while producing science items in any media. □

belonging to all media which gives at one place their biographical details, interests, occupations, addresses, telephone and fax numbers, etc, is a must for bringing them together and for better coordination amongst them.

(9) Experimentation required

A group of select science communicators, say, about 50 to 100, from all over India should be given special facilities such as computers, internet, newsletters, science clipping services, etc., for two years. They may even be networked so that they can also communicate with each other.

(10) Exposure for journalists to science, scientific research, and science in India required

Most journalists or programme producers, whether in English, Hindi or vernacular languages, assigned to science beats in all media are either scared of science and scientists or have prejudice against both due to their lack of exposure to science and scientific research. There is therefore a need to expose them to the science scene in the country. A science body should hold an annual at least two week long 'Science Exposure Programme' for at least 35 selected working journalists (at least one from every language) from all over the country. During the programme, journalists would be exposed to science through lectures, demonstrations, visits to labs, active interactions with scientists, and even hands-on experience in a research lab.

(11) Feature service on science needed in all languages

There is a dearth of science feature services in various regional languages, including Hindi. Even though there are feature services on science run by some private individuals, their credibility and authenticity is always doubted by media persons. The latter need a stamp of authority on the features supplied to them. There is therefore a need for authenticated science feature services in all the regional languages. Every Indian state should form a body of scientists and science writers who could supply every month, if not every fortnight or week, a variety of science stories supported with

Wanted Science Communicators on Health

Science Communicators who can effectively communicate on health, medicine and medical care are very much wanted in the various Indian media because these subjects are in demand among the masses, claims a study on science communicators made by Dilip M. Salwi and Bharvi Dutt (*Science and Culture*, Vol. 66, No.9-10). The study claims that, though health, medicine and medical care tops the list of popular subjects among the Indian masses, hardly 2.3 per cent of the surveyed science communicators have M.B.B.S. degree, though 22.3 percent do write on health related subjects. The study also shows that though television is the most popular medium of communication among the masses, only 3.1 per cent of the science communicators work for this medium and only 6.9 per cent consider themselves as 'script-writers'.

Another issue raised by the study is that 82.3 per cent of the surveyed science communicators had never popularised 'science communication' as a career avenue for the young, which is not surprising in view of the ignorance about popular science communication that prevails among school, college and university students.

The first attempt to assess the status of science communicators in English, Hindi and other regional languages, the study has several other interesting findings, such as, a majority of science communicators write only on biological and environmental sciences ignoring other subjects like geological and engineering sciences, technology and R & D; the poor performance of science communicators is attributed to the lack of easy accessibility to journals, internet and photo archives, among other things. The study recommends the introduction of science communication as a vocational subject at graduate level and the creation of 'Science Media Centres' in various states to combat the ill effects of science and technology in the lives of the masses. □

interesting graphics to all the media in that state. Ideally there should be an apex body which selects material and provides features in all regional languages avoiding unnecessary duplication at all levels.

(12) Fellowships for more interaction between scientists and media

There is an urgent need to establish various types of fellowships for better interactions among science communicator, scientists and media persons.

(a) Science-Media Fellowships: Short-term fellowships, say, from one to six months, should be instituted, which should allow working scientists to spend time in various media, and various media persons to work in institutes, universities and labs. This exchange would help scientists and media persons to appreciate and understand each other's positions and problems.

(b) Fellowships for studying science-media relations and the public understanding of science: Considerable research needs to be done to explore the relationship between science and media. The findings would help in bringing more science, more effectively, to media.

(c) Fellowships in science communication for youngsters: A large number of youngsters, including scientists, are unable to enter the field of science communication and make it their career because they are unable to gain basic experience in it in a media house. These fellowships would help youngsters to gain experience and excel in the media of their choice.

(13) Festivals and Republic Day

Indian festivals like *Ganesh puja*, *Dussehra*, *Janamasthami*, *Jaggannath yatra*, *Durga puja* and other local festivals, in which tableau and exhibitions are put on display to depict various scenes from the lives of Gods, Goddesses and religious leaders, should be



used to give information on the latest issues on science and technology.

At least one tableau in the Republic Day parade held annually in different parts of India on January 26 should be exclusively devoted to a current issue on science and technology. Media should give due coverage to such tableau and bring the issues mentioned therein to wider public attention.

(14) Forum for interaction between the media persons and scientists

There are no regular science correspondents or science reporters on developments in the country in all Indian media because their management and editors do not consider science important enough to be reported. There is therefore a need to convince them from time to time of the importance of science and its implications in the society. Eminent scientists, historians and philosophers of science, science policy-makers and planners, science journalists, science popularisers, etc. have to be regularly brought in touch with managers and editors of all media at special forums, conventions and seminars in all parts of the country.

(15) Guidelines for speaking to the Media

The media consults a scientist for four easily identifiable reasons. One is to report on his/her contributions to science, to highlight him and his/her works. Second, to report on his/her laboratory's or group's contributions to science. Third, to know his/her comment on a scientific or non-scientific event and to quote his/her words. Fourth, to gain insights into the intricacies of a newly emerging or even old scientific subject or to understand a scientific concept or idea.

There is a need for the creation of clearly stipulated guidelines for scientists for speaking to the media by scientific organisations and institutes because often scientists do not talk to the media even though the latter wants from them the explanation of a simple scientific concept found in a standard text-book.

(16) Incentives for science communication activities

Science communication must be treated as a respectable activity

and should be given weightage in all government departments and organisations.

(a) Special marks in Confidential Report: To date, science communication is not given any importance in 'Confidential Reports' while promoting any individual. In fact, any individual active in this field is looked down upon especially in schools, colleges, universities, science departments, institutes and labs. If special marks are given for science communication in C.Rs, it would not only be given more attention but it would also be taken seriously.

(b) Tax exemption on income from science communication: Such a tax exemption would especially encourage media houses to produce more programmes on science.

(c) Accreditation for science communicators: Science communicators should be treated at par with other journalists and should be given accreditation facilities as a matter of right.

(17) Information centers for universities

Universities should have information centers where information on scientific research conducted in them, the teachers who are



conducting research, their fields of specialisation, etc, is properly filed, indexed maintained and updated.

(18) Institute for science communication

A fully equipped institute to train young science graduates in the art of science communications for various media should be established. The institute should offer courses on science journalism and also provide hands-on experience to impart presentation skills.

Experience of various leading institutes or organisations and media houses both in India and abroad should be used for developing the curriculum, etc.

(19) Instruction material needs to be produced and distributed

Instruction material for bringing science to the media in the form of brochures, pamphlets, books and manuals needs to be brought out and distributed among P.R.Os, scientists, science communicators, media persons, and also potential science communicators. Titles such as 'Writing science for media', 'How to write press releases', 'What is the media looking for in science stories', 'How to organise a press meet', 'Why should science be popularised?', etc, should be brought out by an apex body and distributed widely among concerned professionals.

(20) Literary bodies should take cognisance of science writing

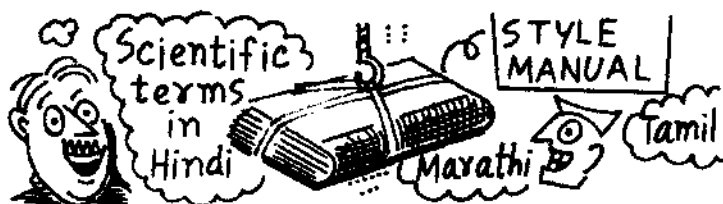
State and national level literary bodies should recognise science writing and science fiction as one of the literary genres and give due recognition to their proponents.

(21) Local science forums needed for small towns

Most of small town media, especially dailies, are starved of science not because the Editors are not interested to publish science or no science-related event or issue occurs there but because nobody thinks it fit to inform Editors about the occurrence of those events, such as, organisation of a science exhibition by schools or colleges or of a science lecture delivered by an eminent personality, or pollution in the local water body. Besides, no scientific information about the local geography, flora and fauna which is a must for the residents, appears in the local media. There is therefore a need for establishing science fora in all small cities and towns which, among other things, bring local science and environmental issues to the notice of local media. If need be, these fora should identify experts and get articles on local issues written and communicate them to local media. Quite likely, most towns all over the country do have such fora, NGOs, etc. These fora should take interest in this matter.

(22) Manual of Style for all regional languages required

A style manual is required for science communication in Hindi and all regional languages. This style manual should place special emphasis on the usage of scientific and technical terms which is at present under a cloud of controversy in all Indian states. Guidelines on the usage of new terms that appear in various frontier areas of science from time to time should also be given.

**(23) Media Guidelines for P.R.Os**

P.R.Os of all institutes, organisations and labs should have clear-cut guidelines from the concerned authorities about what should be and what should not be highlighted in the media so that they can take decisions more confidently.

(24) Science Media Centres

'Science Media Centres' need to be created in different parts of the country where scientists, science communicators and media men could meet and see eye to eye. In addition to bringing them together for a free exchange of scientific information and a harmonious relationship for a balanced and humane growth of society, the centres should have an up-to-date databank on Indian scientists, scientific bodies, associations, institutes and organisations. They should also be able to provide any media person easy access to information on the latest developments in science in the country and abroad, guide and assist her/him in contacting scientists and providing her/him background material on any topic of her/his interest. They could also be a training ground for scientists in the art of communication in various media. If need be, Science Media

Centres could even provide funds for science communication activities.

(25) Science Communicators' Cooperatives need to be created

A science communicators' cooperative/syndicate may be created in cities and towns to pool several resources such as journals, magazines, newspapers, photo, etc, required for communicating science effectively to various media.

(26) Special attention to be paid to regional science communicators

Special attention should be paid to regional communicators in all activities of science communications. In fact, every Indian state should organise its own science exposure programmes for journalists; courses, workshops, and seminars for imparting media skills to science communicators, P.R.Os, and scientists; and so on.

(27) Special facilities for science communicators

Science communicators should be provided some special facilities for access to material on science. For instance, libraries should provide special memberships to science communicators and should provide them with special privileges for borrowing more books and even reference works (for overnight study). Access to Internet facilities should also be provided to science communicators.

II. CONTENT

(1) Alienness to Indian culture and history to be removed

Modern science is at large considered to be Western in origin. The masses at large therefore consider it alien to our culture and history. This notion has to be rectified by the following means:

(a) Including more on ancient Indian traditions in science and technology in all kinds of presentations on science.

(b) If a scientific discovery or invention is reported in the West, Indian scientists in the concerned field should be consulted for their comments and social implications for the Indian milieu. It would



bring the western discovery or invention a step closer to the heart of the Indian masses.

(c) Efforts should be made to highlight contributions made by Indian scientists.

(2) Attitudinal changes towards indigenous science and technology required

Media persons at large have a strong prejudice against any indigenously developed science and technology. They look upon it with doubt and therefore do not give it due publicity. This prejudice has origin in their own lack of background in science, the historical background of India, and the admiration for foreign technologies prevailing in India. As attitudinal changes towards Indian science and technology are difficult to bring about overnight in media persons, it should be made mandatory for the media persons to consult a scientist of the concerned field to judge whether a particular indigenous technology is worth reporting or not. All news or features bureau of particularly government-owned media, namely, A.I.R. and Doordarshan, should have a panel of scientists of different disciplines on their list who could be contacted to give their opinion on news concerning any indigenous science and technology that reaches their bureau. As science news is often not topical or immediate, it could await judgement of an expert rather than be shrugged off without any hearing as the practice is at present.

(3) Brief presentations should be encouraged

Whether it is print media, radio or television, brief, tersely written

items on the fundamentals of science and technology, with their applications in daily life and their societal impact, should be presented along with appropriate visuals. These items could act as fillers in any media. Providing 'minimum science' to the masses could also be the objective of such fillers. (For Minimum science, see Appendix I)

(4) Connectivity and relevance

Science presentations often lack connectivity and relevance. Masses at large do not feel science is intimately connected to their lives because its relevance to them is always missing in most science presentations. The various aspects of science—social, economic, political, historical and others—which connect science to the masses should always be mentioned in the presentations.

(5) Content of science presentation needs to be given thought

(a) Two subjects 'Industrialisation' and 'Pollution' are much in demand especially in interior areas where development is taking place at a rapid pace. Nothing latest on these subjects is easily available for rural media.

(b) Science hobbies, such as, bird-watching, aero-modelling, ham radio, etc, which make the audience, especially youngsters, more active and scientifically minded about the world should be given proper coverage in all media.

(c) People at large are always looking for scientific ideas or items which they can use in their own work or profession or improve their personalities. Such ideas or items need to be highlighted in all media.

(d) Uneducated people have no idea or concept of science or technology, even though they see it daily in their lives. There is therefore a need to give an idea of science and technology, what it is, what it can do and cannot do, in all science programmes over radio and TV.

(e) Educated people in India feel that as they have no degree in science they have nothing to do with science! This wrong notion needs to be rectified and stressed upon in all science presentations over media.

(f) Emphasis should be on day-to-day interesting science. For

instance, why does the milk form a sheath when heated? What is the use of hair oil? How can it be proved that the earth is round? and so on.

(6) Ignored sciences and technologies need to be identified and highlighted

Several scientific disciplines, namely, anthropology, geology, etc, figure rarely in all media. Similar is the case with some technologies, especially appropriate technologies. There is a need to identify these ignored sciences and technologies so that they could be written about and highlighted by media.

(7) Individual enterprise in science needs to be highlighted

Most media persons report and write on contributions made by institute- or lab-based scientists. Rarely, if ever, off beat or interdisciplinary research done by enterprising individuals not associated with institute or lab is highlighted. There are several such enterprising individuals whose scientific contributions go unreported. The need is to identify those individuals and report their work in all media.

(8) Interactive science needs to be highlighted

Science has become something to be passively read or heard or seen, like any other subject. The need is to make it interactive so that readers, listeners or viewers not only learn science but also try to interact, question and discuss it. Readers/listeners/viewers of all media should be encouraged to ask questions about the topics being presented. They should be asked to comment on topical issues related to science. Forums for exchange of views among readers should also be established. Prizes should be announced for best questions/comments, etc.

(9) NGOs are a good source for science-society themes

Non-Governmental Organisations (NGOs) need to be tapped for procuring the latest on science-society themes because their scientific work has social implications and is done under Indian conditions. They should also, in turn, try to propagate the latest developments through at least press releases.

(10) Practical tips for technical knowhow

A large percentage of people are unable to obtain technical education for various reasons. There is need to give practical tips on technical knowhow through various media so that the masses become aware of it and even use it to start small scale business, etc. This could be most effectively done through television in which every item, skill, process or technique can be presented visually.

(11) Regional popular science magazines as disseminators of science news

Some Indian states have their own regional popular science magazines brought out by the state government or a state-funded NGO or some such organisation. They always contain a feature on the latest developments in science. This particular feature should be totally rewritten or geared to media interest. Some interesting graphics should also be added wherever possible. A byline should be added to this feature stating that the material published in the column could be freely reproduced by the media provided, if need be, a proper courtesy line is given to the magazine. Most of the regional media, which is starved of science news and has no finances to subscribe to a regular science feature service, would lap up this feature.

(12) Repetition of science needed

Various scientific achievements of great Indian scientists and scientific institutions need to be repeated from time to time in all media so that they continue to inspire the younger generation. There should be no objection against this repetition because a lot of political, social and business stories are often repeated in the media.

(13) Science in regional languages

Science should be popularised in regional languages because, apart from the fact that most of our masses do not know English, it would be absorbed more quickly for various reasons:

(a) It would be easier to understand and grasp concepts, theories and laws if they are conveyed in the language of the masses.

(b) It would bring science closer to the masses and as a result they could see it work in their daily life.

(c) Science would then not be looked upon as something which only scientists in their labs do and which can be only understood by people who know English.

(14) Science per se is not interesting

People at large are not interested in science for the sake of science. The need is to give the human, social, economical, political, dimensions to all science stories so that they become more interesting, meaningful, and relevant to the masses at large.

(15) Science communication as a career

Very few students and youth know that they can make a career in science communication. Often, it is late in their lives, when they are settled in their careers that they begin science communication activities. If from time to time presentations on science communication as a career - and a challenging one too - are splashed across all media, more students and youth would take it up at an early stage in their lives. Lessons or tips on how to communicate science to the masses should be offered from time to time in all media.

(16) Science *jathas* need to be studied

Nowadays, science *jathas* are organised every year in different parts of the country. Through these *jathas* a team of scientists, science communicators and local social workers visit several villages and communicate the message of science through lectures, plays, demonstrations, puppetry, etc. There is a need to study these *jathas* closely not only to obtain ideas for presentations but also to identify science communicators in regional languages.

(17) Science-related problems to be identified and presented

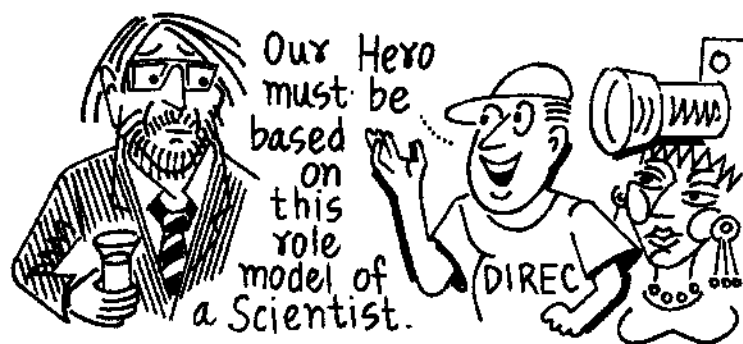
Science-related problems of all cities, towns and villages should be identified and then brought to the attention of all media so that they could be highlighted, presented, discussed and debated. Their solutions should be also presented. In this manner, science could not only get more coverage but also the masses would realise its importance and how it could be utilised to solve the various problems in their day to day life.

(18) Science stories need follow up

Often, a journalist or programme executive reports on or produces a science story and then forgets it. There is a need to closely follow scientific developments over months and even years after the first story has been filed or produced. It educates the masses about the subject and also keeps the interest in it alive.

(19) Soap operas involving science and scientists needed

Soap operas and plays involving the lives of scientists, their lab milieu, the way they conduct research, and the kind of problems they face under Indian conditions need to be written and presented especially on radio and television. Even the inclusion of a scientist character



in an otherwise ordinary soap opera should be encouraged.

(20) Story-like presentations required

Science should be presented in drama, fictional or story-like form without losing its essence so that the masses would easily get hooked to it.

(21) Superstitions need to be attacked with care

Superstitions need to be systematically attacked but care should be taken not to hurt the beliefs and sentiments of people. Often, people are put off by an anti-superstition programme if their basic beliefs and sentiments are challenged.

(22) Visual presentation of scientific facts and figures required

Visual presentation of scientific facts and figures in form of graphs, pie charts, graphics, photos, etc, are the best—and the most effective—way of communicating science. There is a need to give it considerable importance so that science stories look more appealing.

III. MANPOWER**(1) Artist/photographer exposure to science needed**

Scientific illustration is a specialised subject but, unfortunately, no artist is aware of it unless he has to make illustrations/graphics for a science presentation. The need is therefore to introduce science illustration as a subject during the art degree courses in colleges and universities.

(2) Community science communicators required

Every community, whether it be a cluster of villages in Himalayas, or a group of tribals in Madhya Pradesh, or a colony of fishermen in a backwater of Kerala, has its own needs, aspirations and ambitions. It takes years for an outsider to know a community and identify its needs, aspirations and ambitions, but a local person knows these intimately and his people too. Moreover, he can be an effective communicator of scientific knowledge which would be in tune with those needs, aspirations and ambitions. The community would also easily accept him and his words because it could identify itself with him. There is therefore a need to scout, identify and train such persons from all communities and employ them to communicate science in all media, particularly radio and TV, especially in the countryside.

(3) Foundation for communication skills to be built at various levels

Science students often lack communication skills because during their education in school, college and university, these skills are given the least importance. Nowadays, it is only during schooling that students are taught grammar, vocabulary, precis and essay writing in a language but this is not sufficient. During schooling only, science

students should be exposed to and given training in oral as well as written science presentations. Colleges and universities should also include a small course on communications in their science degree curriculum. Such an exposure to communications would in any case be of professional use to a science student whether he takes up research or teaching or becomes a manager or a media person.

(4) Science correspondents required in all media houses

All major media houses, whether print, radio or television, should have their own science correspondents who not only report on scientific developments in the country but also supervise the overall selection and editing of science news and features reaching their respective media houses.

(5) Science qualified staff with media skills for all posts

A basic degree in science plus a good grounding of media should be a must for all science communications posts. Highly qualified science persons without media background should not be appointed on these posts because having no idea about media they make a mess of science presentations in all media.

(6) Refresher courses for science communicators

The rate at which scientific knowledge is exploding is well known. So, it is not easy for any science communicator to keep track of all that is happening at various frontiers of science. There is therefore a need to keep him abreast of the latest on all frontiers because after all science is interdisciplinary. Besides, he should also be imparted knowledge about the concomitant developments in related fields, namely, economics, culture, philosophy, etc., so that he gets a holistic picture.

Refresher courses along the aforementioned lines should therefore be given to selected science communicators in all parts of the country every two years.

(7) Translators should be science qualified

It is unfortunate but true that most of the annual reports, newsletters, bulletins, press releases, etc, in Hindi and other languages often contain

science in distorted form. The reason for this malady is that the translators are often from non-science background who transliterate the text without understanding the subject. Persons with at least a basic degree in science should be recruited for translator's posts.

IV. POLICY

(1) Laws required

Laws are required to prevent a Director of a lab or an institution from stopping his juniors from speaking to the media about their scientific contributions.

(2) Mandate for Government media

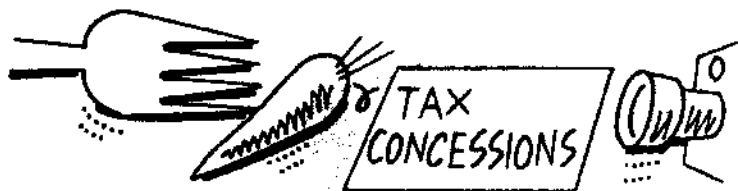
Science popularisation or dissemination should be one of the mandates of all Government media, whether it is Doordarshan or Prasar Bharati or *Yojana* magazine. By virtue of this mandate, these media will give more coverage to science.

(3) Mandate for science dissemination

All Indian scientific bodies, organisations and institutes should compulsorily have 'science popularisation or dissemination' as one of their mandates. In the absence of such a mandate, these institutions keep a closed door policy to the media. After all, the public has the right to know and understand what they are doing because these institutions depend on the taxpayers' money.

(4) Tax concessions to the advertisers

Special tax concessions should be given to advertisers who give advertisements to or sponsor science presentations, whatever the medium, print, radio or TV.



(5) Tax concessions on revenue from science communication

Special tax concession should be given to individuals/companies on the revenue they generate from science communication, be it a script for radio or a TV show on science.

V. FINANCE**(1) Independent body needed for financing TV serials and columns**

An independent body which would collect funds, donations and even advertising revenue from science labs, institutes and organisations, corporate houses and industries, science trusts and foundations for financing or sponsoring science programmes on TV and radio and science columns in newspapers and magazines need to be formed. Such a body could preferably be associated with a Media Science Centre. Composed of a committee of scientists, science communicators and media persons headed by the Director of the Centre, it should collect money for 'Science In the Media Fund' and then distribute it for sponsoring TV and radio serials and newspaper columns. Half of the profits that accrue from serials and columns should be plowed back to this fund. Such a body could even select subjects that need to be popularised and their mode of presentation in different media depending upon their potential and limitations. As an acute need for such a fund exists for producing TV serials on science, such a body could exclusively be a part of Doordarshan or other channels.

(2) Media houses should make more investment in science

All media houses, whether in private, public or government sector, should make more investments for coverage of science and technology. Qualified correspondents for covering science should be hired and provided proper facilities for covering science. Ideally speaking, science bureaus should be set up in all media houses. Such bureaus should have a library of science books and reference works, press-clipping service devoted to science, and other general support services.

(3) More remuneration for scripts

As the script, whether it is print media, radio or TV, is the foundation upon which any presentation is built, it should fetch the script-writer substantial remuneration. Remuneration for scripts, especially in radio and TV media, should be increased substantially to attract better talent.

(4) Regional science magazines should be adequately funded

Regional science magazines should be perceived as the grooming schools for regional science writers. These magazines help scientists and science-trained persons to find their feet in the regional language, know the regional science vocabulary, and even make them aware of style and presentation in the language. In view of their long term utility these magazines should therefore be adequately funded.

(5) Sponsored features on science for all media

To date, only television has sponsored programmes on science. Both radio and print media should look for sponsors for science programmes and columns. A science feature service should especially look for a corporate house to sponsor its news and features.

PRINT MEDIUM**I. INFRASTRUCTURE**

(i) Newspapers should not simply have science editors or correspondents. They should have full-fledged science bureaus composed of a science editor, a correspondent and an editorial assistant with the necessary science library and documentation center. The responsibility of these science bureaus should be to file stories on science regularly. As almost every other news has a science component, the bureau should be consulted on scientific matters as and when required to provide the requisite scientific background and angle to every news.

(ii) Regional magazines on popular science aimed at rural audience should be brought out from all parts of the country in all languages.

II. CONTENT

Readymade capsules of illustrated scientific information, such as facts and figures on earthquakes, tornadoes, volcanoes, etc, or common ailments and their cure, or information on wildlife sanctuaries are required in English and all regional languages, including Hindi.

III. POLICY

There should not be separate supplements marked 'Science/Technology' as though it exclusively caters to science-interested audience. What happens is that the average lay reader turns over the page thinking that it is not meant for him. Science stories should be spread over all the pages of the newspaper so that they come to the notice of one and all. In this manner a lay person would read science and consider it to be a part of his day to day life.

IV. FINANCE

(i) More investments should be made for obtaining science news and photographs on scientific themes in the country. For instance, a correspondent is given all facilities such as air fare, communication equipment, etc, to cover a political news but not science news.

RADIO

I. INFRASTRUCTURE

(i) A central 'Science Broadcasting Division' should be established at New Delhi to make programmes on science as well as coordinate efforts of all stations. This division should look after science programmes made in English and Hindi.

(ii) 'Science cells' should be established in the capitals of all Indian states (some already exist) so that more science programmes in regional languages are produced.

(iii) Good science programmes should be brought out in cassette or book form so that they could reach a wider audience especially in schools and colleges. Even cassettes or books of specially devised programmes could be made and marketed. If radio stations are unable to manage the production and marketing of such cassettes

or books, copyright and other rights could be given to private bodies to do so.

(iv) Programmes especially those aimed at school and college-goers should be announced in advance in schools and colleges through well produced notices and posters. The principals and teachers should also be requested to announce these during general assemblies or in classrooms.

(v) Slots should be given to private media houses to produce programmes on science.

(vi) Workshops for more interaction among the staff should be organised for better coordination among different cells of A.I.R.

(vii) 'Environment cell' and 'Technology cell' should be added to the existing cells that concern science and health and family welfare because of the increasing importance of these subjects in daily life. One may particularly argue that a 'science cell' should include matters concerning technology also. But in reality science is universal but technology is very location-specific and is also given less importance. The cell should deal totally with technologies that exist in the country, their business, industrial and entrepreneurial problems, and their consequences on economy, environment and society.

II.CONTENT

(i) Curriculum-oriented popular science should be given due space in all programmes.

(ii) Programmes should be made in such a manner that they force listeners to respond to them. Listener's response or suggestions along with their names should be duly aired to encourage receptivity for these programmes.

(iii) 'Industrialisation' and 'Pollution' need to be given due coverage especially in fast developing regions.

(iv) Programmes on topical subjects should be given priority over routinely made programmes.

(v) Programmes should be made to inculcate science hobbies among youngsters such as bird-watching, aero-modelling, ham radio, star-watching, etc,. The names of the experts with their addresses and

phone numbers should be given at the end of all such programmes so that they could be contacted for further information.

(vi) Discovery- or exploration-orientated science programmes rather than you-should-know types should be produced.

(vii) 'Voice of the People' type of programmes in which people from all walks of life are interviewed for their comment on science-society issues should be produced.

(viii) 'Science bulletin', a weekly programme on science news and views, should be broadcast. This task can at present be allotted to News Services Division of A.I.R.

III. MANPOWER

(i) Every science cell which is supposed to produce about 400 minutes of programmes every month should have:

(a) Science Officer (1)

(b) Assistant Editors/Reporters (2)

(c) Production Assistant (1)

(ii) Proper orientation/training to broadcasters who intend to make science programmes should be given as the intricacies involved in making a science programme are different from those present in making programmes on other subjects.

(iii) Stringers from scientific community should be hired. Rules to hire them should be flexible.

IV. POLICY

(i) Names of private companies, etc, should be allowed to be mentioned because when they do not get credit they do not send their scientific achievements to AIR.

(ii) At present, there is no concept of 'science cell' in AIR. Persons associated with it are often shifted or transferred to another duty involving non-science subjects; as a result nobody tries to specialise in science.

(iii) Co-ordination among science cells located in different parts of the country is required so that science news obtained by one cell could easily be transmitted to another immediately.

(iv) The practice of 'Closed booking', i.e., one individual can do only one programme in a month should be, if not abolished, reviewed. As a result of this practice nobody gets a proper chance to improve his expression and presentations. If an individual gets at least one programme a week, he can improve his expression and presentation over a shorter time.

(v) It is possible that the very word 'science' or 'technology' puts off a majority of listeners who would otherwise have listened to an interesting programme. The usage of these words should therefore as far as possible be avoided from the titles of all science programmes. A good example is the *Discovery* channel.

(vi) Community Radio Stations, where programmes are made in consultation with the local community, should be employed to catch hold of science communicators from the local community. Those select science communicators should then be properly trained in the art of communication on science because they know the local problems and prospects and could therefore tune their radio programmes according to the needs of the local community.

(viii) Personnel working or trained for making science programmes should not be promoted to higher posts having no science programmes to make unless the concerned person voluntarily agrees for the promotion. In fact, 'science programme-makers' should be promoted only to those posts where their expertise, experience and talent in producing science programmes is usefully utilised.

(ix) Political and legal systems have to be tapped to force AIR and other radio channels to devote a percentage of their broadcast time to science in public interest.

IV. BUREAUCRACY

(i) Only one officer should be assigned to deal with problems associated with a science cell. He should have the final say in all matters concerning the cell.

(ii) The Advisory Committee of every radio station should have at least one local science populariser so that he could provide proper advice and perspective on science programmes being produced at the station.

(iii) Often, experts in various specialised fields are not found at most

radio stations in interior areas. Programmes in consultation with such experts should therefore be produced in all metropolitan stations and passed on to all radio stations for transmission in their respective areas.

(iv) Sufficient time for producing programmes on science should be given because they involve more research and spadework than those made on other subjects.

(v) 'Single window approval' should be a must for all science programmes.

V. EQUIPMENT

(i) Separate vehicle for reporting, etc.

(ii) Separate library cell

(iii) Special mobile phones for on-the-spot recordings

(iv) Access to computer and Internet facilities should be provided.

(v) Special lightweight recorders

(vi) More studio facilities

VI. FINANCE

More remuneration should be paid to script-writers, producers, experts, artists, etc.

VII. TIMINGS

All science programmes should be broadcast at fixed and convenient times and fixed days of the week so that the interested audience, often businessmen, professionals, teachers, etc, who are unable to listen to radio due to shortage of time, make their own schedule accordingly.

TELEVISION

I. INFRASTRUCTURE

(i) A 'Science Programmes Division' should be set at Doordarshan, New Delhi, which would look after science coverage at national level and act as a co-ordinating body for its 'Science programmes units' set up in different states.

(ii) A nation-wide association or organisation of science film-makers, which includes script-writers, researchers, technical hands, directors,

and producers, etc, should immediately be formed to bring them at one platform so that various emerging issues and problems facing them could be discussed and debated. This organisation should also be able to organise science film festivals every year so that interested persons from all corners of the country could meet, share experiences and skills, and view films made in the country.

(iii) A state-of-art computer graphics facility should be established in Doordarshan. It should provide animated visuals on events such as earthquakes, cyclones, floods, droughts, famines, etc, which often occur in India. The visuals should be backed with scientific explanations and also visual statistical data for use by any channel for news purposes.

(iv) Special programmes on science should be made and dubbed in all regional languages for transmission at different TV stations all over India.

(v) A capsule on latest science news and views should be produced every month in English and sent to all TV stations for dubbing in their regional language and transmission.

(vi) A national coordinating, resource-sharing and information exchange body for making science programmes must be set up. This body should be equipped with a laboratory and workshop for preparing science models on order; an animation and graphic studio which can prepare animation on order; a film archive and library which can supply footage of films on a wide variety of science and science-related subjects on demand; and so on. It should also publish directories of expert manpower, namely, script-writers, model-makers, camera men, hold seminars and courses to update their knowledge. Besides, it should also act as a think tank for preparation of novel science programmes and a coordinating agency for exchange of programme, manpower and expertise.

(vii) Video cassettes of good science programmes should be made and sold in the market so that schools, colleges and individuals could buy them for viewing. The school and college market should specifically be tapped.

II. CONTENT

(i) The wonders and methods of science should be routinely

presented on news and talk shows. The real human drama in the process of discovery should be highlighted.

(ii) 'Solved mysteries' serial should be produced in which it should be shown how fantastic mysteries could be rationally explained.

(iii) A TV serial on fundamental misunderstandings and mistakes made by famous scientists, national leaders and religious figures should be made.

(iv) Regular shows should be broadcast on various pseudo sciences in which audience also participate and see and do things normally attributed to these sciences and supernatural powers. Walking on fire, eating broken glass pieces, cutting the tongue, etc., should be demonstrated and explained.

(v) Debates should be organised on various controversial issues that involve science such as AIDS, female foetus detection, pollution, genetic engineering, shape of the earth, animal rights, etc.

(vi) Lab-oriented science should be replaced by home- or environment-oriented science which affects the daily life of one and all.

(vii) Science programmes should be discovery- or exploration-orientated rather than you-should-know types.

(viii) To present and discuss various issues involved in science - society issues, 'Science and People' type of programmes should be produced. In such programmes, people from all walks of life should be interviewed for comments on science society issues.

(ix) As a large section of our population is unable to obtain technical education, there is a need to have programmes devoted to gaining technical knowhow. For instance, programmes on how to repair radio, TV, fridge, etc, or how to set right your leaking tap or tank can be produced to impart various skills and know how, and even demonstrate the use of various tools required to do these tasks. It may even help some people to start small-scale business enterprises.

III. MANPOWER

(i) A 'Science film appreciation' course should be made part of all film and TV diploma and degree curriculums so that young students

are exposed to this genre of films. It may help in attracting more young talents to the genre.

(ii) Sustained effort should be made to train, nurture and create a science personality like Carl Sagan to present science to the public over the TV because this media has become much personality-oriented over the years.

(iii) Community Radio Stations, where programmes are made in consultation with the local community, should be employed to scout for science communicators among the local community. These select science communicators should then be properly trained in the art of communication on science because they know the local problems and prospects and could therefore tune their TV programmes according to the needs of the local community.

(iv) Some technical staff should be exclusively trained and employed for producing science programmes.

IV. POLICY

(i) Doordarshan should give the rights for mass manufacture and marketing of video cassettes of popular science serials like *Turning Point* to private companies for wider dissemination of science among school and college students and even the lay public. The company that produced the serial should be given the first preference in this matter. Only on its refusal to do so should other private companies be given the rights. The royalty generated by the sale of these cassettes should be deposited separately into a 'Special Fund for Science Shows' mentioned below for sponsoring or funding other science serials.

(ii) The DD should have a strong 'Foreign Marketing Cell' for making special efforts to sell science serials abroad because a large market exists for them in the developed and developing countries. This cell should organise science film shows at appropriate avenues, such as film and TV festivals, all over the world to attract buyers.

(iii) For the next decade, until the corporate world recognises the importance of science serials, DD should keep them in the commissioned programmes category, and not sponsored programme category as they are now in.

(iv) All the TV channels should have a clear-cut written policy to

include science news in their main news.

(v) As a lot of scientific research is in progress in the country which the public should know because their tax money is spent on it, an exclusive weekly 2 to 5 minute slot on science news should be broadcast during prime time on all channels.

(vi) A science qualified person should also man the news section of all electronic media channels so that he is able to discriminate between what is science news and what is not. Indigenously designed and produced import substitution goods and processes, the trial phases of various drugs and vaccines, etc, should be properly highlighted in the news along with their significance to the people.

(vii) Any private scientific achievement is not highlighted in science news on the Doordarshan because the mediemen claim, it amounts to advertising it. Clear-cut guidelines should be framed on what should be possible to show and what should not be possible to show. After all, a private achievement is also an achievement which the country should feel proud of.

(viii) It is possible that the very word 'science' or 'technology' puts off a majority of viewers who would otherwise have viewed an interesting programme. The usage of these words should therefore be avoided from the titles of all science programmes as far as is possible. A good example is the *Discovery* channel.

(ix) Personnel working or trained for making science programmes should not be promoted to higher posts having no science programmes to make unless the concerned person voluntarily agrees for the promotion. In fact, 'science programme-makers' should be promoted only to those posts where expertise, experience and talent in producing science programmes is usefully utilised.

(x) Political and legal system has to be tapped to force DD and other channels to devote a percentage of their broadcast time to science in the public interest.

V. BUREAUCRACY

(i) Posts advertised should give priority to experience or training or degree in visual communications, though a graduate degree in science should be an essential qualification.

VI. FINANCIAL CHANGES

(i) Doordarshan and other channels should form a 'Special Fund for Science shows'. This fund should be raised from various scientific labs, institutes and organisations as well as corporate houses, industries, science foundations and trusts scattered all over India. Depending upon the funding, they or their products or processes should be given advertising time over the TV. Half the profits made by such sponsored 'Science shows' should also be plowed back to the special fund. A special committee consisting of scientists, media persons and science communicators should be formed for the creation of this fund as well as for its judicious disbursement among science programme producers.

(ii) Like the Asian Development Bank in Manila, Philippines, which gives loans to make films on environment and ecology, some Indian banks should be directed to give loans to science film-maker only.

VII. INCENTIVES

Awards and Honours should be instituted for science film-makers.

VII. TIMINGS

All TV programmes on science, especially if they are of interest to science professionals, namely, entrepreneurs, engineers, doctors, scientists, etc, should be shown on fixed days at fixed time so that these professionally busy persons could make their weekly schedule much in advance to see them.

SCIENTISTS AND SCIENTIFIC INSTITUTES

Scientists do not take bringing science to the masses as an act of social importance. Rather, a majority of them take it to be sheer publicity and as something of nuisance value. The need is to bring a change in their attitude towards science in the media. Only they can bring about this change. Nevertheless, in the following paras are a few recommendations for them and their research institutes.

GENERAL

(1) Attitudinal changes towards science presentations

required

Every scientist, technologist, engineer, etc, should make it a point not only to read, listen to, and watch science presentations on various media but also to react to them by writing letters on whatever he thinks about them to the concerned authorities at least once a month. Such a response will keep everybody concerned on their toes.

(2) Conference type of get-together with the media required

Every year, scientific institutes, labs and organisations should organise conference-type one- or two-day get-togethers with media persons on their own scientific activities which are of public interest. Scientists and eminent media persons should share a common platform and discuss and debate various scientific issues to which the public should also be invited. Proceedings of such meets are sure to appear in all media.

(3) Initiative has to come from scientific community

Media persons are often so busy that they are unaware of any important scientific event or meet happening in their own city or region. Scientists have to take initiative and bring such an event or meet to their notice so that it could be covered in the media.

(4) Scientific organisations should employ Internet for dissemination of their work

Access to internet is fast becoming common in all media. All scientific organisations should have their home pages on the internet so that any media person can have quick and easy access to scientific research and developments taking place there and can get instant information on technologies, products and processes developed there. The home page should not only contain information on the organisation's achievements, history, budget, technologies, products and processes, but also scientists who could be contacted for further details.

(5) Manual for visits of science communicators to labs needed

To date, journalists and science communicators often visit labs of

various institutes and organisations without any formal protocol, rules and regulations. Some times, such visits cause undue embarrassments to scientists, P.R.Os, or concerned authorities leading to a lot of bad blood. The need is therefore to formulate a manual which gives clear-cut protocol, guidelines or rules or regulations on lab visits of media persons.

(6) Media consultants need to be hired

All scientific organisations, institutions and laboratories should hire the services of a media consultant for highlighting their own scientific achievements in all media. The consultant would not only advise them on media matters from how to write a press release to how to time the dispatch of a press release so that it receives proper attention and also how to handle media persons and impart to scientists the necessary media skills for better exposure to science.

(7) Newsletters/bulletins/in-house magazines should be used for communicating science news

Newsletters/bulletins/in-house magazines should contain some science news items along with graphics geared to media interests. Reproduction of these items along with graphics should be made free to the media with the only condition, if need be, of a courtesy line to the publication.

(8) 'Open Day' should be utilised to disseminate science

Every scientific organisation, institute or laboratory should organise an 'Open Day' at least once every year. During such an 'Open Day' not only the doors of labs should be opened to the public and their activities highlighted in the form of exhibitions, demonstrations, slide and video shows, etc., but this opportunity should also be used to call media persons, science communicators, etc, and a systematic and planned effort should be made to bring to their attention the activities of the various labs. Although some Indian labs, institutes and organisations do organise 'Open Days' but to date no systematic and planned effort is made to highlight their contributions and activities in the various media. Get-togethers between scientists and media persons, science communicators, etc, should be organised; press releases and handouts on the important activities, contributions, products and on-going projects of various labs should be given to media persons; demonstrations, slide and video shows,



exclusively for the media persons should be organised.

(9) Organisers of conferences/seminars should act as guides

Week- or even fortnight-long conferences/seminars on science held often in major cities are rich sources of Indian science stories. Due to shortage of time or their inability to understand the subject media persons often do not sit through these programme. As a result, much interesting that is happening in Indian labs is lost. The organisers of conferences/seminars should therefore lend them a helping hand in this matter by providing them guidance on interesting sessions as well as giving them write-ups/background material on important papers.

(10) Orphaned sciences should also be given importance

Some sciences such as anthropology, geology, etc, though highly interesting, have been given none or much less importance in the media because science writers and scientists do not give them importance in their science popularisation activities. There is a need to give them their due.

(11) Press releases, etc, should also be in the local language

All the press related matters, including press releases, should also be made available in the local language in addition to English.

(12) Public Relations Officers required

Although some scientific institutions have P.R.Os, they are often scientists who have been found good for nothing else! Naturally, they are not properly trained for the job. Often, their job is to keep journalists and visitors in good humour by catering to their needs. Their communication skills are often nil and they have only a superficial idea of the media. There is a felt need for specially trained P.R.O.s in all scientific institutions who know how to communicate science, know media interests and maintain a good rapport with the media. If it is not possible to make fresh appointments, scientists who have some flair for writing should be identified and trained for the job.

(13) Quota for science communication

Every scientist should officially be assigned a fixed quota for communicating science through various medias. He should fulfil the quota till his retirement.

(14) Science communication should also be a criterion for judging the output of a scientific organisation

Science communication activities of a scientific organisation should also be adopted as an additional parameter for judging its scientific output.

(15) Science exhibitions should be held

Science exhibitions are a powerful mode of bringing science to the attention of not only the masses but also the media. The latter is always interested in giving coverage to local events and happenings, and science exhibition whether of a school, college, university, research laboratory or institute is always covered by all media. The need is to bring the event to the attention of media persons who should be provided with the entire background about the contents of the exhibition. The science behind the exhibits should be taken care of and properly highlighted in the press releases.

(16) Scientific and technical personnel should assert

Scientific and technical personnel in the corporate world should

assert the inclusion of scientific information about their product, whether it is soap or washing machine or motor car in all their advertisements and sponsored items in all media. In fact, they should lend an active hand in ensuring that scientific information is always included in all advertisements and sponsored pages.

(17) Scientists should be exposed to science communication activities

At any time, two per cent of the scientist staff of every scientific institution should be exposed to science communication activities which could range from working in a media house to interacting with rural children. Exposure to activities related to the media and science communication would help scientists in understanding the problems involved, remove prejudices, and bridge the communication gap with the masses.

(18) Spokespersons required in all scientific institutions

All scientific institutions, including labs, should identify at least four scientists (in addition to the Director and P.R.O.) who are good at both written and oral communication, and cultivate, train and nurture them as their official spokespersons. They should know all the scientific affairs of the institutions, should know the official line, and should be ready to speak to any media at a short notice. Of these select scientists, two could further be trained for popular science presentations in regional languages especially for television appearances.

(19) Top-notch scientists should collaborate in presentations

Often, top-notch scientists are unable to communicate their own research findings to the media despite their urge to do so for various reasons like shortage of time, lack of presentation skills, etc. Such willing top-notch scientists should be identified and provided with science communicators who could help them in presentation of their work in the media. Of course, both the scientist and communicator should share the byline for the presentation. There is an urgent need to do so, so that the best of Indian science reaches the media.

PRINT MEDIA

(i) Often, scientists ignore or do not give importance to some

Epilogue

An Appeal to raise your voice for science communication

Anybody would say that to create a blueprint and give recommendations is an easy task. It would be very difficult to convert them into reality unless and until...yes, unless and until science communicators, scientists and media persons have a strong will and determination to convert them into a reality. And not the least important in this game is the politician. A strong political will and patronage is required to bring science to the masses. Apart from funds required for building the infrastructure and create quality manpower for science communication in the country, there is a need for a legislation that makes it mandatory for all media to devote a percentage of their time and space to science and scientific issues. There is a need for an M.C. Mehta for science!

First of all, science communicators and scientists have to unite and lobby for funds and a new legislation for inclusion of science in all media. If everything fails, there is need to go public and file a Public Interest Litigation (PIL) case against all media. It is high time, somebody raises a voice for science communication because the negative effects of science are increasingly seen in all walks of life—and are here to stay – in India... unless the public is informed about science and does something to circumvent the negative effects.

Dilip M. Salwi

Appendices

I. MINIMUM SCIENCE PACKAGES

(i) Minimum Science Package for rural and urban settings

A. General health considerations

1. Hygiene
2. Nutrition and foods
3. Potable water and sanitation
4. Diseases, causes and cures
5. Sex, reproduction and family planning
6. Child care
7. Addiction and unhealthy customs

B. Environment and related issues

1. Air, atmosphere and weather
2. Water
3. Soil
4. Trees and forests
5. Other natural resources
6. Food contamination
7. Clothing and housing
8. Biosphere and ecology

C. Miscellaneous

1. Weights and measures
2. Calendars and celestial bodies
3. Children's education
4. Radio and other equipment

(ii) Minimum technology package for rural settings

1. Agriculture and its implements
2. Animal husbandry and poultry
3. Biogas, solar cookers, smokeless chulhas, etc.

(iii) Minimum technology package for urban settings

1. Electricity
2. Appliances
3. Consumer goods
4. Physical exercises
5. Water

II: 'SCIENTIFIC POLICY RESOLUTION' OF THE GOVERNMENT OF INDIA

The Scientific Policy Resolution (No.131/CF/57) was announced by the Government of India in New Delhi on March 4, 1958. It is as follows:

1. The key to national prosperity, apart from the spirit of the people lies, in the modern age, in the effective combination of three factors, technology, raw materials and capital, of which first is perhaps the most important, since the creation and adoption of new scientific techniques can, in fact, make up for a deficiency in natural resources, and reduce the demands on capital. But technology can only grow out of the study of science and its applications.

2. The dominating feature of the contemporary world is the intense cultivation of science on a large scale, and its application to a country's requirements. It is this, which, for the first time in the man's history, has given to the common man in countries advanced in science, a standard of living and social and cultural amenities, which were once confined to a very small privileged minority of the population. Science has led to the growth and diffusion of culture to an extent never possible before. It has only radically altered man's material environment, but, what is of still deeper significance, it has provided new tools of thought and has extended man's mental horizon. It has thus influenced even the basic values of life, and given to civilization a new vitality and a new dynamism.

3. It is only through the scientific approach and method and the use of scientific knowledge that reasonable material and cultural amenities and services can be provided for every member of the community, and it is out of a recognition of this possibility that the idea of a welfare state has grown. It is characteristic of the present world that the progress towards the practical realisation of a welfare

state differs widely from country to country in direct relation to the extent of industrialisation and the effort and resources applied in the pursuit of science.

4. The wealth and prosperity of a nation depend on the effective utilisation of its human and material resources through industrialisation. The use of human material demands its education in science and training in technical skills. Industry opens up possibilities of greater fulfilment for the individual. India's enormous resources of manpower can only become an asset in the modern world when trained and educated.

5. Science and technology can make up for deficiencies in raw materials by providing substitutes, or, indeed, by providing skills which can be explored in return for raw materials. In industrialising a country, a heavy price has to be paid in science and technology in the form of plant and machinery, highly paid personnel and technical consultants. An early and large scale development of science and technology in country could therefore greatly reduce the drain on capital during the early and critical stages of industrialisation.

6. Science has developed at an ever-increasing pace since the beginning of the century, so that the gap between the advanced and backward countries has widened more and more. It is only by the most vigorous measures and by putting forward our utmost effort into the development of science that we can bridge gap. It is an inherent obligation of a great country like India, with its traditions of scholarship and original thinking and its great cultural heritage, to participate fully in the march of science, which is probably mankind's greatest enterprise today.

7. The Government of India have accordingly decided that the aims of their scientific policy will be:

(i) to foster, promote, and sustain, by all appropriate means the cultivation of science, and scientific research in all its aspects — pure, applied, and educational;

(ii) to ensure an adequate supply, within the country, of research scientists of the highest quality, and to recognise work as an important component of the strength of the nation;

(iii) to encourage, and initiate, with all possible speed, for the

training of scientific and technical personnel, on a scale adequate to fulfil the country's needs in science and education, agriculture and industry, and defence;

(iv) to ensure that the creative talent of men and women is encouraged and finds full scope in scientific activity;

(v) to encourage individual initiative for the acquisition and dissemination of knowledge, and for the discovery of new knowledge in an atmosphere of academic freedom;

(vi) and, in general, to secure for the people of the country all the benefits that can accrue from the acquisition and application of scientific knowledge.

The Government of India have decided to pursue and accomplish these aims by offering good conditions of service to scientists and according them an honoured position, by associating scientists with the formulation of policies, and by such other measures as may be deemed necessary from time to time.

III. LIST OF BOOKS

List of books related to science and media in India available in English and Hindi only are mentioned below because of lack of knowledge of books in other Indian regional languages. They are not listed in any particular order.

English

1. *Vistas in S & T Communication*, a report by Pallava Bagla and Sukanya Datta, Publications and Information Directorate (now NISCOM), 1992.
2. *Science for the People*, Edited by S.C.Bhatia, Indian University Association for Continuing Education, 1986.
3. *Television for Education and Development*, Edited by B.S. Bhatia, Space Applications Centre, 1980.
4. *First National Convention of the Indian Science Writers - A Sovenir*, Edited by K.Satyanarayana and N.C.Jain, Indian Science Writers Association, 1993.
5. *National Conference for Science Writers : Proceedings*, Marathi Vigyan Parishad, 1996.

6. *Confluence of Science and Peoples' Knowledge at the Sangam*, by Gauhar Raza, Surjit Singh, Bharvi Dutt and Jagdish Chander, National Institute of Science Technology and Development Studies, 1996.
7. *Minimum Science for Everybody*, by Rakesh Popli and Ashok Sinha, Vikas Bharati, Bishnupur, 1989.
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2. *Bharatiya Bhasha Main Vigyan Lekhan*, Edited by Puran Chand Gupta, Shiv Gopal Misra, Premchand Srivastava and Anil Kumar Shukla, Vigyan Parishad, 1989.
3. *Amrit Jayanti Samoraha: Bharatiya Bhasha Main Vigyan Lekhan*, by Premchand Srivastava, Vigyan Parishad, 1988
4. *Hindi Main Vigyan-Lekhan: Koch Samasayaye*, Edited by Shiv Gopal Misra, Hindi Sahitya Sammelan, 1976.
5. *Hindi Vigyan Patrakarita*, by Manoj Patrairaiya, 1990.

IV. LIST OF SCIENCE DISSEMINATING NGOS IN INDIA

List of Academies/Societies/Councils/Non-Governmental

Organisations, etc, actively associated with science popularisation activities in India. This list is not mentioned here in any particular order.

1. A.P.Academy of Sciences
VC Lodge road
Osmania University Campus
Hyderabad - 500007

2. A.P.State Council of S & T
12th floor, Eastern wing
Gaganvihar, Opp. Gandhi
Bhawan, Hyderabad - 500001

3. Assam Science Society
P.B.No.78 Lamb Road,
Latasil, Guwahati - 781001

4. Bangiya Bijnan Parishad
P-23, Raja Rajkrishna Street
Kolkata- 700006

5. Center for Science and Technology
111/1(new 56), 6th Main
Malleswaram
Bangalore - 560003

6. Chakdaha Bijnan Parishad
c/o Times House
Bongawan Road, P.O. Chakdaha
Dist: Nadia - 741222(W.B.)

7. U.P. State Council for S&T
B-144, Sector C
Mahanagar, Lucknow - 226001

8. Drug Action Forum
S-3/5, Sraboni Sector III
Salt Lake, Kolkata - 700091

9. Ganadarpan
32 D, D.N.Ghosh Road
Kolkatta - 700025

10.Haryana Vigyan Manch
74/22 Kishanpura
Near Rly Crossing, Sonipat Road
Rohtak - 124001

11. Jana Vijnana Vedika
H.No.3-2-16, Near Jute Mill
Guntur (A.P.)

12. Karnataka Rajya Vijnana Parishad
I.I.Sc Campus
Bangalore - 560012

13. Madhya Pradesh Vigyan Sabha
255, Zone II
Maharana Pratap Nagar
Bhopal - 462011

14. Maheshtola Bijnan-O-Sanskritik Parishad
Daulatpur
Budge road, 24 Parganas(S)
743352 (W.B.)

15. Marathi Vidnyan Parishad
Vidynan Bhawan
V.N.Purav Road
Sion-Chunabhatti
Mumbai - 400022

50. Srujanika

Jagamara P.O. Khandagiri
Bhubaneshwar - 751030

51. Forum for Science and Development

Indian Institute of Astrophysics
Koramangalam, Bangalore

52. Forum for Scientists, Engineers and Technologists

6/1, Sudder Street
Kolkata - 700016

53. Kanad Science Foundation

238/6201, Sindhu Bhairavi
Pant Nagar, Mumbai- 400075

54. State Council for Science, Technology and Environment

Govt of Meghalaya, Dhankheti
Shillong-793001, Meghalaya