
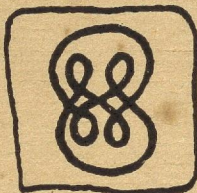


भारत की छाप BHĀRAT KI CHHĀP

A film series on the history of science & technology on the Indian subcontinent
presented by the National Council for Science and Technology Communication,
Department of Science and Technology, Govt. of India



NEHRU CENTRE, DR. ANNIE BESANT ROAD,
WORLI BOMBAY-400 018 • Tel: 4921886
AFTER HOURS 4950266.



**BHARĀT
KI
CHHĀP**

BHĀRĀT KI CHHĀP is a film series in thirteen parts of 50 minutes each, in Hindi. Due to be telecast shortly on the national network, the films trace the development of science and technology on the Indian sub-continent, from the stone age to modern times.

The project was conceived of by Chandita Mukherjee, the director of the films. The National Council for Science and Technology Communication (NCSTC), Department of Science and Technology, Government of India, made the idea a reality by funding and providing the necessary support to Comet Project which is researching and making the films. The project is being carried out under the auspices of Nehru Centre, Bombay. **BHARĀT KI CHHĀP** has a distinguished panel of advisors headed by Prof. Yash Pal, Chairman, University Grants Commission. In addition, many experts have contributed their insights to these films and countless hours of their time.

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Technology

BHĀRAT KI CHHĀP

takes its audience on a journey from the stone age to the present, a journey of discovery about the growth of science and technology on the Indian subcontinent. The films provide us an opportunity to rediscover our identity, to find out what makes us Indians. This rediscovery involves some rejection of stereotypes, as well as some redefinition of landmarks of India's past. The major thrust of the films is affirmation of science as one of the essential components of Indian tradition and history. Broadly, the films aim to generate an awareness and understanding of indigenous developments in science and technology. The films look critically at socio-historical processes and examine how these have helped or hindered the growth of science in different periods. Thus **BHĀRAT KI CHHĀP** is not a mere catalogue of our scientific achievements but a searching reappraisal of the past.

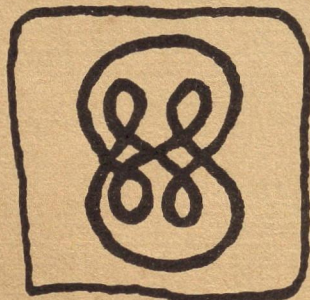
Questions about the past are raised; while most are answered, many are left unanswered. We hope these will be an impetus to viewers to discover more, and to acquire deeper insights into our past and present. The films reinforce the notion that by knowing the past, we can understand our present better and participate more actively in building a sounder basis for our common future. It is in this way that we hope **BHĀRAT KI CHHĀP** will help to foster a rational and scientific outlook.

BHĀRAT KI CHHĀP constitutes a rare attempt in Indian television history. It is not a story-based serial, but one that has required much research and which is seen by its makers not as an end but as a beginning. We were fortunate that the National Council for Science and Technology Communication (NCSTC) adopted the unconventional approach of treating this project as a scientific experiment of which

the long-term objectives were more important than any compulsions to produce something to be made and seen (and probably forgotten) quickly. In other words, we were allowed time to think, read, absorb, travel to archaeological sites and museums, to debate to start afresh. **BHARAT KI CHHAP** has been four and a half years in the making.

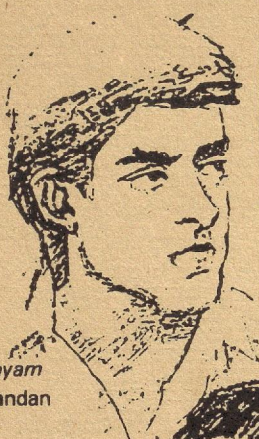
Science serials that have proved popular on Indian television have been J. Bronowski's *The Ascent of Man* and Carl Sagan's *Cosmos*. Bronowski and Sagan have spent their whole lives immersed in their subjects. They write in their books, and speak in their films, with an easy authority. None of us, however, were experts, yet we believed in the importance of our subject and were committed to our objectives. So we had to find a different way. We had to go through a learning process, and find experts who would help. There was no single comprehensive body of work upon which we could draw. One expert may have devoted himself to the whole sweep of ancient astronomy, another confined herself to a specific Mughal craft. We had to discover and pool together a vast array of resources and, in the process, develop our own integration of data arrive at a social perspective, internalise for ourselves the links between what happened in our science and what happened in our history.

In this process lies our chief strength, because it is at the heart of the cinematic form we evolved for **BHĀRAT KI CHHĀP**. Thus the films are explorative rather than definitive, their aim is not destination so much as journey.




The endless knot motif from a Harappan seal


THE JOURNEY BEGINS




Shivkumar
Subrahmanyam
as Raghunandan



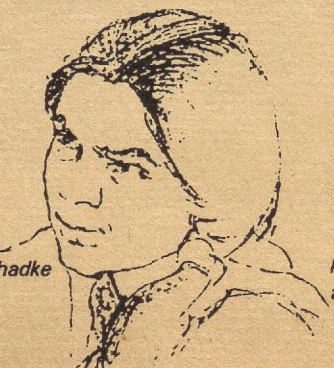
Urmi Juvekar
as Amrita Prasad



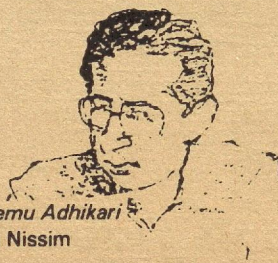
Sohaila Kapur-Limaye
as Shehnaaz Khan



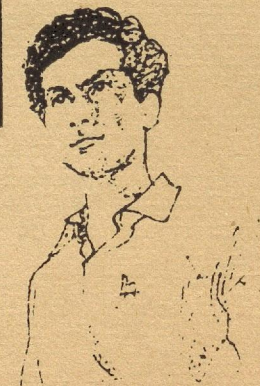
Jayaram Tatachar
as Ramanathan



Vasundhara Phadke
as Maitreyi



Hemu Adhikari
as Nissim



Anirudha Limaye
as Ranjan Pradhan

Amrita, Ranjan, Shehnaaz, Ramanathan, Raghunandan—these are our reporters, fictional young men and women who travel to real places, explore museums, meet historians, archaeologists, scientists and local people. Each reporter has

his or her distinct professional background, his or her personal interests, beliefs and approach. Sometimes they travel with one or more of their colleagues, which allows scope for dialogue and debate as well as shared experience. The reporters ask questions, discover facts, have moments of insight, they grow in knowledge and understanding, and the viewer can empathise and grow with them. They also project themselves back in time through fantasy, and sing songs which are stylized celebrations of science. The mould, then, is not strictly that of "realism". There is a wealth of authenticity combined with a good deal of fun—relevant fun, if we may say so.

Putting the different field reports into perspective, providing conceptual links and historical background, are the two "anchorpeople"—Maitreyi, a computer scientist, and Nissim who is a professor of history. These two have come together to make these films; they have engaged the reporters and worked out the overall framework and objectives. Sometimes, one or more of the reporters drops in at their studio office from where they always speak to the audience. Serious but informal, the anchorpeople are surrounded by books, charts and artefacts relating to the period under discussion.

Besides the visual information expressed through actual visits to historical sites, museum objects, maps etc., extensive use is made of graphics and of animation which provide a lively explanation of technical processes and scientific concepts.

THE EPISODES

- 1 Introduction
- 2 The Stone Age
Till 3500 B.C.
- 3 The Harappan Civilisation
3500 B.C. to 1750 B.C.
- 4 The Iron Age
Till 500 B.C.
- 5 The Age of Codification
500 B.C. to 300 A.D.
- 6 Ayurveda & Astronomy
300 A.D. to 700 A.D.
- 7 Mathematics & Temple
Architecture
700 to 1200
- 8 Synthesis & Growth
1200 to 1600
- 9 Stagnation & a Changing World
1600 to 1800
- 10 Colonialism & the
Industrial Revolution
1800 to 1900
- 11 The Freedom Struggle &
the Scientific Community
1900 to 1947
- 12 Independent India
1947 to the present
- 13 Retrospect & Prospect

BHĀRAT KI CHHĀP
The themes of
the episodes

EPISODE 1
Introduction

This episode introduces us to the anchorpeople and reporters, and shows them engaged in preparatory research. A song by the reporters, using the journey metaphor, takes us to locations such as the ancient Kanheri caves, Jaipur's Jantar Mantar and an impressive modern construction site.

The methods of knowing the past are outlined, highlighting the importance of material evidence. An attempt is made to sift myth from history through an interview with Prof. B.B. Lal excavator of sites mentioned in the Mahabharata and the Ramayana.

Excavations by Deccan College, Pune, at Inamgaon reveal ancient house plinths and indications of drought 3000 years ago.

Through graphic dissolves, we understand how carbon dating of organic remains determines their age, and we see how the process is carried out at the Physical Research Laboratory, Ahmedabad.

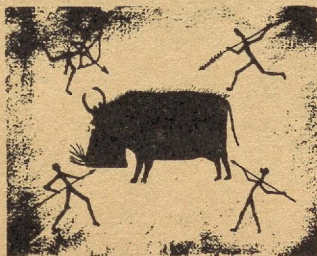
A discussion among the anchor people and reporters gives us glimpses of things to come.

Episode 1 establishes the historical scope, social concerns and form of the serial.

EPISODE 2
The Stone Age
TILL 3500 B.C.

One method of knowing about our first ancestors is by observing contemporary tribal communities who still practise some stone age techniques. Two reporters travel to the interior of Bastar, where they discover how women gather forest produce.

We look at stone tools that span lakhs of years of our biological evolution. An expert makes two stone tools, demonstrating the finesse involved. The cave paintings at Bhimbaitka speak of the impulse to art and perhaps reflect a pre-



*Wild boar cornered by
stone age hunters.*

hunting ritual. One painting dissolves into a fantasy in which the animal is hunted, killed and roasted on a fire. We see how revolutionary the discovery of fire making was in many ways.

Preparations for a *wazwaan* feast in a Kashmir village, and the nomadic tribe of Gujjar shepherds, help us to understand the transformation that occurred when we learnt to domesticate animals and cultivate plants. Navratri celebrations in Bombay bring home to us the fact that many of our present rituals hark back to the barely 7000 year-old discovery of agriculture.

EPISODE 3
The Harappan Civilisation
3500 TO 1750 B.C.

The discovery of Harappa and Mohenjo-daro changed the view that Indian history and civilisation began with the Vedic age. Since then, more than 700 big and small sites have been discovered over an area of 15 lakh square kilometers. A song in the Bharud folk style names the essential features that make a city. The Lothal site helps us to recreate the Harappan city planning and drainage system. Model animation explains how standardised bricks were used to form the strong "English bond". Harappan crops and agricultural technology are described.

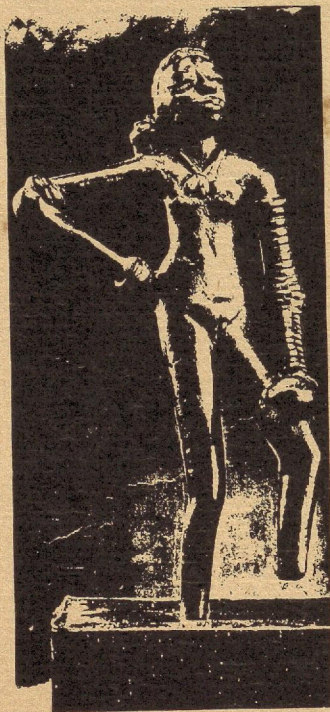
The film explores and celebrates the richness of Harappan remains: beads, terracotta, textile technology, copper tools, the bronze dancing girl. In Khetri, a stone's throw separates the modern smelting factory from ancient copper mines.

Harappan overseas trade and navigational technology are discussed, and we look at their undeciphered script. So much is known, so much still a puzzle.

Finally, the reporters visit the large, unexcavated site of Dholavira near the Indo-Pak Border in Kutch. Under the ground lie some answers, and new questions.

BHĀRAT KI CHHĀP

The themes of
the episodes



Bronze dancing girl from
Mohenjo-daro.

EPISODE 4

The Iron Age

TILL 500 B.C.

An excerpt from Dharamvir Bharati's play, *Andha Yug*, has Ashwaththama hurling the mythical *brahmastra*. The imagery is that of nuclear holocaust. The question is asked: was this the science of the Indo-Aryan speakers? The answer lies in the material evidence: they had iron, superior horses, socketed axes, spoked wheels; these were the significant things. Myth provides poetic inspiration and cultural identity; to confuse it with history is to wrong both.

We follow the social consequences of iron technology. The clearing of forests and improved agriculture (using the iron-tipped ploughshare) laid the basis for new cities, a thousand years after the Harappan decline, in the Gangetic plains. In the break-up of the tribal order, the protoscientific *Rgvedic* concept of *rta* or universal law was lost.

The megalithic culture, predominant in the south, serves to give a more complete picture of the period. Bastar iron smelting today is almost identical to the megalithic technology as understood from an excavated furnace.

Kaushambi and Rajgir are city sites we explore. The rise of brahmanical orthodoxy is discussed, along with the geometry arising out of the construction of sacrificial altars. The film ends with a sense of the growing social trauma and the birth of Buddhism and Jainism.

EPISODE 5

The Age of Codification

500 B.C. TO 300 A.D.

In the melting pot culture of the new cities, many dialects of *bhasha*, the early form of Sanskrit, could be heard. Panini the grammarian attempted to systematise the inherent rules of language. His work, a

masterly achievement of logic, analysis and classification, is of great interest to computer scientists today. He made impressive use of the classical *sutra* style so that a large number of rules could be derived from brief, easily memorised formulae.

Sarnath, the Buddhist caves at Kanheri and a song enactment of a Jataka story evoke a sense of Buddhism's anti-oppressive teachings and encouragement of trade.

At Pondicherry, an ancient port, the trade with Rome is recalled. Cities and ports in the south were able to come up in this period because of excellent irrigation systems. We take a look at the simple 'etram' or water lever, the temple tank and the impressive Grand Anaicut on the Kaveri.

The Saraswati Mahal Library, Thanjavur, is a storehouse of many manuscripts first composed during this period, which saw the codification of social, religious, aesthetic and philosophic principles. Among these is the *Manusmriti*, which reflects the growing rigidity of the social order, with women and lower castes being denied basic rights. Two secular exceptions to the largely religious corpus of work are Kautilya's *Arthashastra* and the ayurvedic texts of Charaka and Sushruta, the latter to be discussed in Episode 6.

EPISODE 6

Ayurveda & Astronomy

300 A.D. TO 700 A.D.

Although there was a flowering of cities, arts and crafts in the so-called "golden age" of the Guptas, this was the result of earlier trends. Besides, urbanism had already reached a zenith in the Kushana cities of the early centuries A.D. We visit the site of Sonkh and admire the red sandstone sculpture in the Mathura museum. The remains of an immense, 2,500 year old tank at Shringaverpur near

BHĀRAT KI CHHĀP

The themes of
the episodes

Allahabad, used to store flood water, are explored.

The Kushanas were Buddhist rulers who encouraged the science of ayurveda. Discussions at the Jamnagar Ayurvedic University and a fable about Jivaka the physician, show how the Charaka and Sushruta *samhitas* are remarkable not only for their pharmacopoeia and surgical knowledge, but also for their empirical-rational basis, scientific method and materialist world view.

The growing debate between idealism and materialism, with the common-sensical Lokayata attitude intervening, is dramatically recreated at Nalanda University. The Chinese traveller Yuan Chwang came here and the astronomer Aryabhata may have taught here.

Aryabhata's achievements are impressive: his calculation of the earth's rotation; the value of pi; his correct explanation of eclipses. Mathematics is seen to be a fundamental component of astronomy. Aryabhata is wholly rational, but it was an age of orthodoxy and superstition in which he was exceptional. The works of his successors, by contrast, are tainted with astrology.

EPISODE 7

Mathematics & Temple Architecture

700 TO 1200

This is an age of cultural and scientific exchange, in which the Arabs play a major role. The learning of India, Europe and the Arabic world is brought closer together.

In this period, a strange paradox is noted. India is ahead of many regions in many scientific and technological respects, but we see that almost invariably an impasse is reached here, while elsewhere these accomplishments take root and grow. Thus the mathematics of our astronomers and of the great Bhaskara II reaches a dead

end, to be revived centuries later by Leibniz and Newton. Alchemy arises in China and India from a quest for immortality and gold, but it is in Europe that it gives birth to modern chemistry. The social reasons for this phenomenon are examined.

In the process, our subcontinent does make significant contributions to the world: the zero and the place value number system (1 to 9); the sophisticated technology of zinc distillation. At Hindustan Zinc Ltd., Zawar, and at the MS University Museum in Baroda, the technical aspects and social consequences of zinc making are recreated.

Metallurgy reaches artistic heights in the superb Chola bronzes. The image in worship links up with the growth of Hindu temples.

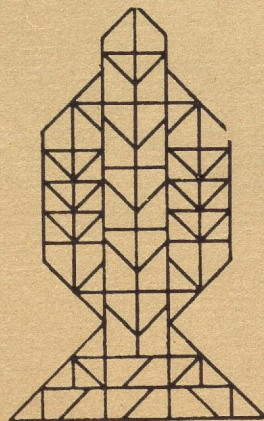
At a number of ancient sites we trace the features of trabeate architecture and how, once formal development ceased, architecture became more and more decorative. Another impasse. But the winds of change are imminent: new forms of architecture, new scientific ideas, new mechanisms are on their way with the Turks and Afghans.

EPISODE 8

Synthesis & Growth

1200 to 1600

A scene set at the Qutb complex in Delhi describes society prior to the Turk and Afghan migrations into India. In the Sultanate period and later, feudalism got deeper entrenched. A couple of centuries before, the traveller Al-Biruni commented on how insular he found the people and how unwilling the orthodox learned men were to share or improve their knowledge. But the peasants and artisans were open to technical innovation. A wide range of crops were grown and new technologies came into common use. The persian wheel, adopted from Iran, was described in great detail by Babar, newly arrived in the country.



Use of geometry in brick altar, late vedic period.

BHĀRAT KI CHHĀP

The themes of
the episodes

The Portuguese had already founded their trading posts and golden Goa rivalled the opulence of the Indian courts. The missionaries carried out botanical studies and introduced the printing press to India. In the south also flourished the kingdom of Vijayanagar—the excavations at Hampi reveal, along with an impressive layout of temples and statuary, a network of water tanks and aqueducts.

Under Akbar the emerging cultural synthesis reached new heights. There was an explosion of crafts—exquisite products made by the most laborious means for the consumption of an increasingly decadent nobility. Our reporters travel around Fatehpur Sikri with a guide. They listen to a *quawwali* at Salim Chisti's tomb, visit the ruins of the craft workshops and comment on the exorbitant taxes collected, mainly from agriculture.

The work of the historian Abul Fazal and the inventor Shirazi is discussed. The nobility encouraged horticulture and introduced many exotic fruits. Jehangir made an extensive study of plants and animals. India was renowned for its painted and printed textiles. A visit to Machilipatnam traces the still surviving art of Kalamkari. This was one of the prime commodities that attracted European traders to India.

EPISODE 9

Stagnation & a Changing World

1600 to 1800

At Banurgarh, a minor Shivaji fort, a *bhajan mandali* sings a Tukaram *abhang*. *Bhakti* and *sufi* movements were gathering force as the Mughal empire dissolved into small feudal kingdoms. While the religious leaders emphasised ideas of equality, this democratic impetus did not realise its potential for a wider involvement with science. Despite the high levels of craft development, the theory-practice divide continued, and this was to prove a great limitation.

A visit to Jam Salaya in Gujarat, where a wooden ship is being constructed, provides an appropriate setting to discuss the technical

strengths of Indian shipbuilding. Indian-built ships were much in demand by the Europeans. But we lacked navigational technology—it was Europe, and not the East, that sailed the high seas and eventually ruled the world, helped of course by its military might.

The Renaissance in Europe broke with the constraints of the medieval worldview and revolutionised both science and art. Man became the centre of thought and action. The new scientific knowledge and the new philosophy travelled to India as well. It was left to individual nobles, however, to take an interest, and this interest never acquired the dimensions of a social force.

Meanwhile, Jai Singh plans the city of Jaipur, reforms the calendar and builds a number of astronomical observatories—the Jantar Mantars. Strangely, his astronomy is pre-telescopic, though the invention is known to him.

Tippu Sultan of Mysore has a more integrated approach to social and technological change. His economic policies are evidence of this. He attempts to acquire the latest military technology, and the steel rocket invented by his army is a singular achievement that harasses the British troops considerably. Tippu is fascinated by the French Revolution, and is unique for his early conviction that Indian forces must unite against the British. With Tippu's defeat, a major threat to colonialism is removed.

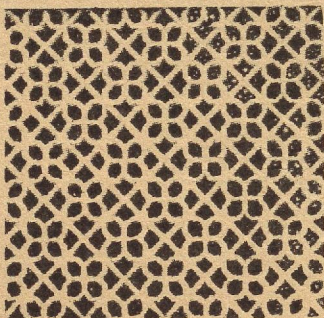
Meanwhile, the Scientific Revolution is happening in Europe—a great leap forward in many theoretical fields that also cuts across social barriers and forms a prelude to the Industrial Revolution of the 19th century.

EPISODE 10

Colonialism & the Industrial Revolution

1800 to 1900

The film begins with a study of the medieval steel making processes practised in the Telengana area. Indian wootz ingots and steel—misleadingly known as Damascus steel—were an



Pierced marble screen, Mughal period.

BHĀRAT KI CHHĀP
The themes of
the episodes

important commodity in international trade. Typical of many of India's other skill-based craft industries, it was to come to an end with the flooding of world markets with the mass produced goods of the Industrial Revolution.

The Birla Industrial and Technological Museum in Calcutta provides a setting for a scene on the Industrial Revolution in Britain. One man could now produce what would have taken many times more men to produce earlier. The tremendous social and economic changes that went with it are discussed.

In India, the East India Company conducts extensive surveys of the country's natural resources. These findings lead to the development of raw material processing industries and the encouragement of certain crops, of use to British industry.

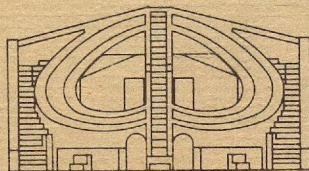
A trip to Murshidabad, the capital of Mughal Bengal, gives us an opportunity to review the decline of once-flourishing craft centres and markets. The discontent of artisans, peasants and nobility presages the 1857 war of independence.

The 1857 uprising is narrated in song form. We visit Lucknow and look at the changed cityscape in the context of political changes post 1857.

Meanwhile the exposure to the West has had an impact in the field of ideas. The efforts of social reformers and educationists such as Rammohan Roy are discussed.

The railways played an important role in the consolidation of Britain's hold over India. At Delhi's Railway Transport Museum our reporters reconstruct the manner in which the railways were developed.

A discussion on the state of education and the stirrings of a fresh movement to free India brings the episode to an end.



Jai Singh's Jantar Mantar.

EPISODE 11

**The Freedom Struggle & the
Scientific Community
1900 to 1947**

A profile of Bombay under the British reveals how ports were developed as commercial trading centres. We visit docks, workshops, a textile mill and reconstruct the migration of people to the city, the growth of an entrepreneurial class, the emergence of highly skilled mechanics.

The spread of education contributed to the growing nationalism. A need was felt for independent research facilities and for science education. Mahendralal Sircar founded the Indian Association for the Cultivation of Science, and Calcutta was at the hub of the new scientific upsurge.

The work of scientists such as J.G. Bose, P.C. Ray, C.V. Raman, Meghnad Saha and S.N. Bose is discussed in different sequences. The institutes they founded, their work places, their instruments and old photographs are used. At the Udaipur Solar Observatory we understand the contribution made by Saha's theory of thermal ionisation to astro-physics, and see Raman's effect being studied at close quarters. These early scientists were significantly involved with the setting up of institutes, with planning, industry, and the vision of a free India.

Science the world over was undergoing immense transformation—and so was the world. A song reminds us of important markers in this period.

The plunder of our natural resources continued, and the story of coal is a typical example. A visit to the coalfields in Dhanbad helps us to understand how unscientific mining practices led to cave-ins and coal fires that rage underground.

The reporter narrates how geologists and mining engineers came together and, against various odds, demonstrated how Indian coal could be washed. This technological breakthrough was also a nationalist achievement.

Finally, it is 1947 and freedom is won.

BHĀRAT KI CHHĀP
The themes of
the episodes

EPISODE 12

Independent India
1947 to the present

The gaining of Independence brought with it the challenge of development—equitable growth and economic regeneration of a depleted country. This experiment fired the imaginations of scientists and technologists.

Meghna Saha had had a keen interest in planning. We explore the issues taken up in his journal 'Science and Culture' and meet one of his students. Another key figure of this period was Homi Bhabha. He was involved with building up institutions and he emphasised self-reliance.

The four reporters travel through Delhi in a car and attempt a definition of self-reliance through a discussion of its different problems and aspects.

The Green Revolution is often taken as an example of self-reliance in food production. How valid is this claim? We explore this issue through interviews with farmers, agricultural scientists and economists.

One of the inputs required by the hybrid seeds of the Green Revolution is water. The proposed system of dams on the Narmada River is expected to make huge amounts of water available for agriculture and to generate power for industry. Through scenes set along the banks of the Narmada, and interviews with both critics and supporters of the project, we outline the controversial issues involved. These include the problems of the refugees created by the reservoirs, the loss of forests and the technical arguments regarding feasibility.

Independent India has seen various achievements and yet certain problems persist. Applications of new technologies have shown us results, yet often, the price in the long run is heavy, and the benefits inequitable. All this points to the need for greater awareness and participation on the part of people.

A song reminds us that while we cannot change our past, it is upto us to make our future.

A recent example of people's involvement in planning local development is the Baliraja dam



*Homi Bhabha:
Multifaceted personality.*

in a Maharashtra village. Here, in a drought-prone area people have formed themselves into a water cooperative. The first, political stage of their struggle is over, but the real test lies ahead. Now, they must adopt new technologies to improve their agriculture, and make the co-operative work successfully.

EPISODE 13

Retrospect & Prospect

As the journey draws to its end, the anchor people and reporters feel the need to recapitulate the lessons of the past and envisage possibilities for the future. They recall the negative role that non-scientific forces have played in our history—this leads into a discussion on whether we can validly talk about science changing society without assuming that society itself has to change. Science is not "outside" society but is part of the social structure and influenced by it.

Nehru spoke not just of big dams and factories but of the need for a scientific temper as well. We have made considerable progress in the first area but not in the second—and so we have, for example, the growing phenomenon of communalism. Industrialisation has not led to modernisation of thought; communal forces encourage and reinforce insular identities based on distortions of history and of the present. Science in its broadest sense can provide a new identity, a new unity. School education, voluntary organisations, the media and the people's science movement all have a role to play here.

A reporter visits some villages in Udaipur where a voluntary organisation is training local people for afforestation programmes, adult literacy classes, improvement of community health.

In Meerut, which has witnessed repeated communal outbursts, the typical circumstances, attitudes and interests behind such occurrences are analysed through the anatomy of the town as well as interviews with townspeople and victims. Hoshangabad district in Madhya Pradesh

BHĀRAT KI CHHĀP

The themes of the episodes

has introduced science and social science textbooks designed by a voluntary group as part of the official school syllabus. We attend an exciting classroom discussion on current issues and a history lesson about caste. Children on a science ramble collect specimens of plants, mud and insects.

The problem of health is explored and the nature of our drug industry analysed. Peace, the role of the media, the ironies and potential of science in society today are discussed.

All through the episode, the reporters draw on their experiences so far, and the discussion in the present is enriched by visual and thematic allusions, to earlier episodes.

Episode 13 is not so much a conclusion as an open-ended film that looks forward to a continuing voyage and search.

Chandita Mukherjee, the director of *Avalokan*, graduated in 1975 from the Film & Television Institute of India, Pune, with a Diploma in Cinema Direction. Her first professional assignment was as a producer of science programmes for television with ISRO during the SITE experiment (1975-76). She has produced, directed and scripted films and a.v.s for the Union Ministry of Rural Development; Union Ministry of Social Welfare; Films Division; Directorate of Adult Education; and UNICEF. She is a founder-trustee of *Avehi*, an audio-visual resource lending facility. She has travelled throughout the country and participated in conventions and meetings of groups doing science popularisation.

Over 80% of those who saw the two episodes said they would see the other episodes too, and recommend *Bharat Ki Chhap* to their friends.

One of the most unusual aspects of the project was the decision to pretest **Bharat Ki Chhap** before it is telecast. The aim was to get a feedback from the audience so that necessary changes to enhance audience comprehension and interest could be made.

The pretesting survey was carried out in seven cities (Ahmedabad, Anand, Bhopal, Bombay, Calcutta, Delhi and Madras) and among students of Kashmir University by Shri S.R. Joshi and his team from DECU (Development and Educational Communication Unit), ISRO, Ahmedabad. It involved previewing of two completed episodes (one and three), filling up of a questionnaire and post-viewing discussions by high school and junior college students, as well as mixed groups of adults. In Ahmedabad and Delhi, the episodes were also previewed and discussed by specialised groups which included scientists, communicators, activists, and other interested and knowledgeable persons.

The pretesting has been of immense formative value and DECU'S findings are already influencing the scripting and execution of the films, helping to make Avalokan even more effective in the communication of ideas. While we can confidently say that we are not operating in the dark when it comes to our weakness, DECU's report indicates that viewers have been overwhelmingly responsive and have shown high levels of appreciation and interest.

(On this page are excerpts from "Pretesting of Programmes on History of Science and Technology", a study conducted for NCSTC, DST, Government of India, by S.R. Joshi, DECU, ISRO).

"The programme is able to describe to the viewer the rich heritage of Indian society and the inter-relationship between science and history".

“
There is very
overwhelming
opinion that both
the programmes
inspired the
audience to
seek more
knowledge
”

“
Mostly every one
appreciated the
use of young people
(as characters) in a
programme of
this kind.
”

BHĀRAT KI CHHĀP
Participants through
the episodes

Research & Script

Suhas Paranjape
Smriti Nevatia
Chandita Mukherjee
Vasundhara Phadke
Urmi Juvekar
and
Mandira Kumar
Arati Rege

Direction

Chandita Mukherjee

Assistants

Urmi Juvekar
Smriti Nevatia
Vasundhara Phadke
and
Anik Ghosh
Mandira Kumar
Neil Sadwelkar
Nikhath Siddiqui

Anchorpeople

Hemu Adhikari as Nissim
Vasundhara Phadke as Maitreyi

Reporters

Urmi Juvekar as Amrita Prasad
Sohaila Kapur-Limaye as Shehnaaz Khan
Anirudha Limaye as Ranjan Pradhan
Jayaram Tatachar as T. Ramanathan
Shivkumar Subrahmanyam as
Raghunandan

Cinematography

Indrajit Bansal
Fernando Cabral e Sa
Darshan Dave
Anil Mehta
C.K. Muralidharan
Ranjan Palit

Additional Camera

Anoop Jotwani
Ashvani Kaul
Samir Sabnis

Sound

Indrajit Neogi

Associate

Ajay Munjal

Editing

Dipti Bhalla
Sameera Jain
Reena Mohan
Renu Saluja

Hindi Dialogue

Prakash Hindustani
Hriday Lani
Smriti Nevatia
A.V. Rammurty
Rana Sahri
Ishan Trivedi

Music

K. Narayanan

Lyrics

A.V. Rammurty
Himanshu Rai Rawal
Smriti Nevatia
Rana Sahri

Song Composition

Shridhar Phadke

Production

Santosh Khanna
Subodh Randive
Sheil Sadwelkar
Harin Vyas

Administration

Geeta Ramakrishnan

Consultancy

Anirudha Limaye

Base Office

N. Krishnan
Kashmira Mistry
Melanie Sequeira
K. G. Visalakshi

Liaison

Arindam Ganguly
Communication Centre (Delhi)
V. Haridas
Vasu Studio, Madras