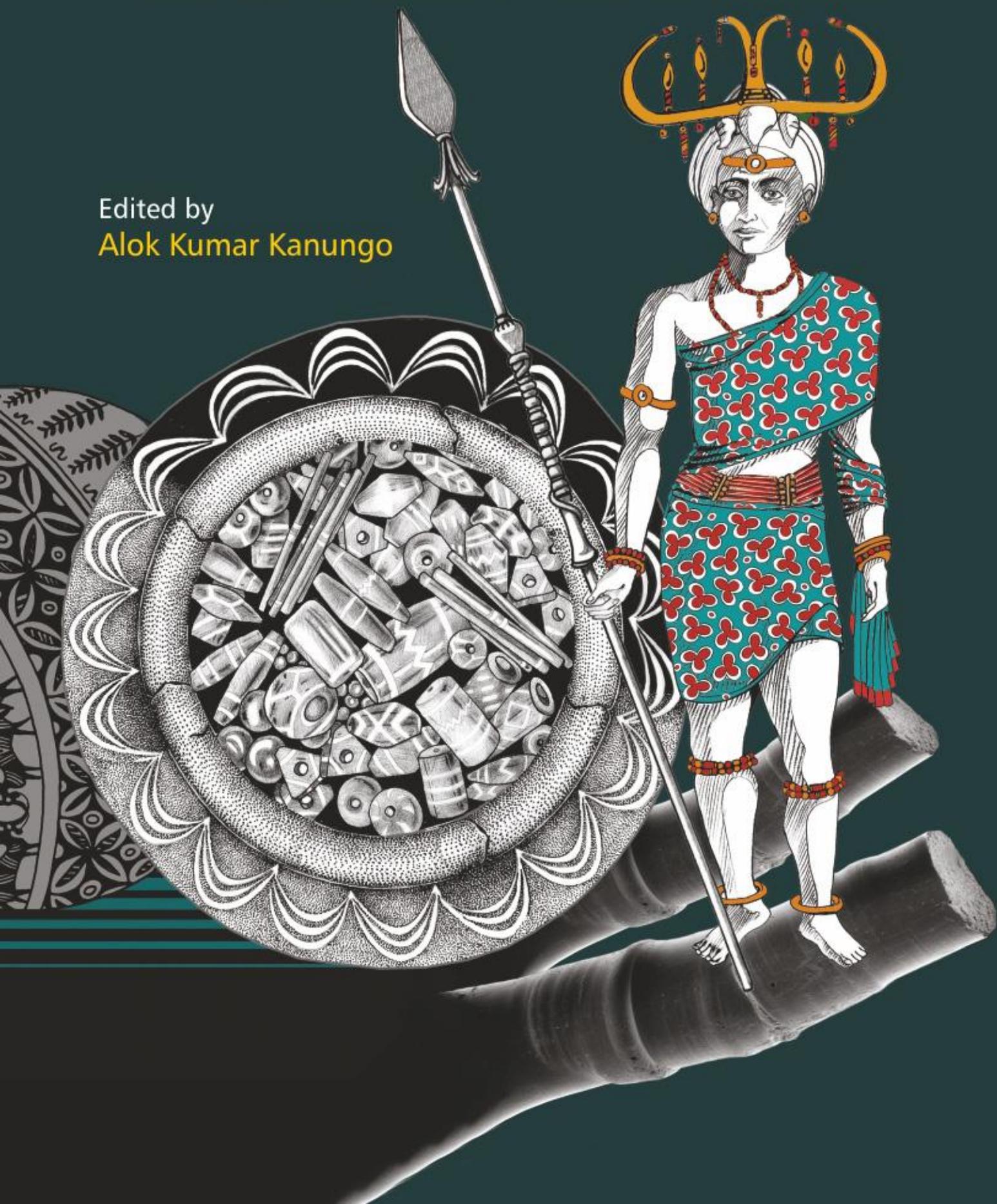


STONE BEADS OF SOUTH AND SOUTHEAST ASIA

Archaeology, Ethnography and Global Connections

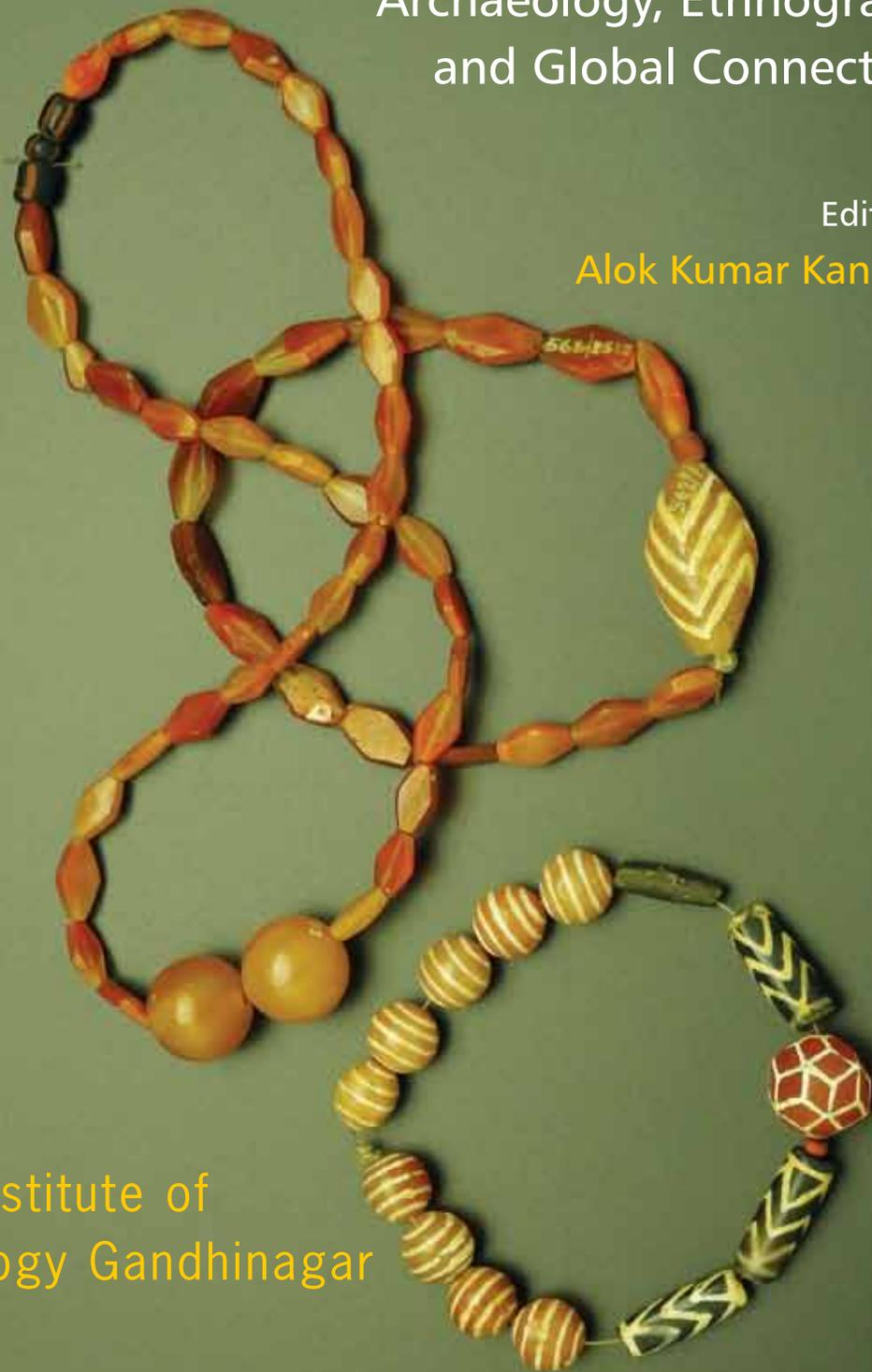
Edited by
Alok Kumar Kanungo



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Indian Institute of
Technology Gandhinagar
Gandhinagar



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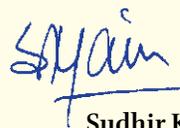
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Foreword

The Indian Institute of Technology Gandhinagar established its Archaeological Sciences Centre in December 2012 as a facility dedicated to scientific investigations of archaeological sites and excavated materials for a more systematic understanding of our human past. Since its inception, our faculty members have initiated research projects in archaeometallurgy, palaeobotany and palaeoclimatology, petrology, techniques of beadmaking and drilling, remote sensing and ground penetrating radar, among others. We have also established a close collaboration with the Archaeological Survey of India and leading archaeologists in the country and abroad. Besides, our Archaeological Sciences Centre has conducted lectures, workshops and other events to bring together experts and specialists in the various disciplines of archaeological sciences.

The book you are holding is the outcome of one such event, a course-cum-workshop on the History, Science & Technology of Stone Beads conducted in August 2015. Stone beads have been among the earliest ornaments fashioned and worn by humans. Easy to carry and trade, they travelled thousands of kilometres and have long histories to tell. Since the Indus civilization, which pioneered advanced bead manufacturing and drilling techniques, the Indian subcontinent's craft traditions have continued to produce a bewildering variety of precious and semi-precious stone beads right to the present day.

The essays of this book, contributed by some of the most eminent national and international experts in the field, bear testimony to the vast amount of research carried out on these delightful artefacts. Rich contributions in the fields of archaeology, craft traditions, ethnography and literature will make this book not only a major reference in its field, but a model of cross-disciplinary studies.



Sudhir K. Jain

Director

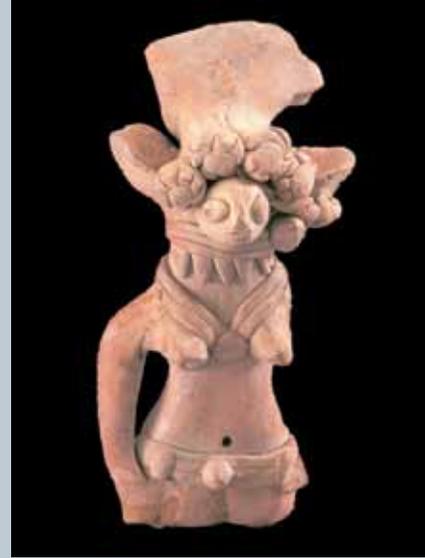
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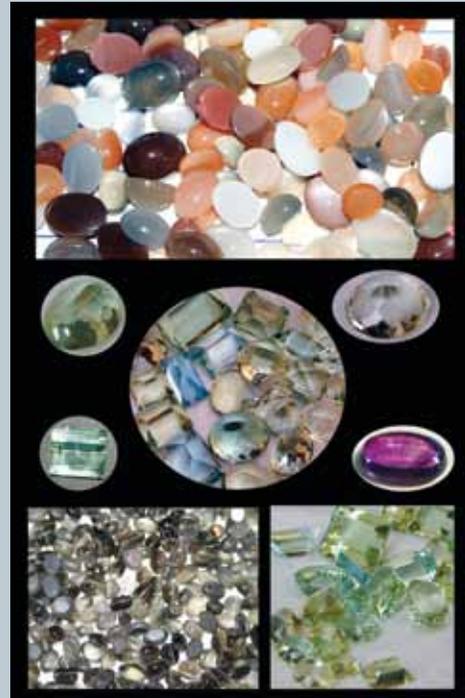


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Preface

Archaeology as a science needs well-trained, motivated and scientific archaeologists to face diverse challenges ahead. This is important for furthering the goals of archaeology in India as well as other countries of South Asia and the world as a whole. In order to begin to meet these needs, the Archaeological Sciences Centre (ASC), Indian Institute of Technology Gandhinagar (IITGN), has been conducting targeted and integrated workshops at regular intervals. These workshops have three objectives: (1) understanding our past with the aid of latest scientific and multi-disciplinary approaches, (2) making good quality teaching and training programs available to students and researchers, and (3) professional training of archaeology students and professionals. These workshops have benefitted over a hundred graduate and post-graduate students, research scholars and members of department staff of governmental archaeological services by providing them opportunities to develop their research skills and technical competence and get a more meaningful exposure to archaeological science by interacting with leading professionals of the subject.



Some of the key challenges facing archaeology today are: 1. As part of professional requirement most of the established scholars prefer to write about the result of their research in highly specialised and peer-reviewed journals which reach only a few libraries, whereas this subject has an unwritten mandate to create awareness among the people about their rich

cultural heritage thus requiring our publications to reach as many enthusiasts as possible. 2. Many independent publications lack scientific and experimental analyses (in most cases due to unavailability of resources and facilities) which are the two pillars of this subject. The interpretation of an object which is far in time or space is possible only with a multidisciplinary approach. 3. A professional challenge for conference/workshop proceedings has been that they tend to be collections of papers rather than well-rounded stories about the topic. 4. Yet another challenge is to critically evaluate and present facts about the history of ancient technologies in a more objective and scientific perspective.

Keeping these factors in mind we have conceptualised this series on Indian ancient artefacts of important archaeological markers. In this series we aim to develop reference manuals by engaging the best scholars in different areas. Stone beads started appearing in South Asia, in the southern Indian peninsular context at around 15,000 BP, e.g., limestone beads at Jwalapuram in Kurnool district of Andhra Pradesh. Since then there has been no gap in the development of bead producing technology, which reached its zenith in Harappan times and the Indian subcontinent became one of the most important bead producing regions of the world. This position has been maintained till today. Since stone beads are one of the most important markers of prehistoric technological complexity, especially in South Asia, their study is crucial in understanding our past, technology and trade, besides comprehending our mastery over material culture and the procurement of diverse raw materials.

On 10–14th August 2015, the ASC in collaboration with the Archaeological Survey of India (ASI), conducted a short-term course-cum-workshop on History, Science and Technology of Stone Beads. This workshop discussed the development of stone beads through the ages,

ranging from literary and epigraphical references, discussions over the utility and fruitfulness of typologies, the techniques historically used in their production and finally the modern scientific procedures which can be used in their study to better understand and interpret the past technology. Experts and participants came from ten countries including USA, UK, France, Japan, Thailand, Iran, Nepal, Sri Lanka, Bangladesh and India. It was gratifying to see 80 participants from most of the Indian states, representing about 30 universities, research institutes, museums, state departments as well as delegates from beadmaking industries.

An ambitious series like this and workshop having a target to publish a time-bound reference manual, covering all related research areas of the topic is not possible without the vision and support of the head of the institute, trust of the authorities and tireless team effort of the unit I work in.

I am indebted to Prof. Sudhir Jain, Director of IITGN for not only supporting the workshop at every stage but also giving his precious time in meeting one and all – experts, participants and craftsmen – who came for the workshop for the welfare of the Centre; Prof. S.P. Mehrotra, the Dean of Research and Development and the coordinator of ASC for all the encouragement and free hand he provided in the conduct of the workshop; Prof. D.P. Roy for the administrative support without entertaining any excuses yet making no reservations about the required paraphernalia; Prof. D.V. Pai for always pitching for a good publication of the outcome; and Michel Danino, the advisor of the ASC for his role to put us in the line of practical achievements.

Dr. V.N. Prabhakar and Dr. Shahida Ansari graciously put up with my constant requests for going through various documents and use of their good offices for logistic support respectively at ASI and Deccan College. Dr. Trupti More, Librarian of the Deccan College, found cross-reference literatures, out of print, rare and unpublished documents in time, without any hesitation to my list

of never-ending requests. Dr. T.S. Kumbar, Librarian of IITGN did his best too in finding the references as and when those were sought for. The efforts put up by our post-doctoral fellows, Dr. Sandhya Sharma and Dr. Vinod V. were indeed commendable.

Mr. Yashwant Chouhan and Mr. Shailesh Patani took care of all local logistical support, safety, transport, accommodation and food for resource persons and participants; Mrs. Sunita Menon left no stone unturned to facilitate the smooth functioning of the workshop. If Mr. Gaurav Shukla was the man behind the visuals, Ms. Preethi Sampath was the woman behind the attractive posters, banners, brochures, invitations and conference tags during the workshop. Mr. Dayananda Meiti made the coordination with media look effortless. A special word of thanks to Mr. Santosh Raut for his timely help on many occasions.

My gratitude to all the leading experts who came to IITGN, presented their results, trained the

students and made sure that the outcome of the workshop in book form was prepared with rigorous scientific and academic standard. Craftsmen Mr. Anwarhusain Shaikh, Mr. Pratap Bhai, Mr. Iqbal Bhai, Mr. Shohib Bhai, Mr. Salman Bhai and Mr. Shadab Bhai of Khambhat made the workshop an experimental training reality for the participants.

Mr. Devadatta Phule (artist) has brought the past alive in his design of the cover page. The time spared by Dr. Pranab Sharma and Mr. Mudit Trivedi for going through some of the papers is appreciated. Timely support of Banaras Beads Limited is acknowledged.

If I have omitted anyone, it is unintentional. I once again express my heartfelt thanks to all who have helped in this huge endeavour.

IITGN gratefully acknowledges the support received from Archaeological Survey of India, Indian Council of Historical Research and the Gujarat State Archaeology Department.

Alok Kumar Kanungo



Delegates during the workshop on 'History, Science and Technology of Stone Beads', 14th August, 2015 at IIT, Gandhinagar.





There has been a growing need for comprehensive books focusing on archaeological artefacts from ancient India and South Asia, encompassing scientific applications that have global appeal. This is particularly relevant for the many different types of traditional crafts that have survived and adapted to the onslaught of periodic modernization for hundreds if not thousands of years. Stone beads are among the earliest preserved ornaments fashioned and worn by humans. Being small and easy to wear, carry and trade, they have been transported thousands of kilometres, across both land and sea, and have a long history of production and use in the Indian subcontinent. Their history is preserved in the archaeological record, epigraphy and ancient literature, representations in sculpture and paintings, as well as in the present-day traditional beads craft centres. Bead production techniques encompass a wide range of technologies ranging from both simple to highly complex, and involve the use of organic materials, stone, ceramic and glass. These technologies developed and evolved through time, based on both the creative inspiration of individual craftspeople as well as the need to meet the demands of both local and international consumers. Beginning with the earliest stone beads (limestone) dating to more than 15,000 years ago at Jwalapuram in India, hard stone beads 9,000 years ago at sites such as

Mehrgarh, Pakistan and later at Bhiranna, India, the mastery of shaping, drilling and polishing stone beads made South Asian beads among the most sought-after luxury items in the world. These beads were used by all levels of society as a way to both integrate communities culturally through the use of important symbolic objects as well as to differentiate people by the qualities of raw materials and complexities of production.

This book is the first of the series on the various artefacts which demonstrate important continuities from past to present. These artefacts also help us to better understand the importance of the past for developing new technologies in the future.

The entire book is divided into four sub-themes. Under the first, viz. 'Beads: Importance and Literature' there are four essays. Kishor Basa in his paper on 'Small Find, Immense Impact: Importance of Bead Studies' reviews the shifts in the study of beads alongside the major artefactual trends and debates on beads in South Asia stressing the need to study distribution and variability as indexes of the semiotic capacities in which beads serve to communicate social distinctions and preferences. The paper on 'Jewels and Jewellery in Early Indian Archaeology and Literature' by R.S. Bisht gives an overview of terms and terminology and Vedic references for the stone beads in *Rigveda*, *Atharvaveda* and other later Vedic texts and Sanskrit literature like that of Kautilya's *Arthaśāstra*. V. Selvakumar in his essay 'Beads and Ornaments in Early Tamizh Texts' gives significant references made in ancient Tamil literatures such as *Paṭiṟṟupattu*, *Maṇimekalai* etc. which provide representations of a world in which the collection of raw materials and the presence of beadmakers were such features ordinary of the social landscape so as to be recruited towards Sangam Era poetic imagery. The next paper 'Ratnattin Tiruvābharaṇaṅgal in the Inscriptions of Brihatīswarā Temple' by

V. Selvakumar emphasizes epigraphic and other records maintained by the patrons and kings who carefully audited the donations of jewels to the Tanjore Brihatīswarā temple which has records of donated stone beads including those fashioned from ruby, emerald, lapis lazuli, jasper etc.

There are six papers under the second theme, viz. 'Beads: History, Methodology and Ethnoarchaeology'. The paper on 'Geological Aspects of Raw Materials for Stone Beads' by Ravi Prasad, V.N. Prabhakar and Vikrant Jain reviews the rock cycle for archaeologists, introducing them to phenomenon such as physical and chemical weathering, as well as the measures of susceptibility and extent of weathering of different kinds of rock formations and minerals over a long period of time and space. Jonathan Mark Kenoyer in his paper 'History of Stone Beads and Drilling: South Asia' gives a broad overview of the origin and development of stone bead technologies in prehistory, stressing the origin of pecking and drilling techniques, the developments therein and the crucial significance of identifying these in the study of beads. The essay on 'Stone Beads of the Indus Tradition: New Perspectives on Harappan Bead Typology, Technology and Documentation' by Jonathan Mark Kenoyer stresses the principles behind designing a classification system and typology, the essential attributes of records on beads and drills, as also what information should be recorded about beads recovered from different associations at the time of excavation. Kuldeep Bhan, Jonathan Mark Kenoyer and Massimo Vidale in their paper 'Living Tradition: Stone Bead Production in Khambhat – An Ethnoarchaeological Approach' present the results of a long-term ethnoarchaeological project mapping the organization, division of tasks and specialized roles and supply and production chains of contemporary beadmaking in Khambhat. The paper on 'Transition in Stone Beadmaking at Khambhat:

An Ethnohistorical Survey' by Alok Kumar Kanungo examines the transition taken place amongst Khambhat lapidaries, their guilds and trade from the time this craft at Cambay was first reported. The paper on 'Stone Bead Users - Symbolic Value and Trade: The Nagas' by Manabu Koiso, Hitoshi Endo and Ayumu Konasukawa, deals with the dying tradition of stone beads and emergence of glass beads, the impact of socio-religious changes on the traditional ways of using stone beads as well as on the industry, and the unifying role demonstrated by the bead wearing conventions of different Naga tribes.

The third section, 'Beads: Case Studies from South Asia', covers eight essays. The essay on 'Early Evidence of Beadmaking at Mehrgarh, Pakistan: A Tribute to the Scientific Curiosity of Catherine and Jean- François Jarrige' by Massimo Vidale, Maurizio Mariottini, Giancarlo Sidoti and Muhammad Zahir summarizes several recent advances which constrain and complicate the origin of bead technologies in South Asia pointing to evidence of the bead manufacturing complex of the Iranian Chalcolithic in the early 5th millennium BCE. This paper also stresses for the need to think about the diversity of raw materials at Mehrgarh and lapis lazuli exploitation at Shahr-i-Sokhta and presents results of new Indus bead finds from near Sumer in Mesopotamia. Kuldeep Bhan in his paper 'Stone Bead Production through the Ages in Gujarat' contextualizes the bead production workshop found at Gola Dharo within the regional sequence, which stretches back to Loteshwar and synthesizes the available data from several other sites in Gujarat. The paper on 'Early Harappan Bead Production in Gujarat: Technology, Adaptation and Contacts' by Ajit Prasad and Marco Madella presents a detailed consideration of the evidence from Datrana besides highlighting the significance of the stockpiling of raw materials and production by both pecking and drilling in the Early Harappan period at the site.

The essay on 'Documentation and Analysis of Stone Drills from Dholavira' by V.N. Prabhakar presents the multi-variate, detailed and methodical study of drills from Dholavira which represent the largest corpus of Ernestite drills known in the Harappan world. The paper on 'Antiquity of Semi-precious Stone Beads from Deccan' by Rabindra Mohanty presents the Deccan plateau traditions and the complexities of the technological sequences and social contexts of bead finds and bead production at the site of Mahurjhari and others in the region. K. Rajan in his paper 'South Indian Stones Beads: Archaeological, Textual and Ethnographic Approach to Traditional Gemstone Industry' summarizes the finds of the extraordinary site of Kodumanal where crafts production of various kinds included bead manufacture. The paper on 'Early Historic Stone Beads from Ahichhatra' by Bhuvan Vikrama, presents results from recent excavations at the site of Ahichhatra, where a significant new bead assemblage has been documented. The paper on 'Ancient Stone Beads of Southeast Asia and Indian Connection' by Bunchar Pongpanich highlights various facets of stone beads in central and western Thailand and in regions near the Cambodian border, and, taking the example of *triratna* beads, examines the culture contacts with the Indian subcontinent.

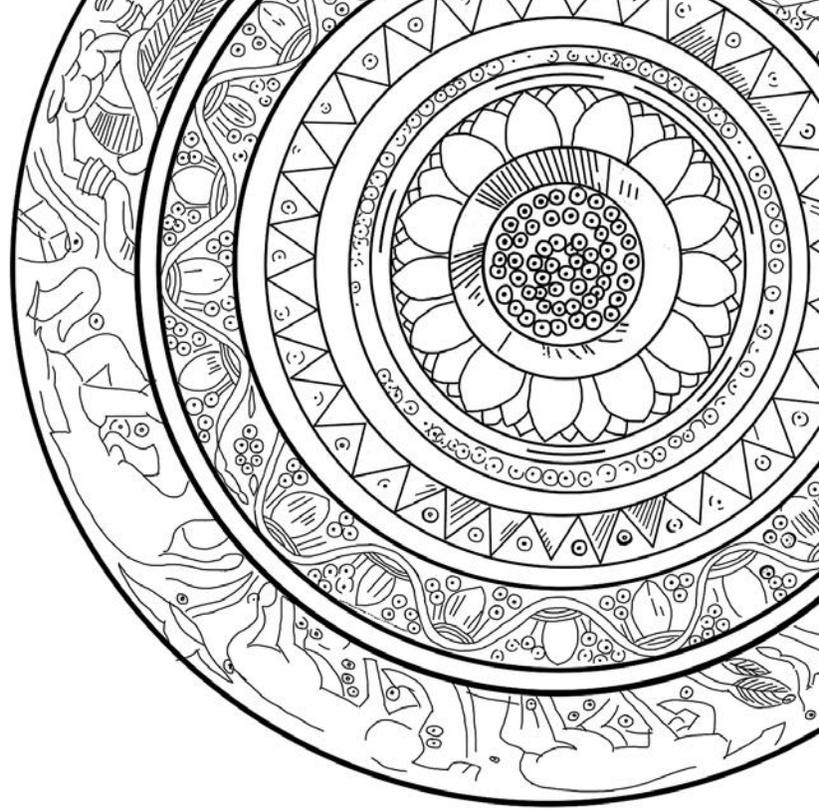
The last theme, viz. 'Beads: Scientific Studies' deals with three papers. The paper on 'Scientific Analyses and Stone Beads' by Laure Dussubieux and Mark Golitko presents in detail, alongside case-studies, the opportunities, difficulties and necessary precautions which need to be taken when attempting to use PIXE (Proton Induced X-ray Emission), INAA (Instrumental Neutron Activation Analysis), ICP-MS (Inductively Coupled Plasma Mass Spectrometry) techniques in the analysis of stone beads, particularly in trying to establish their provenience. Randall Law in his paper 'Non-Destructive Identification and

Characterization of Ancient Beads: A Case Study from Harappa' emphasises the importance of various non-destructive analyses [SGT (Specific Gravity Test), VP-SEM (Variable Pressure Scanning Electron Microscope) and XRD (X-ray Diffraction)] for scientific identification of the raw material, provenances and the probable manufacturing technique of archaeological artefacts, with a case study of cache of 133 beads in a pot at Harappa. The

final paper on 'Using SEM to Study the Stone Bead Technology' by Jonathan Mark Kenoyer teaches how SEM (Scanning Electron Microscopy) studies can be used to study bead drilling technologies and their development, variability and change.

The above-mentioned papers, written by some of the best known authorities, make the book one of its kind. The holistic approach adopted helps in making it a reference work on the subject.

Alok Kumar Kanungo



List of Contributors



Prof. P. Ajithprasad has been teaching in Maharaja Sayajirao University of Baroda (MSU). His primary research interest has been to understand cultural evolution and human adaptation in the Quaternary period. Over the years he has worked in Stone Age prehistory and Harappan period occupation of Gujarat and has been instrumental in discovering several Acheulian and Harappan sites in primary context. Currently he is a co-director of the North Gujarat Archaeological Project (NoGAP), a collaborative study between the MSU and the Department of Archaeology and Anthropology, IMF, Spain for investigating the beginning of agro-pastoral way of life in the region.



Prof. Kishor K. Basa is one of the leading Indian historiographer and theoretician in the field of anthropology in general and archaeology in particular. As an academic-administrator, he served as Director, Indira Gandhi Rashtriya Manav Sangrahalaya, Bhopal, Indian Museum, Kolkata and the Anthropological Survey of India. Since 1980 he has been teaching archaeology and museum studies in Utkal University. He has excavated the sites of Malikhoja, Harirajpur and Gouranga Patana in Odisha. He is



the founder editor of the journal *Humankind* and General Editor of a series on *Intangible Cultural Heritage of India*.



Prof. Kuldeep K. Bhan taught South Asian Archaeology and Ancient Technology in MSU. He explored northwest coastal area of Saurashtra for his Ph.D. dissertation and later north Gujarat that resulted in

the settlement pattern studies. He has excavated several major settlements of the Indus Civilization in Gujarat which are relatively smaller in size but were flourishing trade and craft production centres. He has also excavated other settlements that belong to periods both preceding and following the Harappan culture. As Director and Curator of the Archaeological Museum of the MSU, he was instrumental in organising many exhibitions that toured places in India and abroad.



Dr. Ravindra Singh Bisht, one of the foremost Indus Civilization scholar, retired from Archeological Survey of India (ASI) as Joint Director General, is associated as Visiting Professor with IIT Gandhinagar, Institute

of Archaeology, ASI and, Institute of History of Art, Conservation and Museology (National Museum), New Delhi. His command over ancient literature in general and Sanskrit in particular is unparalleled among the archaeological community. He carried out some of the path-breaking discoveries with major excavations at Dholavira in Gujarat, Banawali in Haryana, Semthan in Jammu and Kashmir, Chechar and Sarai Mound Nalanda in Bihar, and Sanghol in Punjab. Recognising his contribution, Government of India conferred upon him Padmashri in 2013.



Dr. Laure Dussubieux is a Research Scientist at Field Museum, Chicago and has established herself as one of the leading analytical scientist of ancient materials in general and glass in particular. She is

responsible for developing analytical protocols with LA-ICP-MS and XRF, training students in using analytical equipment and helping with data interpretation. At the Elemental Analysis Facility, in a little more than a decade, she facilitated more than 150 projects dealing with questions related to the archaeology of cultural production, interaction and exchange. Several of these projects involve the sourcing of stones such as carnelian, agate, garnet or lapis lazuli. She is also co-teaching a class about Analytical Archaeology at the University of Illinois at Chicago.



Dr. Hitoshi Endo works as a Researcher at Center for Transdisciplinary Innovation, National Institutes for the Humanities (NIHU) / Visiting Researcher of Faculty of International Resource Sciences,

Akita University, Japan. His major research interest has been ethnoarchaeology and lithic technology, especially stone beads manufactural technology. He has been studying the archaeological stone beads of South Asia, Egypt and Japan as well as following the contemporary craftsmen for understanding the ancient technology better.



Dr. Mark Louis Golitko is a visiting Assistant Professor of Anthropology at University of Notre Dame, and a Research Associate at the Field Museum of Natural History in Chicago.

His field and laboratory research has spanned several world regions, including Europe, the western Pacific, South America, and Mesoamerica. His current research explores the development of social networks and bio-cultural diversity on the north coast of Papua New Guinea during the last 6000 years as climate, environment, and technology underwent dramatic changes. He is a specialist in applications of the physical sciences and network analysis to archaeological research.



Dr. Vikrant Jain works as Associate Professor (Earth Sciences) in IIT Gandhinagar. His field of research is Earth Surface Processes and its interaction with humans at different time scales. He has

developed process based understanding of different spatial and temporal aspects of various riverscapes in India, Australia and Canada. Currently, his main research work lies towards understanding complex geomorphic behaviour of riverscapes in response to external forcing. His research also aims to integrate geomorphic tools with hydrological and ecological datasets in developing framework for sustainable management of natural resources.



Dr. Alok Kumar Kanungo works as Assistant Research Professor in IIT Gandhinagar. For nearly two decades he has been travelling and documenting in the field, museums and libraries, the rich heritage of

the Nagas of northeast India, and the Bondos and Juangs of Odisha. He has spent considerable time in the field, living in villages and towns where these communities trade. He has worked in many areas where it is difficult to say where anthropology or history stops and archaeology begins. He has

excavated the site of Kopia in Uttar Pradesh and Bhagatrav in Gujarat, besides studying and documenting the traditional glass beadmaking areas in India.



Prof. Jonathan M. Kenoyer teaches archaeology and ancient technology at the University of Wisconsin, Madison since 1985. His main focus is on the origins of technology and urbanism in South Asia with a special

focus on the Indus tradition. He has studied stone beadmaking in Khambhat and other regions of South Asia and the world for last three decades. He has worked on excavations and ethnoarchaeological studies in both India and Pakistan since 1974. He has a special interest in ancient technologies and crafts, socio-economic and political organization as well as religion.



Prof. Manabu Koiso is a professor at Faculty for the Study of Contemporary Society, Department of Tourism, Kobe Yamate University, Japan. He has degrees and expertise in both the subjects of Geography and

Archaeology. After carrying out noteworthy research on morphological comparison of Indus Civilization pottery, for the last four years he has been working on ethnohistory of beads among the Nagas.



Dr. Ayumu Konasukawa is a post-doctoral research fellow in Japan Society for the Promotion of Science (Department of South Asian Studies, Institute for Advanced Studies on Asia, the University of Tokyo). His research

interest is focused on Harappan Civilization.



Dr. Randall William Law is a lecturer and honorary fellow at the Department of Anthropology, University of Wisconsin-Madison. Since joining the Harappa Archaeological Research Project (HARP) in 2000, he has travelled extensively across Pakistan, India and Oman seeking out the geologic sources of the stone and metal artefacts excavated at Indus Civilization sites and today he is one of the most sought after scholar on provenance study.



Dr. Marco Madella is an archaeobotanist and environmental archaeologist in Pompeu Fabra University. He has an interest in the socio-ecological dynamics of past human populations from Mediterranean to tropical environments. His research spans from past vegetation histories, the modelling and simulation of processes in human behavioural change, people-plants co-evolutionary dynamics, long term trajectories of biodiversity and sustainability in prehistoric societies, and the origin and resilience of agriculture.



Dr. Maurizio Mariottini, a Geologist, has worked at the Superior Institute for Conservation and Restoration of the Italian Ministry for Cultural Heritage and for the Italian National Geological Service. He is a member of the Petrography group of ICOMOS Stone Committee. He specialized in mineralogy and petrography, with a focus on characterization and conservation studies of stones used in monumental constructions, ancient coloured marbles, pigments and semi-precious stones. He has analyzed rocks

and minerals of archaeological interest from Egypt, Iran, Central Asia and Pakistan.



Prof. Rabindra K. Mohanty taught field archaeology, Early Historical archaeology, iconography, art and architecture, and, protohistory of South Asia in Deccan College Post-Graduate & Research Institute. He has extensively worked on Early Iron Age megalithic culture of Vidarbha and Chalcolithic culture of western Rajasthan. For over a decade he has been involved in carrying out intensive archaeological investigations and excavations in several sites pertaining to Early Historic fortified urban centres and Neolithic-Chalcolithic settlements in eastern Odisha.



Dr. Bunchar Pongpanich, originally trained in medicine, served in health sector for two decades. After taking voluntary retirement he has been spending most of his time in promoting Buddhadasa Archive (BIA), Bangkok with an objective to protect the cultural heritage of Thailand. He and his colleagues have initiated a research program on early Buddhist evidence in Southeast Asia, in collaboration with DASTA (Designated Areas for Sustainable Tourism Administration) and GISTDA (Geo-Informatics and Space Technology Development Agency).



Dr. V.N. Prabhakar works as Superintending Archaeologist in ASI and has completed three years of deputation at IIT Gandhinagar as Visiting Faculty, where he co-coordinated setting

up of the Archaeological Sciences Centre. He has a very focused and specialized research interest and field experience on Harappan archaeology. He has excavated two very important Harappan sites – Karanpura in Rajasthan and Rupnagar in Punjab. His in-depth study of drilling materials for stone beads and bead perforations are one of its kinds in Indian subcontinent.



Mr. Ravi Kant Prasad is a research scholar at IIT Gandhinagar. He is working on geochemical methods and proxies applied in earth surface processes to decipher the geochemical weathering rates

in critical zones with different climatic and geologic settings in western India. The primary techniques he uses are major ions analyses of river water and sediment and further using other sophisticated geochemical tools including isotopic ratio, viz. Strontium, Uranium and Lithium etc.



Prof. K. Rajan teaches and does his archaeological research in Pondicherry University. He has brought to light more than 1500 archaeological sites ranging from prehistory to early historic period. He directed the

archaeological excavations at Mayiladumparai, Thandikudi, Porunthal and the famous site of Kodumanal. He is closely associated with underwater diving operations in Poompuhar (Tamil Nadu) and Dwarka (Gujarat) carried out by the National Institute of Oceanography, Goa and National Institute of Ocean Technology, Chennai. He is one of the Team Heads of the Ford Foundation project on Historical Atlas of South India.



Dr. V. Selvakumar is a faculty member in the Department of Epigraphy and Archaeology, Tamil University, Thanjavur. His research interests include archaeology of India, prehistory, heritage management, maritime

history and archaeology, archaeological theory, heritage management, history of science and technology, Indian Ocean cultural interactions, and ecocriticism.



Dr. Giancarlo Sidoti works as Chief Chemist of the laboratory of "Materials Testing" at the Chemistry lab of the Superior Institute for Conservation and Restoration of the Italian Ministry for Cultural

Heritage. He specialized in the archaeometric and conservative study of artworks and archaeological artefacts; in particular, he is an expert in the morphological and structural characterization of liquid crystalline polyesters, teflons and biomaterials.



Prof. Massimo Vidale teaches archaeology at University of Padua, Italy. He got his Ph.D. at the Oriental Institute of Naples, with a thesis on the agate and steatite beadmaking workshops of Mohenjo-daro,

Sindh, Pakistan. Later, he continued to study the prehistoric beadmaking industries of the Indo-Pakistani subcontinent, taking part in fieldwork at the sites of Mehrgarh, Harappa, Chanhudaro, and in the last years in the Swat Valley, Khyber Pakhtunkhwa. In India, for three seasons he co-directed the Khambhat Bead Project with J.M. Kenoyer and K.K. Bhan.

**Dr. Bhuvan Vikrama**

works in ASI, Agra circle as Superintending Archaeologist. He contributed with a difference in the excavations at Lalkot, Humayun's Tomb, and Shalimar Bagh in Delhi; Siswania,

Ayodhya and Ahichhatra in Uttar Pradesh; and Dholavira in Gujarat. In recent past he spearheaded the conservation works of temples in Odisha in general and Sun Temple at Konark in particular.

**Dr. Muhammad Zahir** is a

Lecturer in archaeology at Hazara University, Pakistan. He was an inaugural Aman Fellow at the South Asia Institute of Harvard University. His main interest is the prehistoric and

protohistoric archaeology of the north-western regions of Pakistan. He has collaborated with the Italian Archaeological Mission in Swat (Pakistan) for a new study of the protohistoric graveyards of the region.

Stone Beads of South and Southeast Asia: Archaeology, Ethnography and Global Connections is by far the most comprehensive book on stone beads. With contributions from 25 leading scholars from 17 research institutions of eight countries, the book dwells on related matter from ancient as well as modern India and other regions of South Asia, West Asia and Southeast Asia.

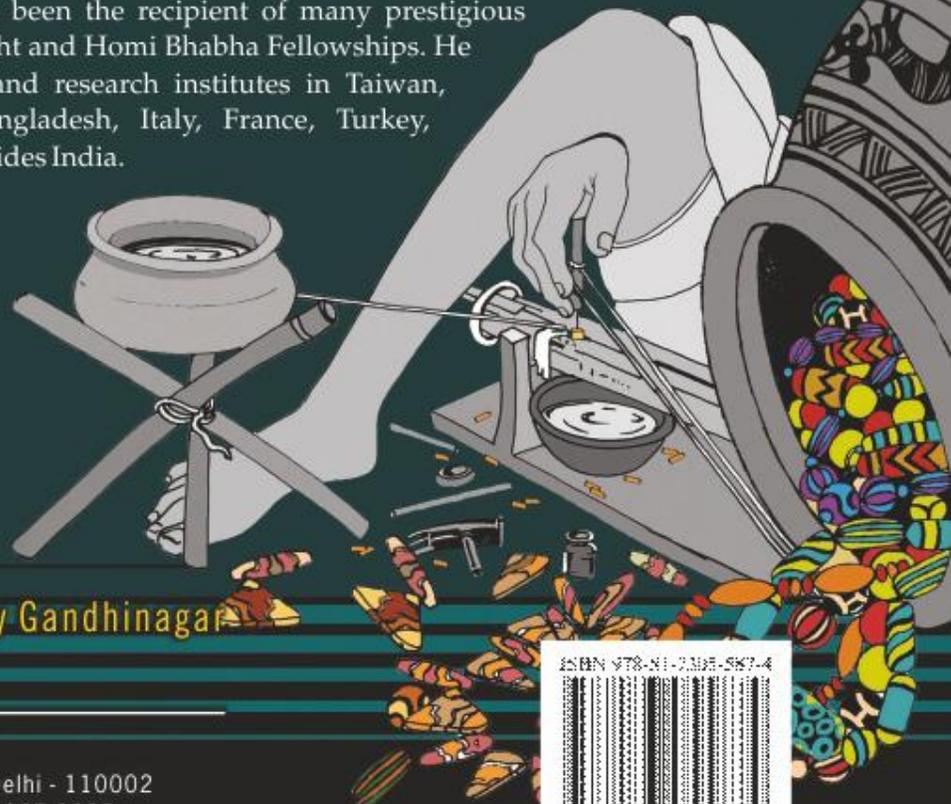
Stone beads have gained the reputation of being one of the most important markers of prehistoric technological complexity, especially in South Asia. Their study is crucial for understanding our past contacts, technology and trade, besides comprehending our mastery over material culture and the procurement of diverse raw materials. Keeping this in mind, this book discusses, with the help of literary and epigraphical references, the development of stone beads through the ages, the utility and fruitfulness of typologies, the techniques historically used in their production and finally the modern scientific procedures which can be used in their study to better understand and interpret the past technology. It also deals with ethnohistorical studies of Khambhat (Cambay) to understand the historical development of the city—the most prominent traditional stone bead industry of the world—since the crafts started there, and ethnographical studies to know the symbolism behind the aggressive use of particular products.

The combined output of this book is a result of long-term fieldwork and experimental and scientific studies in laboratories in not only answering the statics of beads like 'when' and 'where' but also cognitivism, that is, 'why' and 'how'.

Dr. Alok Kumar Kanungo, a faculty at IIT Gandhinagar, was born in Odisha and grew up in close contact with many indigenous communities of eastern and north-eastern India. His early childhood experiences led him to eventually focus on archaeological and ethnographic studies of indigenous and ancient technology.

For the last two decades, Dr. Kanungo has travelled and documented the rich heritage of the Nagas of North-East India, and the Bondos and Juangs of Odisha both in the field and in museums across Europe and the United Kingdom. He has worked in many areas where it is difficult to say where anthropology or history stops and archaeology begins. He has studied and published extensively on the subject of glass and glass-bead production, and written or edited 11 books and about five dozen research articles. He has been the recipient of many prestigious awards including Humboldt, Fulbright and Homi Bhabha Fellowships. He has lectured in many universities and research institutes in Taiwan, England, USA, New Zealand, Bangladesh, Italy, France, Turkey, Malaysia, Germany and Thailand, besides India.

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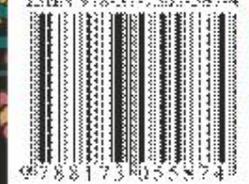
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