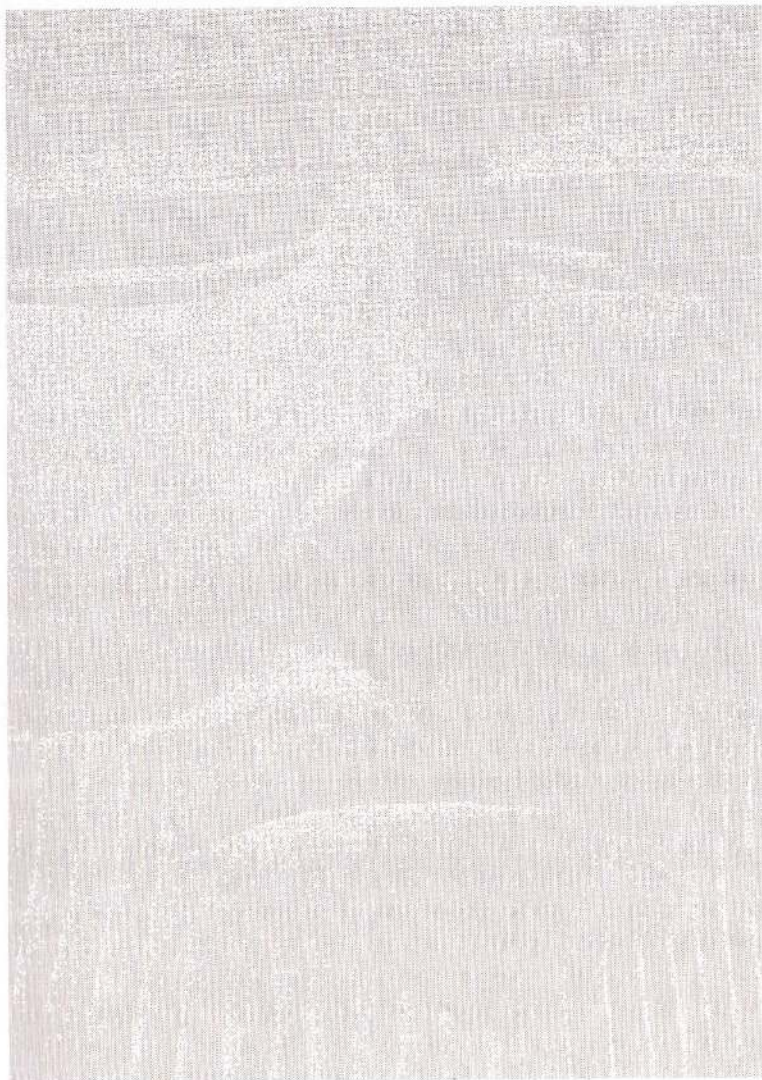


AN EXHIBITION

INDUS CIVILIZATION



Indus Civilization



Indus Research Centre
a unit of Roja Muthiah Research Library Trust

Presents an Exhibition on

Indus Civilization

23 - 27 June 2010
at the World Classical Tamil Conference, Coimbatore

Curated by

C. Subramanian and G. Sundar
in consultation with Dr. Iravatham Mahadevan

Assisted by

R. Prakash, G. C. Suresh Babu *and*
the staff of Roja Muthiah Research Library

Art Design

Moses Gladson and George Mathew

Roja Muthiah Research Library

3rd Cross Road, Central Polytechnic Campus, Taramani, Chennai 600 113

Indus Civilization

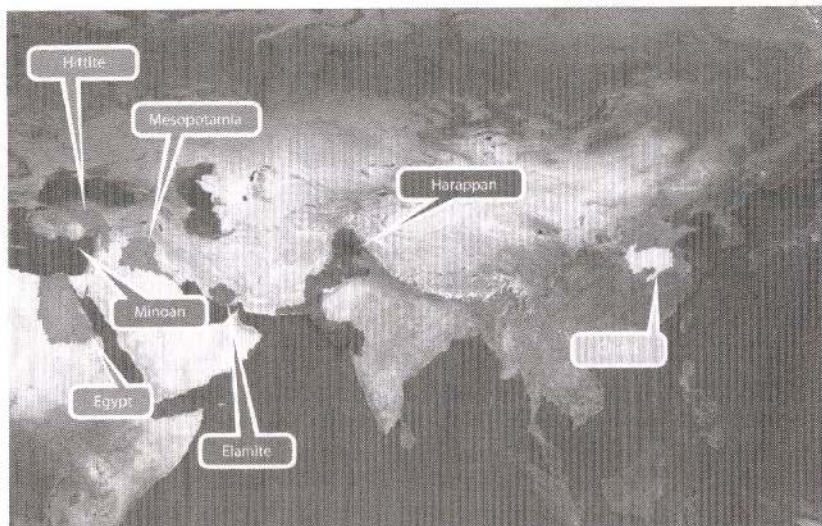
As one of the greatest civilisations of the ancient world, the Indus Valley (or Harappan) Civilization has fascinated not just historians, archaeologists and anthropologists, but also experts from such diverse fields as urban planning, architecture, linguistics, computer science, mathematics, statistics, geology, astrophysics, etc. This is because the greatness of this ancient civilization, its vast extent, its trade links to other regions and its great achievements in the fields of architecture, commerce, fine arts, manufacturing, etc. These are being better understood with every new archaeological find.

However, the Indus civilisation remains an enigma in some ways: The cause of the sudden fall of the civilisation - renowned for its urban planning, high quality construction, water management and carefully designed drainage systems - is still not fully understood. The Indus script, which still remains undeciphered despite numerous attempts by various experts, continues to attract many researchers.

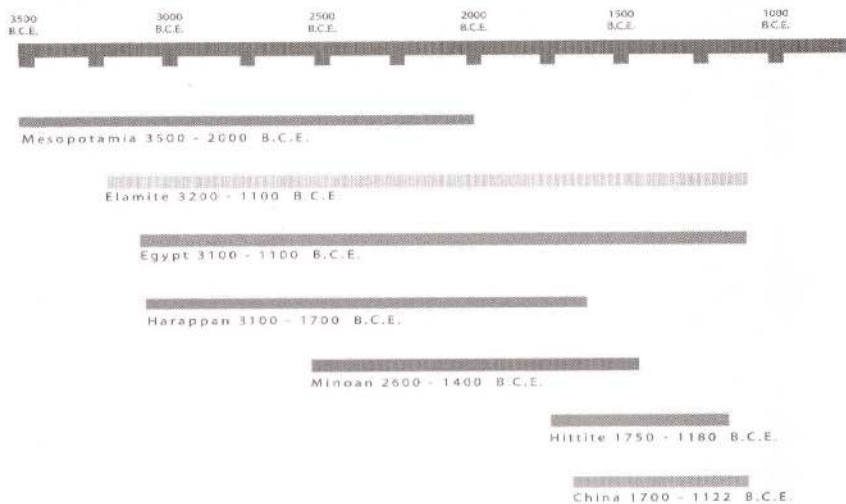
There is an emerging body of evidence that the Indus Valley Civilisation did not simply vanish, as its remnants may still be amongst us in the form of legends, myths, symbology and social practices. There is even more compelling evidence that the language spoke by the Indus people may be proto-Dravidian. Several scholars such as Iravatham Mahadevan and Asko Parpola have been zeroing in on the Tamil aspects of the Indus civilization and its script which point to the linguistic and cultural connection across the two geographical locations. The honourable Chief Minister of Tamilnadu obviously has recognized these aspects and has included the elements of the Indus Civilization into the logo of the World Classical Tamil Conference.

The World Classical Tamil Conference has given an opportunity to showcase the greatness of the Indus civilization and point out its possible cultural and linguistic ties with the Dravidian languages and culture, which are ancient in their own right.

Ancient Civilizations of the World



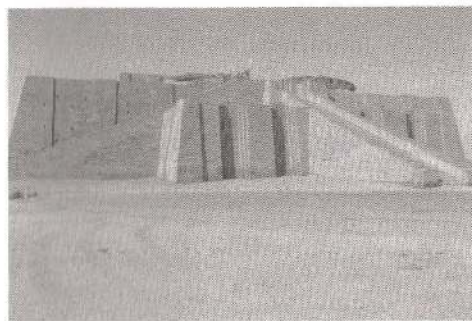
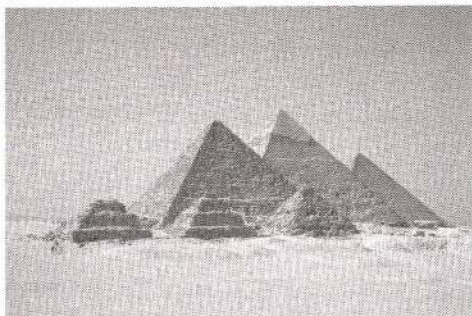
ANCIENT CIVILIZATIONS OF THE WORLD - TIMELINE



Ancient Civilizations of the World

The ancient civilizations of the world built huge monuments for religious and non-religious purposes.

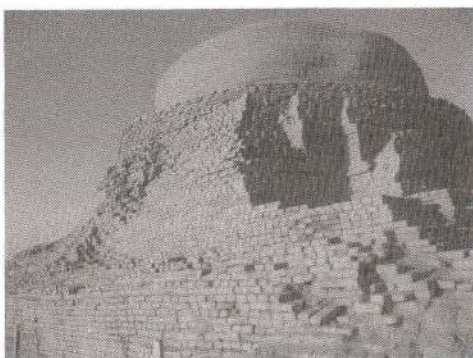
Pyramids of Mankaure (left), Khafre (centre) and Khufu (right) were built in 25th century BCE.



The Great Ziggurat in the Sumerian City of Ur (present day Iraq) was built by king Ur-Namma in 21st century BCE.

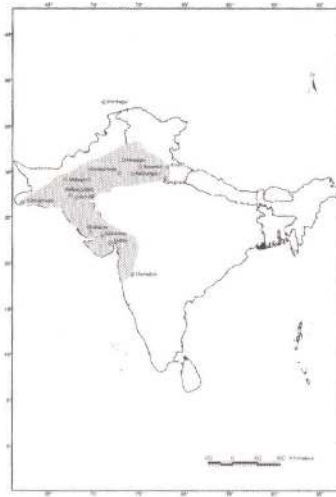
Monuments in Mohenjodaro, such as the Great Bath and the Granary, were built between 2600 and 1900 BCE.

Citadel Mound, *Mohenjodaro*, with a later period Buddhist stupa on the top.





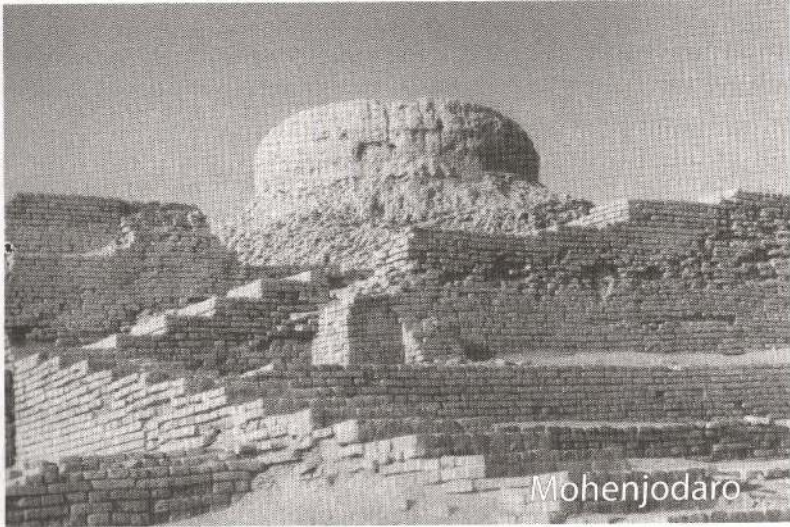
Harappan or Indus Civilization Location and Extent of the Harappan Civilization



Harappa Chronology		
Period	Era	Years
Period 1	Ravi aspect of the Hakra Phase	c. 3100 B.C.E. - c.2800 B.C.E.
Period 2	Kot Diji (Early Harappa) Phase	c. 2800 B.C.E. - c. 2600 B.C.E.
Period 3A	Harappa Phase A	c. 2600 B.C.E. - c. 2450 B.C.E.
Period 3B	Harappa Phase B	c. 2450 B.C.E. - c. 2200 B.C.E.
Period 3C	Harappa Phase C	c. 2200 B.C.E. - c. 1900 B.C.E.
Period 4	Harappa/Late Harappa Transitional	c. 1900 B.C.E. - c.1800 B.C.E.(?)
Period 5	Late Harappa Phase	c. 1800 B.C.E.(?) - <1300 B.C.E.

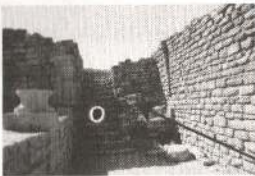
The Harappan civilization covered a vast area that is located in today's India, Pakistan, Afghanistan and Iran. Its estimated size of 1.5 million sq.k.m. is larger than the size of the modern western Europe, and is larger than the ancient Egypt and Mesopotamia combined!

Harappan Civilization Major Sites

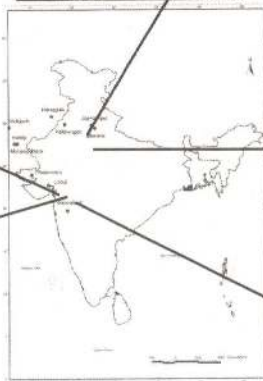


Harappa

Dholaveera



Surkotada

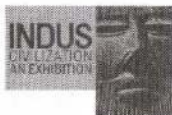


Kalibangan



Lothal





Discovery of the Harappan Civilization

1842- The ruins of Harappa were first described by Charles Masson (a deserter from East India Company's army) in his book *Narrative of Various Journeys in Balochistan, Afghanistan and The Panjab*.

1856(c.) - East Indian Railway Company used burnt bricks found in Harappa as ballast for a nearly 150 km stretch of the Lahore-Karachi railway line.

1873- First publication of a Harappan seal by Alexander Cunningham, Director, Archaeological Survey of India.

1912- Publication of more Harappan seals by J. Fleet, a British archaeologist.



Alexander Cunningham



Daya Ram Sahni

In the year 1921-22, through excavations conducted in Harappa (Punjab), its antiquity was established. Historians called this civilization Harappan or Indus Valley Civilization. During this period an archaeological excavation was carried out in Harappa by Daya Ram Sahni, Field Officer, Archaeological Survey of India.

Discovery of the Harappan Civilization

In 1922, Rakhal Das Banerji, an archaeologist with the Archaeological Survey of India, correctly identified Mohenjodaro as something far more ancient.



Rakhal Das Banerji



John Marshall

John Marshall, Director, Archaeological Survey of India, continued excavating in Mohenjodaro after Rakhal Das Banerji.

Madhav Swaroop Vats had the honour of doing excavation in both Harappa and Mohenjodaro.



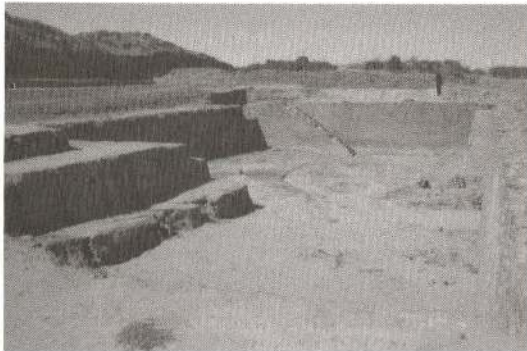
Madhav Swaroop Vats



Archaeological Sites found in India after Independence



Since 1947, over 400 archaeological remains of the Harappan Civilization have been found in this country. Most of these sites are located in the dry bed of the Sarasvati / Ghaggar- Hakra river and Gujarat.

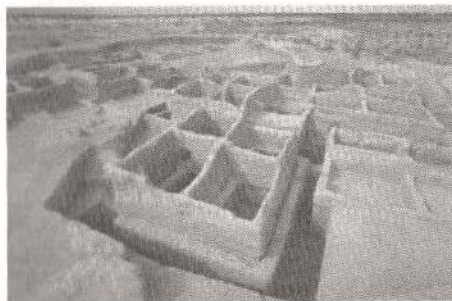


Dholavira

Although no Harappan sites have been discovered south of Daimabad yet, Indus-like signs have been found on megalithic and chalcolithic pottery from South India and Sri Lanka.

From Mehrgarh to Harappan

Mehrgarh is located on the banks of the Bolan river in the Baluchistan province of Pakistan. Here archaeologists have found evidence of continuous human occupation since 7000 BCE.



Transition from hunter-gatherer life to a more rural agrarian life was evident from Mehrgarh onwards. Picture shows an early farming village in Mehrgarh, c. 7000 BCE, with houses built with mud bricks.

Archaeologists generally divide the Mehrgarh occupations into multiple periods of activity:

Period I:	Early settlements built with mud-bricks, no pottery, and little use of technology
Period II:	Rectangular houses subdivided into rooms, some pottery
Period III:	Size of settlement grows to 70 ha. Increase in pottery and craft industries expanding significantly
Period IV to VII:	Evidence of land clearing, and shift towards the plains

Pre-Harappan Period

Hakra Phase:

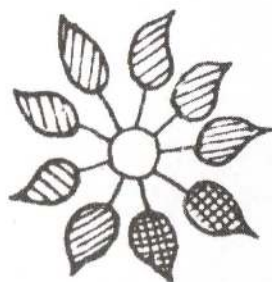
This represents the period when the pastoralists established campsites along livestock pastures. Several pottery pieces have been found providing continuity from earlier periods, but no urban sites or fortifications/citadels that marked the later phases.



Seal from Rehman Deri



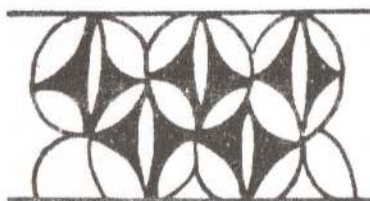
Kalibangan: Line patterns
on pottery



Kalibangan: Solar pattern
made of pipal leaves on
pottery

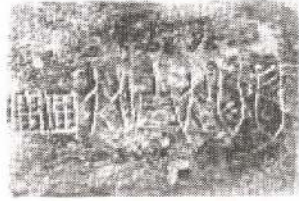
Kot Diji (Early Harappan) Phase:

During this phase people settled in fortified high mounds and the surrounding lower habitation areas. There are obvious signs of massive burning of the entire site. This pattern is observed at other Early Harappan sites. There are signs of people migrating to larger cities. The reasons for this migration is not well understood. Pottery found from this phase have design with horizontal and wavy lines, or loops and simple triangular patterns.



Kot Diji: Circular pattern

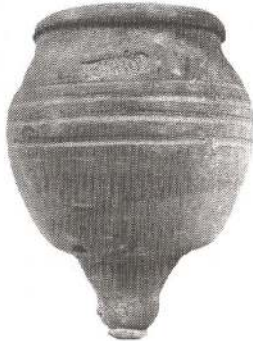
Indus Inscribed Objects



Incised Copper Tablet



Tablet



Sealing



Copper Tools



Seal and Seals Impression

Harappan Seals

Most of the Indus seals are made with steatite, a soft stone. Silver, copper, marble and calcite were also used to make Indus seals.



"Pulikadimal", Mohenjodaro

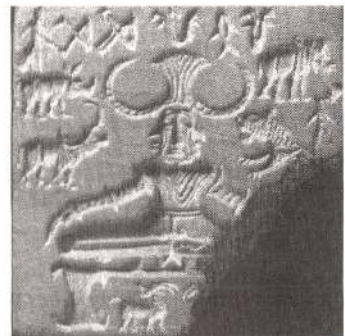


Seal depicting a bull baiting scene,
Mohenjodaro

The lion-fighting Gilgamesh (Sumerian) is comparable to the tiger fightings motifs on the Harappan seals. It reminds us of the Bharata legend from Sanskrit literature and Pulikadimal in Sangam literature.

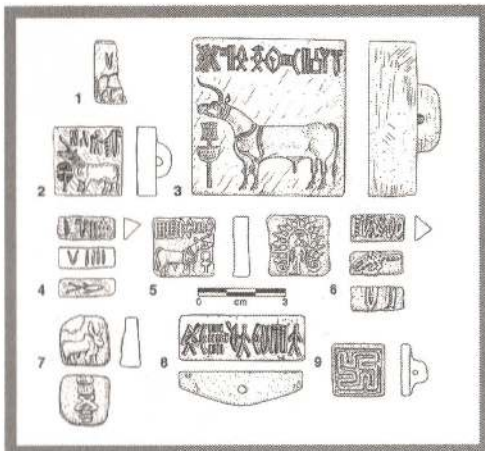
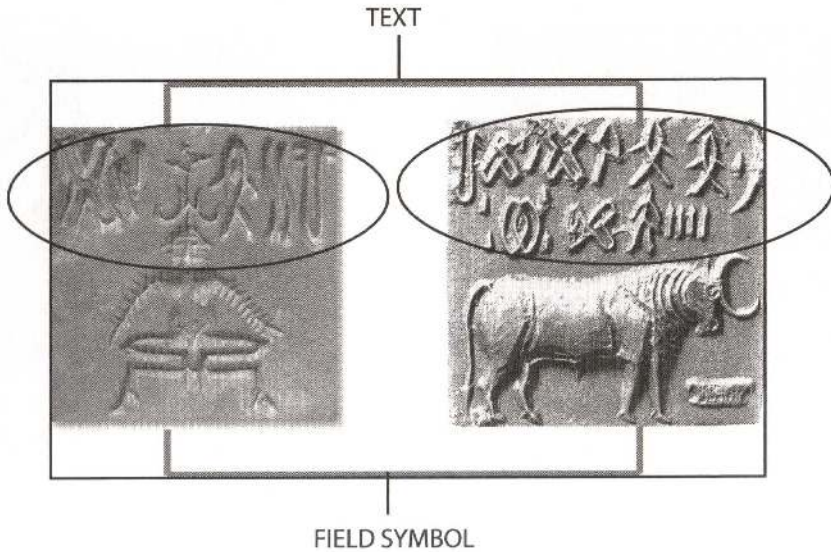


Seal depicting pipal leaves and
unicorn heads, Harappa



Pasupati Seal, Mohenjodaro

Components of Seal



Seal Types:

- 1, 2, 3 and 8: Steatite Seal
- 4: Incised Steatite Tablet
- 5: Molded Terracotta Tablet
- 6, 7: Molded Faience Tablet
- 9: Molded Faience Button Seal

Harappan Seals



Seal depicting deity wearing horned headdress and standing along with a pipal tree, *Mohenjodaro*



Steatite Seal with humped bull, *Mohenjodaro*



Impression of a cylindrical seal depicting two men fighting over a woman, *Kalibangan*

M.S.Vats, eminent archaeologist story of Sunda and Upasunda fighting over Tilottama narrated in Mahabharata .



Swastika Seal - *Mohenjodaro*

The swastika sign occurs frequently in Harappan seals. This sign is still regarded as auspicious in India.

Field Symbols



Humped Bull



Buffalo



Personage wearing headdress / crown standing under an ornamental arch



Gharial with fish in its mouth



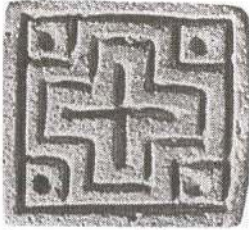
Rhinoceros



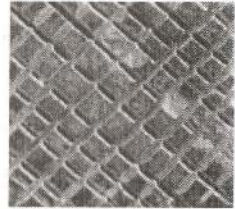
Tiger with a hunter, Scene

Field Symbols are pictorial depictions that accompany Harappan inscribed objects. Two animals that are conspicuously missing are horse and the lion.

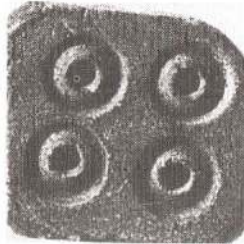
Other Symbols and Geometric Patterns



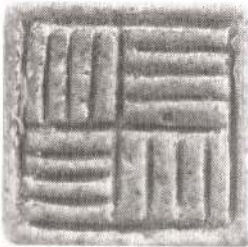
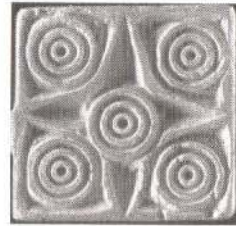
Squares and Rectangles



Geometrical Patterns



Dotted Circles



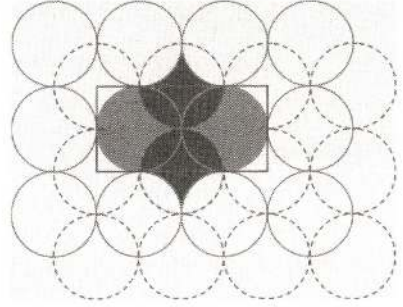
Perpendicular lines forming a Swastika



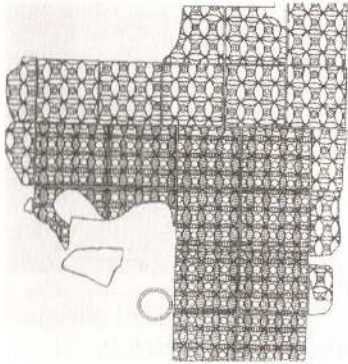
Endless Knot Motif

Many Harappan seals and pottery have repeating patterns that occur as field symbols or stand alone patterns. These give us an indication of Harappans' understanding of geometry and their sense of beauty and fine arts.

Geometric Patterns



Japanese Fan Motif found on an Indus Seal, and the geometry behind it.



Ornate floor tiles with incised intersecting circles, Bala-kot.



Kalibangan: Flooring with ornate tiles. This pattern of intersecting circles is a symbol of the Indus Valley Civilization.

Pots and other Terracotta Objects



Pot depicting horned figure, and a carnelian bead necklace - Burzhome, *Kashmir*



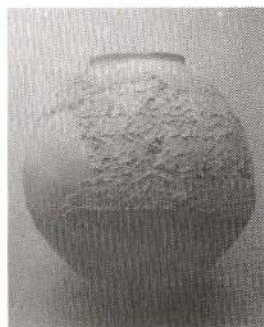
Large storage jar with red slip and black painted motifs, *Chanhudaro*



Disposable, scored goblets, *Mohenjodaro*



Terracotta Pot, *Mohenjodaro*



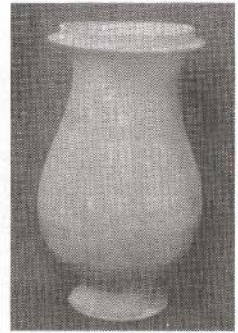
Harappan Pot, *Mehrgarh*

Pottery in red with designs painted in black resembling shapes such as interlocking circles, pipal leaves, peacocks, etc. , on it has been found at Harappan sites. The discovery of numerous seals made of clay with figures of animals such as tiger, rhinoceros, elephant and crocodile gives us more information of the significance of these animals in the Harappan society. Harappans buried terracotta pots along with their dead.

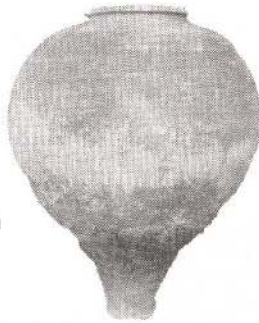
Harappan Jars



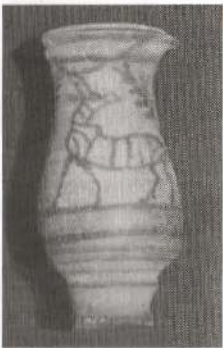
Perforated jar, probably used as a strainer, *Harappa*



S-shaped jar with prominent lips, *Harappa*



Black-slipped storage jar with narrow base, *Harappa*



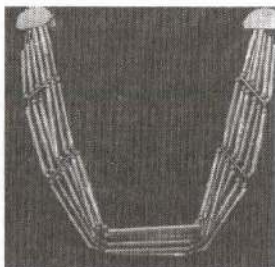
Painted miniature jar, *Lothal*



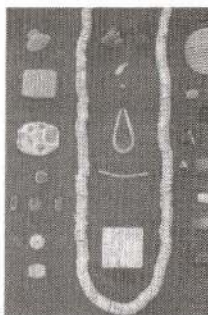
Tall vase with polychrome geometrical motifs, *Mehrgarh*

Jewellery and Other Ornaments

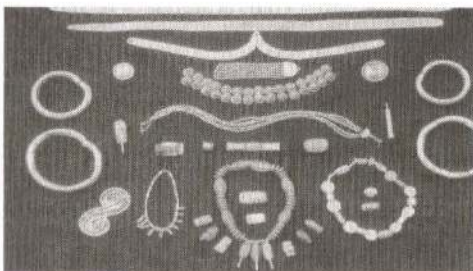
Harappan citizens seemed to have worn ornaments such as fillets, necklaces, finger rings and amulets made of shell, beads, gold, silver, copper and semi precious stones such as lapis lazuli, agate and carnelian. Indus people did not know the usage of iron.



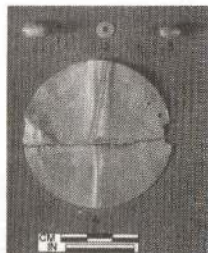
Carnelian and copper/bronze necklace or belt, Mohenjodaro



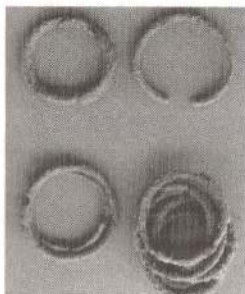
Assorted ornaments, Harappa



Assorted ornaments, Harappa



Gold object, Kalibangan



Copper Bangles, Bhirrana

Beads of Lapis Lazuli (blue in colour) and Shell (white in colour), Bhirrana



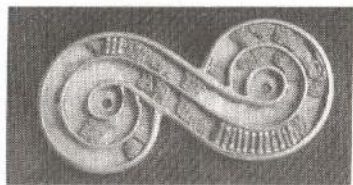
Jewellery and Other Ornaments



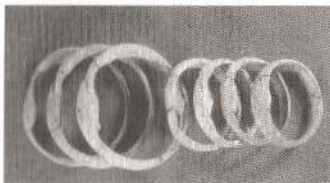
Necklace with flat gold disc beads, turquoise and onyx beads, and banded agate, *Mohenjodaro*



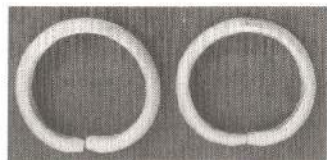
Necklace with pendent beads made from turquoise faience, *Mohenjodaro*



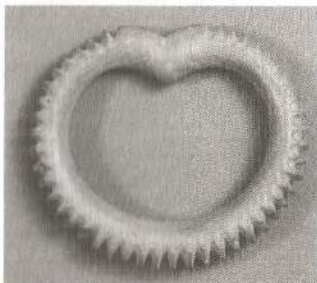
Double spiral brooch with steatite and gold inlay, *Harappa*



Shell bangles, *Harappa*

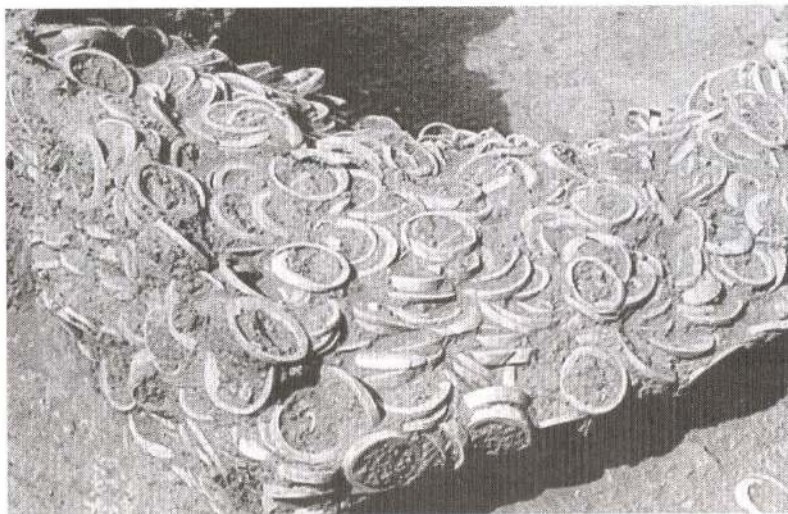


Hollow bangles of hammered sheet gold, *Mohenjodaro*



Faience bangle with deeply carved cogs/ribbing, *Harappa*

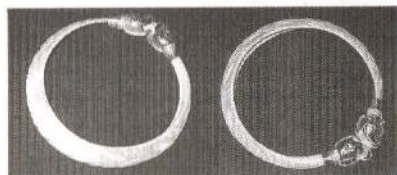
Shell Bangles a Cultural Continuity



Unfinished shell bangles in the shell workshop, *Gola Dhoro* (Harappan Civilization site), Gujarat

Shell bangle making was a major industry of Mohenjodaro, but the conch shells had to come from the coastal areas.

Even today, as part of the wedding rituals in Bengal, seven married women adorn the bride's hands with the traditional bangles made of seashell. The conch shells for these also come from Tamil Nadu!



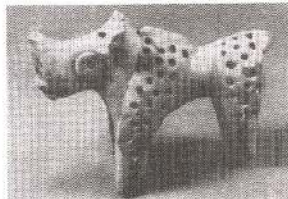
Shell bangle

Toys, Dolls and Other Objects

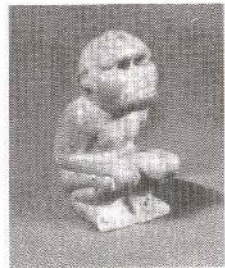
Harappans made toys and dolls made of terracotta, clay and faience, some of which were hollow and had wheels. Some of them have shell or stone inlay work.



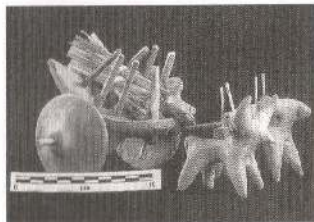
Seated male figure with shell inlay in one eye, *Mohenjodaro*



Perforated rhinoceros figurine, *Harappa*



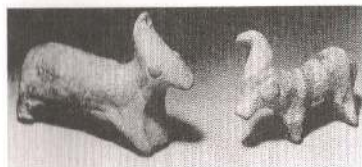
Faience monkey figurine, *Mohenjodaro*



Terracotta model ox drawn cart, *Harappa*. Note the solid wheels



Copper/bronze seated ram figurine, *Mohenjodaro*



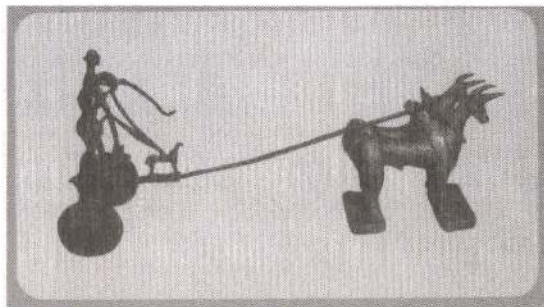
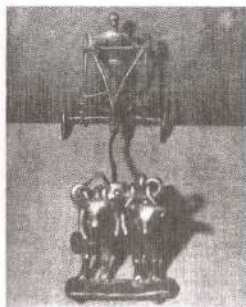
Copper/bronze seated ram figurine, *Chanhudaro*



Barking dog with projecting collar, *Mohenjodaro*

Daimabad Bronzes

Daimabad, *Maharashtra*, marks the southernmost reach of the Harappan civilization, based on our current knowledge. The bronze figurines (the Daimabad bronzes) from the Late Harappan period shown below were found in 1974-75.



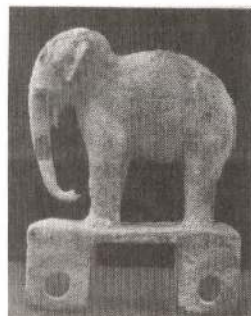
Man driving a chariot drawn by a pair of bulls accompanied by a dog.
Note the solid wheels



Rhinoceros
on wheel



Buffalo on wheel



Elephant

Human Figurines

Harappans created exquisite works of art, including many male and female figurines in stone, bronze and terracotta.



"Priest King with Trefoil Robe", stone,
Mohenjodaro



Male figurine wearing a
elaborated headdress and
carrying a infant in his
hand, *Nausharo*



Figurine holding an
infant, *Mohenjodaro*



Male figurine or diety with
goatlike beard, terracotta,
Mohenjodaro



"Mother Goddess",
Mohenjodaro

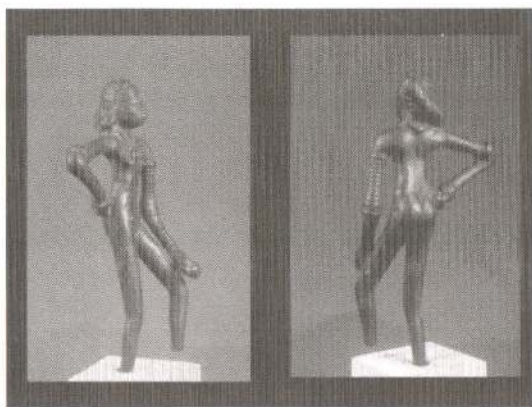
Human Figurines



Dancing Girl on Pottery from
early Harappan period,
Bhirrana



Dancing Girl figurine,
bronze casting using
"lost wax" process,
Mohenjodaro



Dancing Girl figurine,
Mohenjodaro

Harappans made exquisite sculptures and figurines in terracotta and bronze. The two dancing girl sculptures found in Mohenjodaro are examples of the mastery of the Harappan craftsman in metallurgy and metal casting. These bronze figurines were cast using the "Lost Wax" process, the same method used even today in Tamil Nadu for casting bronze idols.

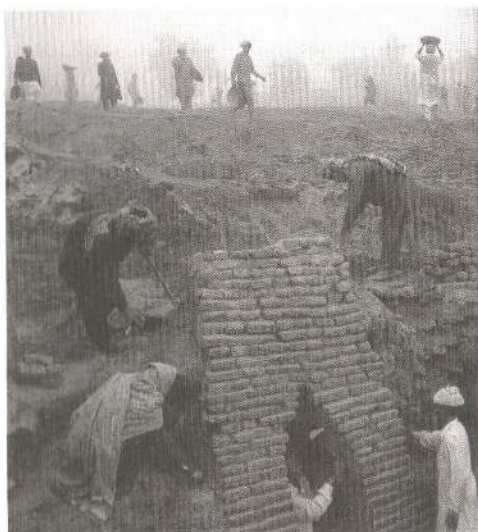
Urban Civilization - What do we know about the Harappan Civilization

Harappan people enjoyed affluent urban life. They lived in well constructed buildings. Their construction techniques included very good drainage systems and water conservation.

Many Harappan cities were large for their time:

- Mohenjodaro is estimated to be 250 ha. (2.5 sq. km.) in area
- Harappa is estimated to be 100 ha. (1.0 sq. km.) in area

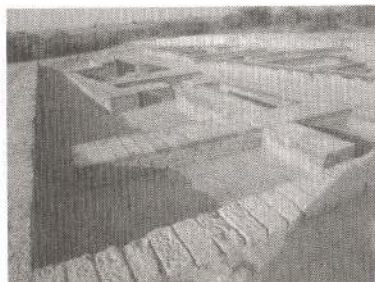
Arid places like Dholavira had water harvesting and storage areas. Wells were found in individual houses and common areas. Wedge shaped bricks were used for lining the wells.



Drain, Harappa



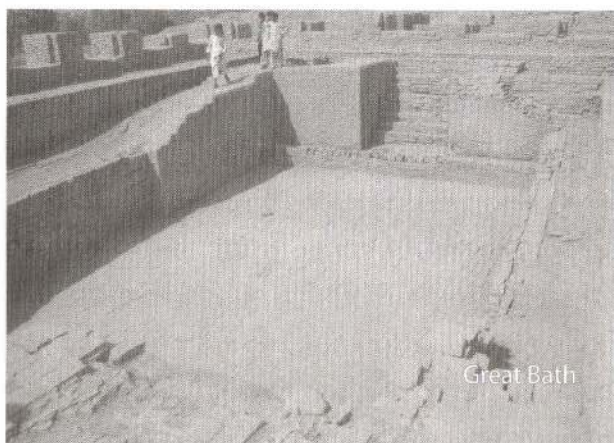
Residential area, Harappa



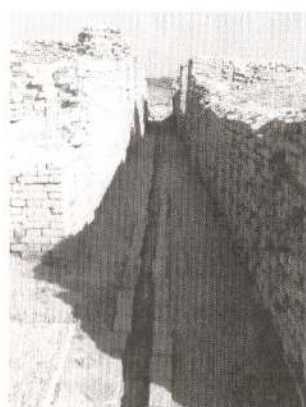
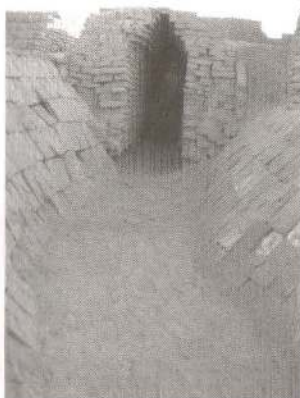
Main sewer and other structures at the Acropolis, Lothal

Harappan Architecture

One of the important structures to be excavated Mohenjodaro was the Great Bath. It measured 12 m. by 7 m. and had a depth of 2.4 m. It may have served as public water tank or a place of religious worship. The tank had steps leading into the tank



on the northern southern ends. Surrounding the tank there were halls and private rooms. floors were made water-tight using natural bitumen (tar). Even today temples have adjoining tanks.



Carefully planned drainage canals, Mohenjodaro

Harappan Architecture Port City of Lothal

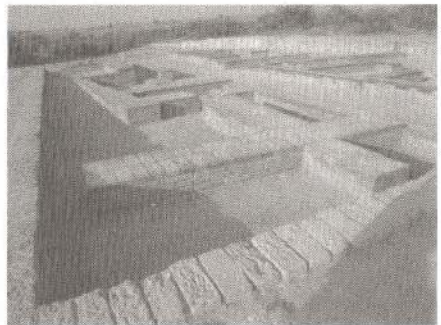
The Harappan port city of Lothal was discovered in *Gujarat* in 1954. Lothal had a well planned dock built with brick, neatly laid out streets and a sophisticated system of public sanitation.



Dockyard



Acropolis with drains

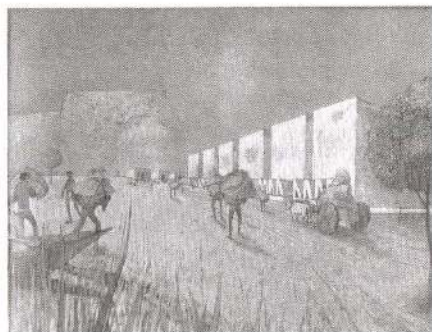


Lower Town

Harappan Architecture Granaries



The Granary at Harappa



*An artist's view of the
Granary at Harappa*

In Mohenjodaro, next to the Great Bath, a huge structure measuring 50 metres by 27 metres has been excavated. This could have served either as a granary or a public hall. Staircases and ramps were found next to it. A similar structure, measuring 45 metres by 45 metres has been found in Harappa.



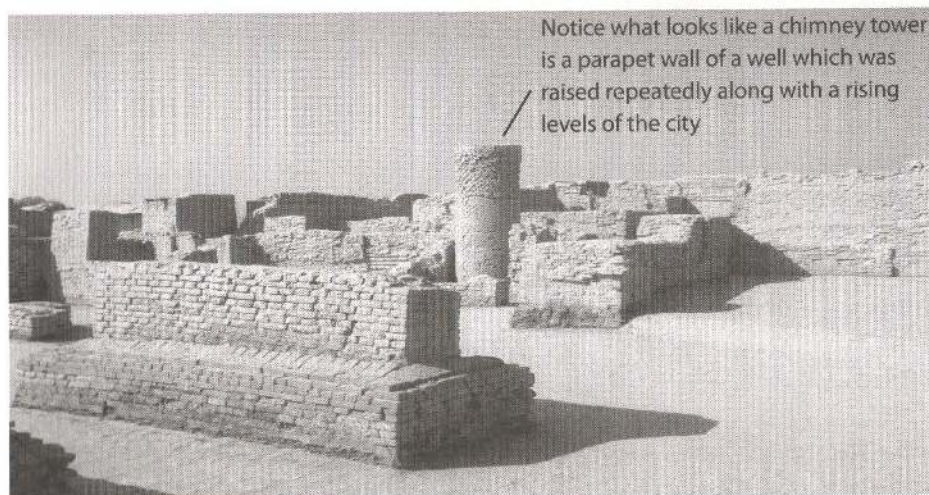
The Granary at Mohenjodaro



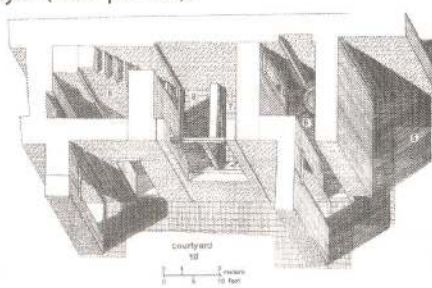
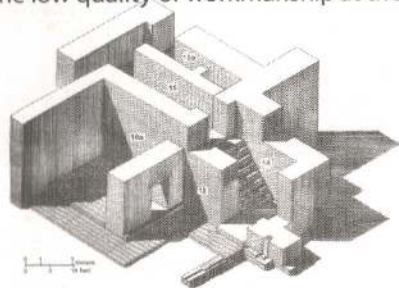
*An artist's view of the
Granary at Mohenjodaro*

Harappan Architecture Houses

Harappan houses seemed to have been built to a plan, with courtyards, windows, and spacious rooms. Many houses were multi-storied.



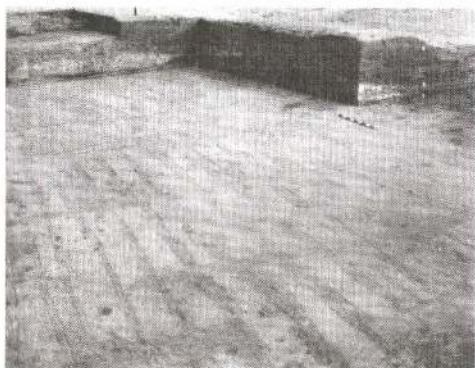
A residential section of Mohenjodaro. The well (cylindrical structure at the centre) in the backdrop shows three distinct layers indicating three different periods. Notice the low quality of workmanship at the top layer (later period).



Reconstruction/oblique projection of houses in Mohenjodaro based on archaeological data.

Harappan Agriculture

Harappans grew several crops. Winter crops such as wheat and barley, as well as monsoon dependent crops such as rice were grown. The variety of food crops grown and the geographic areas in which they were grown gives us an idea of the weather patterns as well as the food habits of Harappans.



Furrow marks found in an excavated trench in Banawali

Similar furrow marks in a Modern agricultural field



Terracotta model of a plough,
Banawali



Harrow, this was the first tool used for ploughing fields. Harrow is also one of the signs in Indus Script.

Harappan Textiles

Harappans cultivated cotton. We have some direct and a lot of indirect evidence for the production and use of textiles by Harappans.

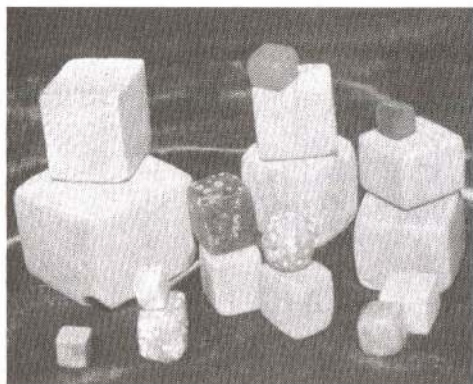


The earliest evidence for normal weave cotton textiles at Harappa is found in this impression on a Ravi Phase bead from Harappa, dating to around 3300 BC. This fragment is only 1 cm long. Normal weave denotes interlacing single threads (one thread over/under the next).



Early Harappan female figurine holding a bowl in her two hands. The lower body is decorated with cross hatched painted design that may indicate the patterns of ancient Indus textiles.

Weights and Standards



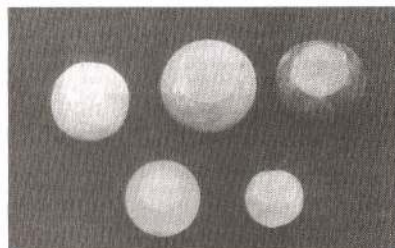
Standardized cubical weights in graduated sizes, chert and agate, *Lothal*

Several cubic and spherical weights have been found in Harappan cities. These weights may have been used for controlling trade. For smaller weights, Harappans used a binary weight system. This was used for weights from 0.856 gram to 13.7 gram. For larger weights (from 13.7 gram to 1.37 kilogram) Harappans used a decimal weight system.

Bricks used by Harappans were of standard dimensions (standardized around a 1:2:4 ratio, the most suitable size for construction / bonding).



Brick with animal drawing, *Harappa*



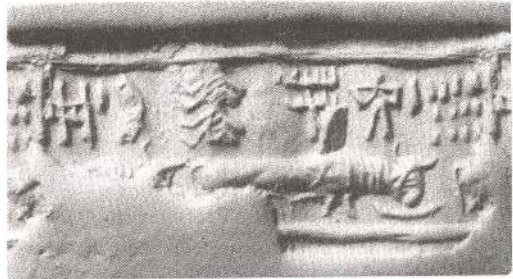
Truncated spherical weights, *Mohenjodaro*

Commerce and Trade

Harappans had commercial interactions with areas within their own civilization as well as neighbouring countries. Several Indus-like seals have been found in Ur (today's Iraq) and Dilmun (Today's Bahrain). Also, "Meluhha" being referred to in the Sumerian literature is widely believed to be Harappan cities.



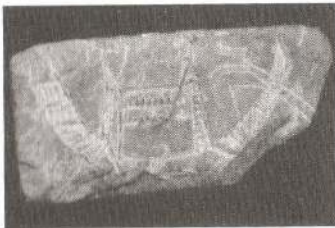
(b)



Indus-like cylindrical (a) seal and (b) impression, Susa, Iran



Seal with flat-bottomed boat with two rudders carrying merchandise, including fauna, Mohenjodaro



Seal with a two-tiered(?) boat with double rudder, Mohenjodaro



Modern day boats, with strikingly similar appearance, plying the Indus river



What do we NOT Know about the Harappan Civilization

Causes for its fall / disappearance

The Harappan Civilization started to decline around 1700 BCE, but we do not know exactly why. Some possible reasons are:

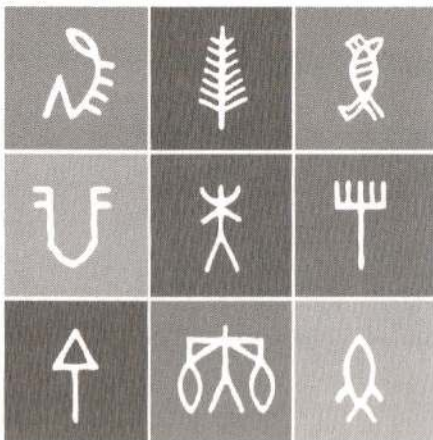
- Natural calamity
- Increase in population, excessive deforestation or decline in agriculture
- Arrival of other linguistic groups

What happened to the Harappans

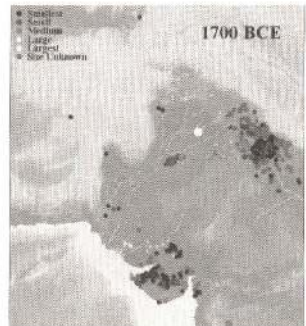
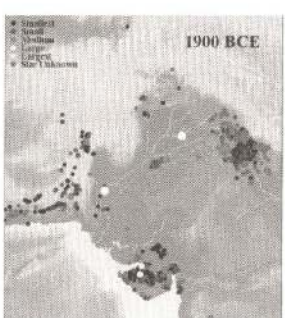
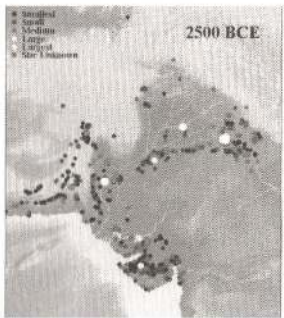
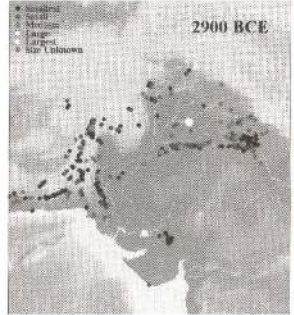
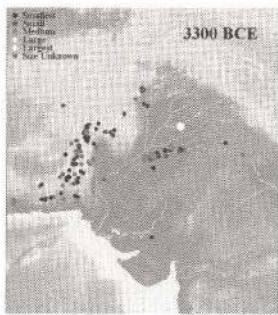
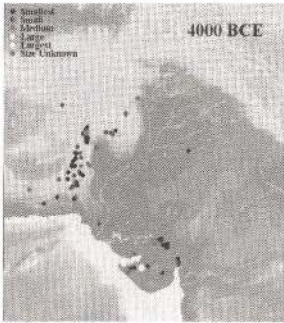
- The Aryans merged with the indigenous population creating a new culture
- Some Harappan elements migrated to the south

The language and script used by the Harappans

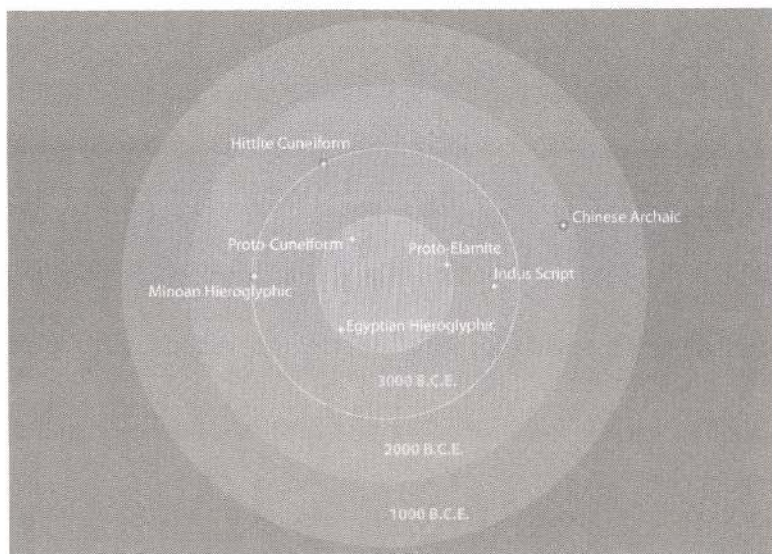
- Not deciphered completely/satisfactorily
- Most Indus experts around the world are leaning towards a proto-Dravidian origin for the Indus script



Rise and Fall of the Indus Civilization inferred from distribution of settlements and their sizes



Ancient Languages of the World



Evolution of Scripts

Most of the ancient scripts of the world started as pictograms and developed into logograms and logosyllabic. These then evolved into syllables and ultimately into vowels and consonants.

The Indus scripts did undergo some changes but more or less remained constant during the mature Harappan period. We still do not know if they are logograms or logosyllabic.

Evolution of Languages

We can classify ancient languages as follows:



Logographic: We do not have a pure logographic language. However, Egyptian hieroglyphs have their origins as logograms.

Logosyllabic: These are scripts in which the graphemes represent morphemes, often polysyllabic morphemes, but when extended phonetically represent single syllables.



Evolution of Languages Sumerian

Evolution of Sumerian script: The Sumerian script evolved from simple pictograms into a cuneiform script over a very short time. The Sumerian cuneiform has been deciphered fully, but the Proto-Sumerian script is yet to be completely deciphered.



Picture above shows the stages of evolution of the sign SAG (meaning "HEAD")

- 1 - the pictogram as it was drawn around 3000 BCE.
- 2 - the rotated pictogram as written around 2800 BCE.
- 3 - the abstracted glyph in archaic monumental inscriptions, from ca. 2600 BCE.
- 4 - the sign as written in clay, contemporary to stage 3.
- 5 - late 3rd millennium
- 6 - represents Old Assyrian ductus of the early 2nd millennium, as adopted into Hittite
- 7 - simplified sign, written by Assyrian scribes (early 1st millennium)



Ca. 2600BCE

























Ca. 2400BCE



Ca. 1400BCE

Evolution of Alphabets

	'		T		P
	B		Y		C
	G		K		Q
	D		L		R
	H		M		Š, Š
	W		N		Th
	Z		S		
	Ch		'		

Phoenician Alphabets – Notice the absence of Vowels

CONTEMPORARY ENGLISH	ARCHAIC PHOENIC	ARCHAIC GREEK	PHOENICIAN	BRĀHMI	DEVELOPMENTS OF BRĀHMI	MODERN HINDI
A	𐤀	Α	𐤀	𑀀	𑀀 𑀁 𑀂 𑀃 𑀄	अ
K	𐤂	Κ	𐤂	𑀅	𑀅 𑀆 𑀇 𑀈 𑀉	क
G	𐤃	Γ	𐤃	𑀊	𑀊 𑀋 𑀌 𑀍 𑀎	ग
T	𐤄	Τ	𐤄	𑀏	𑀏 𑀐 𑀑 𑀒 𑀓	त
TH	𐤅	Θ	𐤅	𑀔	𑀔 𑀕 𑀖 𑀗 𑀘	थ
D	𐤆	Δ	𐤆	𑀙	𑀙 𑀚 𑀛 𑀜 𑀝	द
P	𐤇	Π	𐤇	𑀞	𑀞 𑀟 𑀠 𑀡 𑀢	प
B	𐤈	Β	𐤈	𑀣	𑀣 𑀤 𑀥 𑀦 𑀧	ब
Y	𐤉	Υ	𐤉	𑀨	𑀨 𑀩 𑀪 𑀫 𑀬	य
V	𐤊	Υ	𐤊	𑀭	𑀭 𑀮 𑀯 𑀰 𑀱	व

Evolution of modern alphabets from Aramaic, which itself evolved from Phoenician

Evolution of an Alphabet the Story of Canaanite

The alphabet was a utilitarian invention for Egyptian soldiers and merchants. The assumption is that they developed a Semitic script based on acrophony, where the first sound of the Semitic name of an Egyptian glyph came to be the value of that glyph. For example, the name of the hieratic glyph for house changed from Egyptian pr to Canaanite bayt, and thus the glyph came to stand for /b/



Egyptian
Pictogram

> (pr) ->

Egyptian
Syllable

bayt -> /b/

Canaanite
Syllable



A specimen of Proto-Sinaitic script containing a phrase which means 'to Baalat'. The line running from the upper left to lower right.

Traces of the 16 and 12
characters of the two Wadi el-Hol
inscriptions

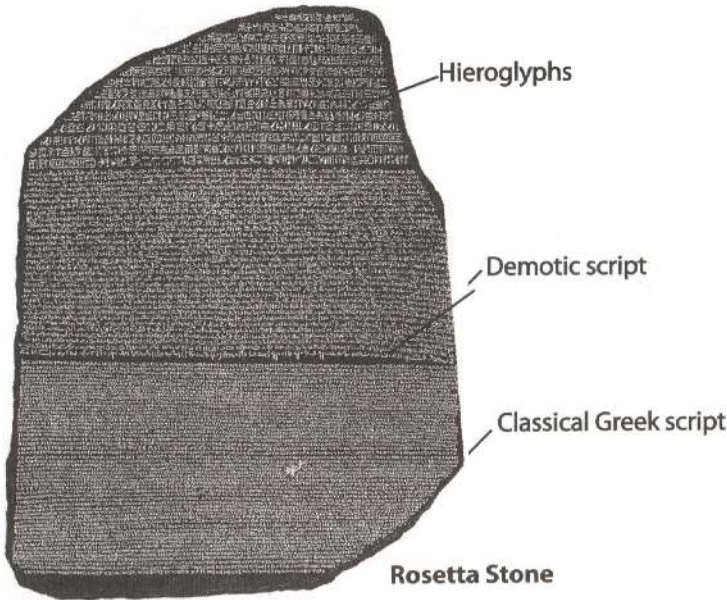


Most of the ancient languages of world went out of usage by around 600 BCE, replaced by alphabets, which people find easier and simpler to use.

Deciphering the Indus Script

The Indus script has not been satisfactorily or completely deciphered yet because:

- Texts available are very short – not more than 5 signs on an average per seal.
- There is no bilingual “Rosetta Stone”, as shown below, which was the basis for the decipherment of the Egyptian hieroglyphs.



The Rosetta Stone was found in Rosetta (Rashid) in Egypt. It is an ancient Egyptian artifact which led to the decipherment of Egyptian hieroglyphic writing. The Rosetta Stone had the same text in three scripts – the ancient Egyptian hieroglyphic (top), the Demotic, a later script used by the Egyptians, and Classical Greek. Using this text, French scholar Jean-François Champollion, who was expert in ancient languages, made the first interpretations of the Egyptian hieroglyphs.

Deciphering Mayan Script



Mayan Glyphs



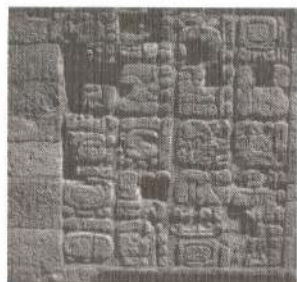
1852 – Numbers/counting system deciphered by Constantine Rafinesque



1880 – Mayan mathematics and astronomy deciphered

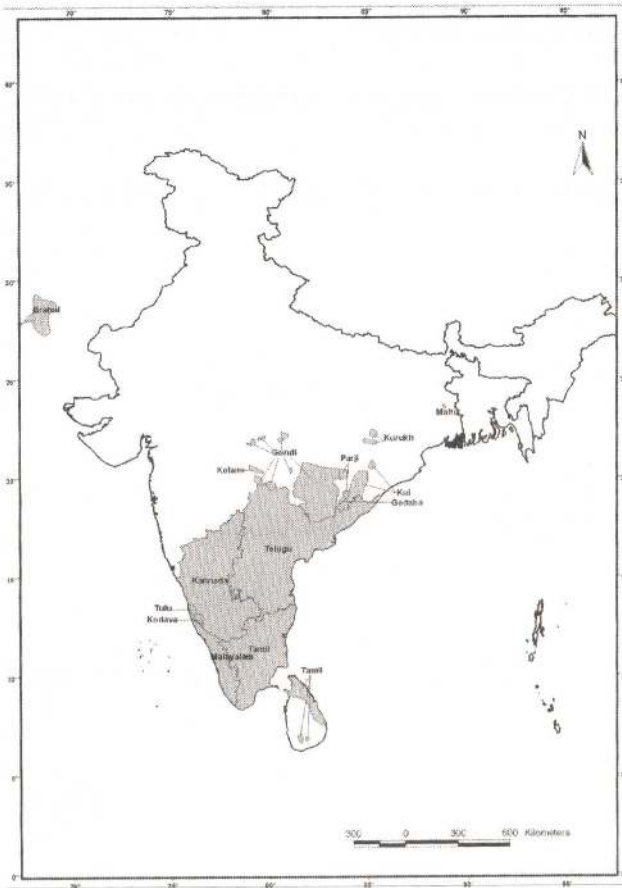


1952 – Yuri Knorozov postulated that the individual symbols in Maya glyphs stood for phonetic sounds



Now: Both scholars and modern Mayan people can read and understand the ancient Mayan language

Theories About the Indus Script: Proto-Dravidian



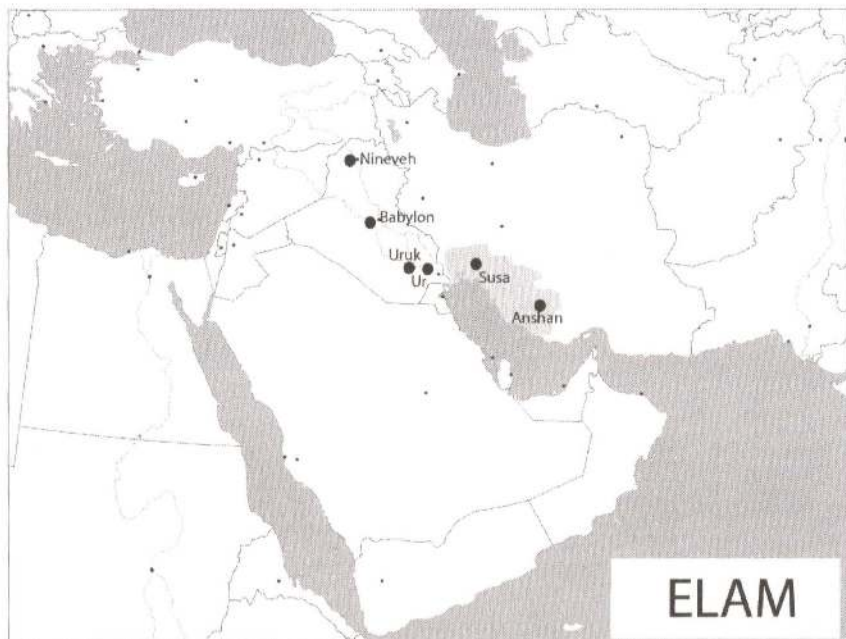
Many researchers believe that the Indus Script was proto-Dravidian. Notice that Brahui, a Dravidian language, is still spoken in Pakistan's Baluchistan province, where the Harappan civilization thrived.

Theories About the Indus Script: Proto-Elamo-Dravidian

The Proto-Elamite script is thought to have developed from early cuneiform (proto-cuneiform) in Iran around 3100 BCE.

The Proto-Elamo-Dravidian is considered to be the source of the Indus script, Dravidian and Elamite languages.

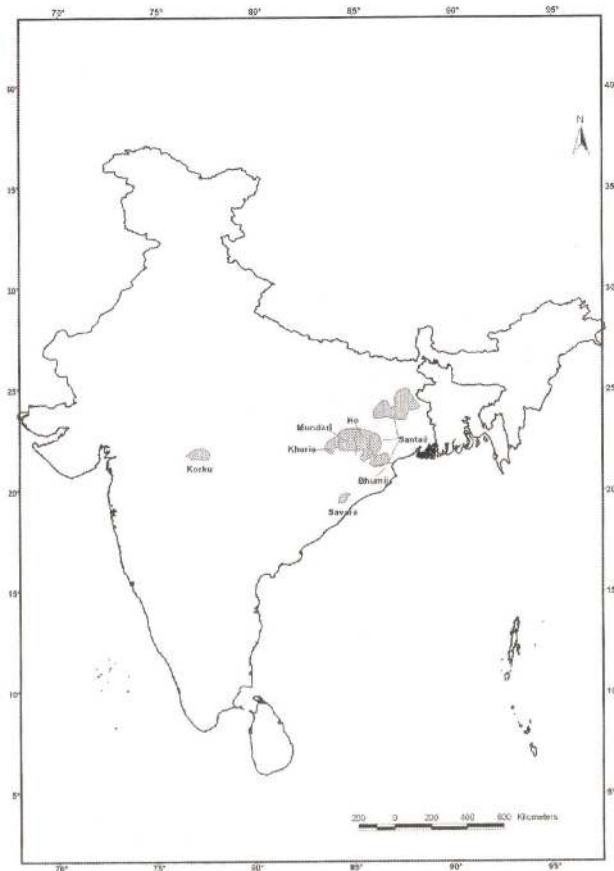
However, this theory has not been accepted by many scholars even now.



Theories About the Indus Script: Proto-Munda Language

The Munda family of languages are mostly spoken by tribal people living in the eastern states of India.

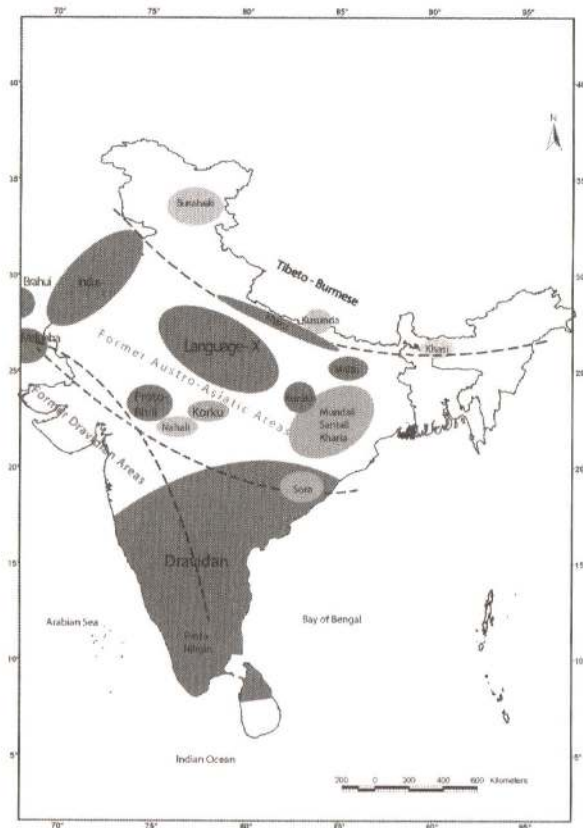
The proto-munda theorists believe that the population moved eastwards from the Indus area as it became uninhabitable.



Theories About the Indus Script: Language X and Multiple Languages Theories

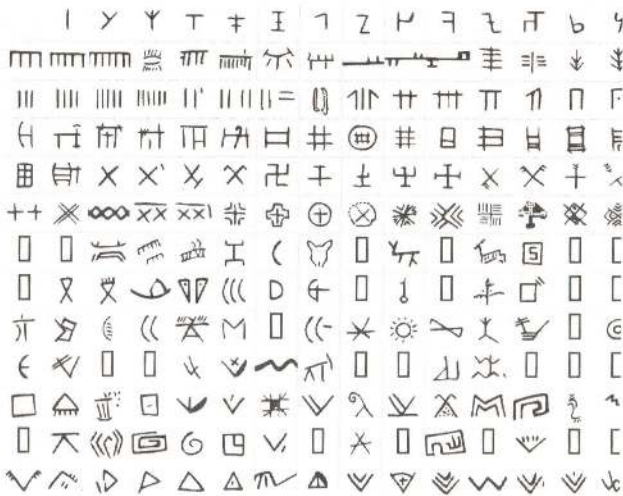
Language X: This theory is based on the research that a significant substrate of the contemporary languages spoken in the Ganges plains cannot be traced back to Indo-Aryan, Dravidian or Munda languages.

Multiple Languages: Some scholars theorize that give the vast size of the Indus civilization, not one but many languages were spoken by its citizens. This is a new postulate, but without substantial research or evidence.



Theories About the Indus Script: Not a Language

In 2004, S. Farmer, R. Sproat, and M. Witzel wrote an article questioning whether the Indus Script encoded language at all. They suggested instead that it might have been a nonlinguistic symbol system akin to the Vinča inscriptions and Near Eastern emblem systems.



The Vinča symbols, or signs, are a set of symbols found on prehistoric artifacts from southeastern Europe (6000-4000 BCE).

The uproar caused by this article has helped Indus script researchers redouble their research efforts. Since 2004, several papers have been published rebutting the S. Farmer et al.



Clay Amulet with Vinča inscription
Tărtăria, Romania ca. 4500 BCE



Structural Analysis of the Indus script

Research Tools:

- Sign list
(a standardized list of signs occurring in Indus texts)
- List of Sign variants
- Corpus of Indus text
- Concordance
Occurrence of the same sign in different texts at different positions
- Statistical tables

OCCURRENCE	*	INDEX
1717 10	U T T B K * 0	
10	E U 3 0 0 2 5 7	0
2570 00	W 6 * 0	
2672 00	W 0 0 * 0 0 *	
2170 00	9 0 0 * 0	
2181 00	U 3 0 0 * 0	
3100 03	9 6 * 0	
1580 02	W 9 0 * 0	
2136 00	W 8 * 0	
2623 00	9 5 2 * 0	
6120 01	U 0 0 2 * 0	
07	U	
6104 01	U 0 0 2 * 0	
07	U	
4009 00	U W / 2 0 0 0 2 0 0	
1921 16	U U 9 0 2 * 0	
30	U U 0 0 0 * 0 *	

Indus Concordance -
Irvatham Mahadevan, 1977

TEXTS IN THE INDUS SCRIPT

5228	210001	U T 0 0 * 1 * 0 0 0 0 0 *
	23690	
5230	210001	U T 0 0 * 1 * 0 0 0 0 0 *
	23690	
5231	200001	E U T 0 0 0
5232	200001	E U T 0 0 0
5233	200001	W * U W
5234	210001	U T 0 0 * 1 * 0 0 0 0 0 *
	23690	
5235	209901	U T 0 W
5236	200001	E U 0 T 0 0
5237	210101	U A W * 0
	20101	U 0 0 0
5238	210101	U A W * 0
	20101	U 0 0 0
5239	210101	U A W * 0
	20101	U 0 0 0
5240	210101	U A W * 0
	20101	U 0 0 0







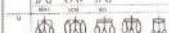
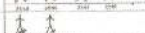
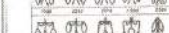















Corpus of Indus Texts-
Irvatham Mahadevan, 1977

Example of Standerized Sign List and Sign Variants

Sign List



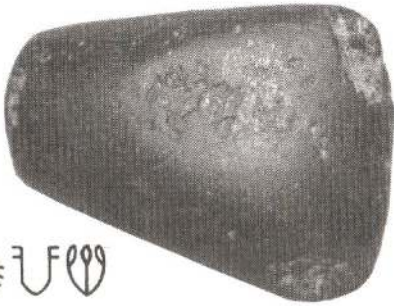
Sign Variants

GROUP No.	VARIANTS	GROUP No.	VARIANTS
1		20	
2		21	
3		22	
4		23	
5		24	
6		25	
7		26	
8		27	
9		28	
10		29	
11		30	
12		31	
13		32	
14		33	

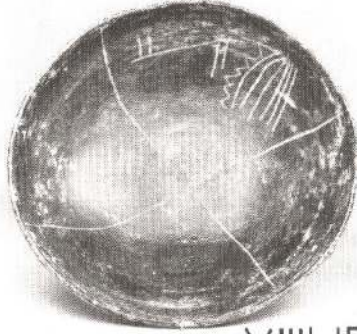
Approaches to Deciphering the Indus Script

Several studies of graffiti, painted and incised pottery marks are being undertaken for similarity in writing and other clues.

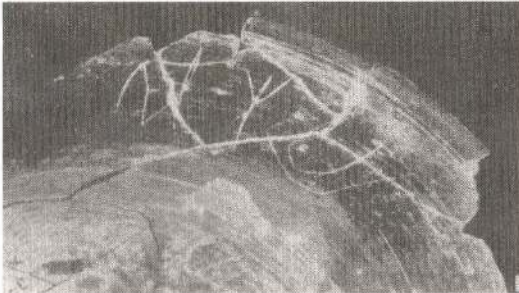
Celts and other pottery objects with Indus-like inscriptions have been found in far away places like Tamilnadu indicating possible trade links between the two regions.



Neolithic stone axe with Indus-like inscriptions from late neolithic period (about 1500 BCE.) found in Sembian Kandiur, Tamilnadu, with striking similarity to the Indus script (normalised)



The "Sulur Dish", from megalithic period (first century BCE.) found near Coimbatore, Tamilnadu, with inscriptions very similar to the Indus script (normalised)


















Megalithic pottery with a sequence of three Indus-like signs from Sanur, Tamilnadu (normalised)

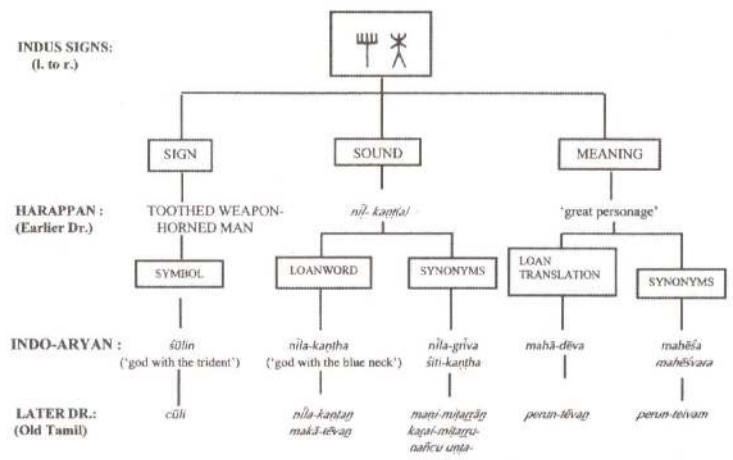


Approaches to Deciphering the Indus Script

Iravatham Mahadevan's Research Work on Indus Script

Modifiers	Agricultural Signs			Other Signs
	I	II	III	
	 137 share (of grain)	 141 share of crop	 162 crop	 001 man
A. SKY > god's	 139	 142		
A. EIGHT > State's	 140	 143	 164	
C. UPPER > landlord's	 138		 163	
149. STREETS > city's		 144		
176. HARROW > tenant - farmer's		 145	 165	 038

Agricultural Terms in the Indus Script



Phonetic values and bilingual parallels of sign pair 𑀲 𑀱

Cultural Linguistic Approach

Recent Research Work by Iravatham Mahadevan

Many of the Indus texts start with the citadel sign and end with the Jar sign and this can be explained as below. The script is written here from left to right for ease of reading. This is an important evidence that connects the Indus and Proto-Tamil civilisation

Place Signs in the Indus Script

Sign	Variant	Interpretation
		akam house, place, 'inside' (DEDR 7)
		mēl-akam 'High House (Citadel)' (DEDR 5086 & 7)
		pāji city' (DEDR 4112)

Place Signs in the Indus Script

Literal (word-initial)

Grammatical (word-final)

Sacrificial Vessel (to carry food offerings). Dr. cata 'food'.
(Ta.cātam 'cooked rice';
cf. Ātaṇ, a 'Cēra name'.

Masculine singular
Nominal suffix
Dr. -(a)ṇ(u)

Arrow-head or Lance-head : weapons.
Dr. ampu 'arrow'

Non-Masculine singular
Nominal suffix
Dr. -(a)mp(u)

Place Signs in the Indus Script



He of the (High) House
aka-(tt)-(i)



He with the Jar
kuṭa-muṇi (Agastya)

Cultural Linguistic Approach

Recent Research Work by Iravatham Mahadevan

Assumes that the cultural remains of the Harappan Civilization is still among us, in the form of various legends, literary works and puranic tales.

Based on word borrowings between Dravidian and Indo-European languages.



Kavaḍiyas (Kāvāḍi-bearers) carrying holy water from the Ganga (near Allahabad).



Copper Coin of Travancore (19th cent.) with BEARER motif.

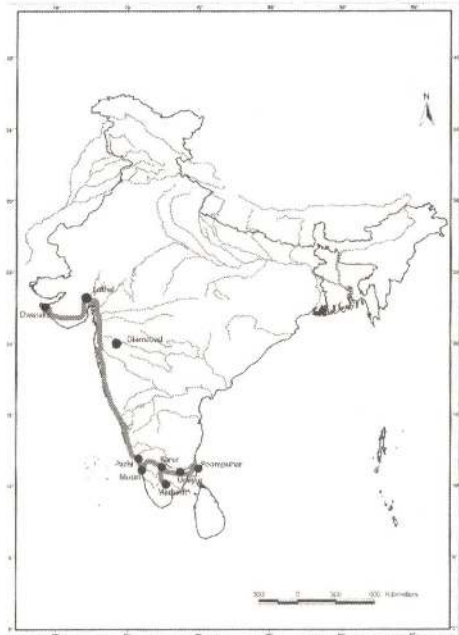
Harappan	 Bearer	 Jar-Bearer	 Arrow-Bearer
Early Dravidian	poṛ-(ay)	(food-bearer)	(arms-bearer)
Vedic	bharata	cat(a)-poṛ-(ay)	ey-poṛ-(ay)
Puṛaṇic (Andhra)	(-vāhana)	bharadvāja	bharanta
Old Tamil (Caṅkam Age)	poṛai, irumpoṛai, poṛaiyaṅ ātaṅ poṛaiyaṅ	sāvāhana cāta-poṛai (lit., 'food-bearer')	sālivāhana evvi Name of a Vēḷir clan
Religious Tradition	kāvāṭi (Tamil), kavaḍiyā (Hindi): (‘carrying of offerings on a yoke’).		

Hypothetical Southern Migration Path of Velir

According to Nachinarkiniyar's commentary on Tolkappiam, Saint Agathiar led the Veli clansmen from Dwaraka to the Southern country. The map below is an attempt to reconstruct from the Sangam literary sources the hypothetical migration path of the velir clansmen. The ancient capitals and trade routes of the ancient Tamils are also included.

நீயே, வடபால் முனிவன் தடவினுள் தோன்றிச்
செம்பு புனைந்தியற்றிய சேனெடும் புரிசை
உவரா ஈகைத் துவரை யாண்டு
நாற்பத் தொன்பது வழிமுறை வந்த
வேளிருள் வேளே (புற.201:8-12)

“Oh Vēl among the Vēḷir! You are descended through forty-nine generations of the lineage of unwearying liberality which, arising out of the water-pitcher of the Northern Sage, ruled over Tivarai surrounded by long and soaring walls made of bronze.” (Purāṇāṇṇu 201 : 8-12).



Linguistic Approach

The linguistic approach analyses the frequency of occurrence of signs and sign combinations to segment long texts.

Segmentation of texts into phrases based on frequency analysis:

Most Frequent opening phrases:

- Pairs



- Triplets



Frequent terminal phrases

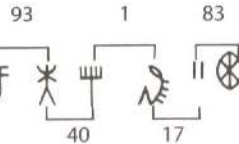
- Pairs



- Triplets



Indus seal with 17 signs



Other Approaches to Decipherment Contributions of Prof. Gift Siromoney



In 1968, Prof. Gift Siromoney presented a paper on "Context-sensitive rules in Tolkappiam" in the Second World Tamil Conference, held at Madras. In the same conference, Dr. Iravatham Mahadevan presented his landmark paper entitled "Dravidian parallels in Proto-Indian script". They met and became friends.

When Iravatham Mahadevan compiled a comprehensive computerized concordance of the Indus script in 1977, he presented a copy of the Concordance to Gift Siromoney, and Dr. Siromoney was naturally attracted to this puzzling script. Many of Dr. Siromoney's research work on Indus script were based on Mahadevan's concordance.

Sampling of Dr. Gift Siromoney's Work on the Indus script:

- Classification of frequently occurring inscriptions of the Indus civilization in relation to metropolitan centres, 1980
- Cluster analysis of the Indus signs: A computer approach, 1981
- Segmentation of unusually long texts of Indus writings: A mathematical approach, 1982
- Measurement of affinity and anti-affinity between signs of the Indus script, 1983
- A statistical analysis of pairs of Indus signs with "Jar" and "Lance", 1983
- Statistical analysis of Harappan signs and sites, 1984
- Inscribed objects and Harappan signs: A computer analysis, 1984
- Harappan signs and field symbols: A statistical study, 1985
- Segmentation of Indus Texts: A dynamic programming approach, 1988

Other Approaches to Decipherment Contributions of Dr.R. Madhivanan

The Indus script originated in the deep south and moved north.
Indus script and numerals are written from left to right, as in Tamil.
The grammatical structure of the Indus and Tamil Brahmi languages are the same.

Dr. Madhivanan's mapping of Tamil alphabets to the Indus script

•	•	U	V, E, B
•	•	U	S, V, P, A, B
•	•	Q	
•	•	Q	Q
•	•	Q	Q, B
•	•	I	S, I, H
•	•	II	D, S, A, A, S
•	•	III	Y, III, III, III
•	•	IV	IV, IV, IV, IV
•	•	V	A, A, A, A



Indus Seal, Thingalan panna(n)

KEY TO THE INDUS SCRIPT

ALPHABETS	INDUS SCRIPT	ALTERNATED AND SPICERISED SYMBOLS
•	•	•, •, •
•	•	•, •
•	•	•, •
•	•	•, •
•	•	•, •, •, •
•	•	•, •, •, •
•	•	•, •
•	•	•, •, •, •
•	•	•, •, •
•	•	•, •, •, •, •
•	•	•, •, •, •, •

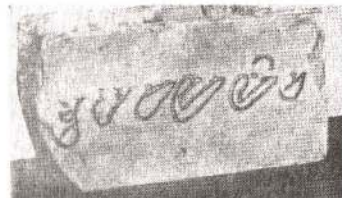
Jaffna Metal Seal



Indus Seal, 'Yaanan'



Pattanam 'Vanchi'







Keezhivaazhai Parai





Pictures : Naavaal(i) Thevan



Other Approaches to Decipherment Contributions of Prof. Asko Parpola

According to Prof. Asko Parpola the Indus Script is mostly likely to be Proto-Dravidian. His methodology for deciphering consists essentially of two parts, namely the rebus principle (applicable to all amount logo syllabic scripts) and linguistic techniques applicable to Dravidian.

Dr. Parpola, starting off with the reading of the fish sign as *min* by Fr. Heras proceeds to decipher various fish related signs as follows:

I. Number + fish signs				
No.	Sign	Identification	Reading	Meaning
1		fish	mīn	(1) fish (2) star
2		3 + fish	mu(m) mīn	three stars (Mrigasairas)
3		6 + fish	caru mīn	six stars (Pleiades)
4		7 + fish	etu mīn	seven stars (Ursa Major)

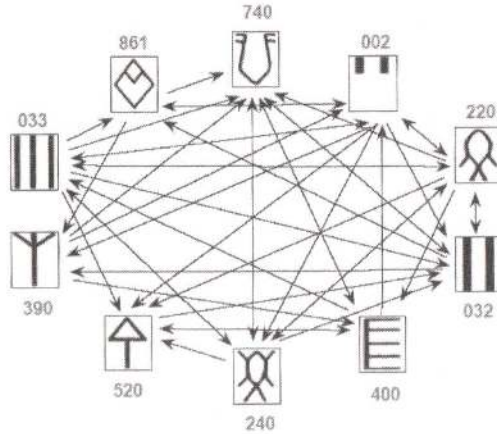
II. Modified fish signs				
No.	Sign	Identification	Reading	Meaning
1		hoiving + fish	pacu mīn	green star (Mercury)
2		root + fish	may/may mīn	black star (Saturn)
3		intermediate space + fish	vel(li) mīn	white star (Venus)
4		dot/drop + fish	pottu mīn	(1) red fish (carp) (2) red star (Rohini)

III. Bangles and squirrel signs				
No.	Sign	Identification	Reading	Meaning
1		ear/nose rings, bangles	muruku	(god) Murukan
2		bangles + squirrel	muruku pīllay	(god) Murukan Pīllay

For bangle, he uses the linguistic technique to identify intersecting circles as muruku.

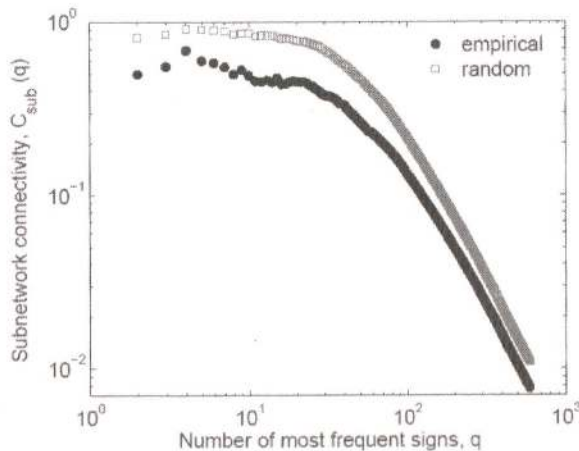
Network Analysis

Computer based analysis of the Indus Script using computer based algorithms, a network is constructed of using all possible pairs signs, and the theoretical.

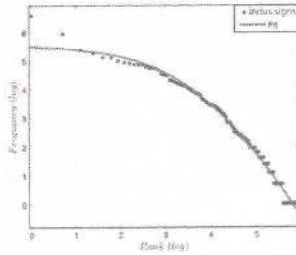


However it is observed that not all possible, including some of the highly probable pairs as indicated by the random model, do not appear at all in actual data.

This suggests the existence of syntactic relations in constructing the sequences



Computer-based Analysis of the Indus Script



$$\log f_r = a - b \log(r + c)$$

	Indus	English
a	15.39	12.43
b	2.59	1.15
c	44.47	100.00

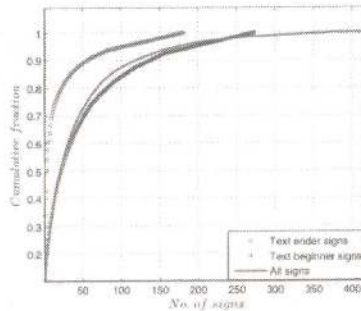
Zipf's Law: Zipf's law states that given some corpus of natural language utterances, the frequency of any word is inversely proportional to its rank in the frequency table. Thus, the most frequent word will occur approximately twice as often as the second most frequent word, which occurs twice as often as the fourth most frequent word, etc. Zipf - Mandelbrot law is a variation of the Zipf's Law.

N-gram Models:

N-gram models are a type of probabilistic model for predicting the next item in a sequence.

N-gram linguistic model uses the previous N-1 words to predict the next one. In speech recognition, these statistical models of word sequences are referred to as a language model.

Google, for example, uses N-gram models for a variety of R&D projects, such as statistical machine translation, speech recognition, checking spelling, entity detection, and data mining.



What Next ?



Additional excavations in major Indus sites (e.g. Dholavira and along the ancient Ghaggar-Hakra river bed – viz., Ganweriwala, Dholavira, Farmana) can provide more inscriptions and artifacts and, perhaps, even the Rosetta Stone equivalent for the Indus Script!

Or the Harappan equivalent of the Rosetta Stone may be amongst us already - in our literature, myths, and cultural and other practices – it is just that we have not discovered it !!



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- Ancient Cities of Indus Valley Civilization – Jonathan Mark Kenoyer
- Ancient Cities of India – Gregory Possehl
- The Ancient Indus: Urbanism, Economy and Society – Rita Wright
- Civilization of the Indus Valley and Beyond – Sir Mortimer Wheeler
- Corpus of Indus Seals and Inscriptions Volumes 1 and 2 – Asko Parpola and Others
- Deciphering the Indus Script – Asko Parpola
- Finding Forgotten Cities – Nayanjot Lahiri
- Harappan Architecture and Civil Engineering – Jagat Pati Joshi
- The Indus Script Texts, Concordance and Tables – Iravatham Mahadevan
- Lost Languages, The Enigma of World's Undeciphered Scripts – Andrew Robinson
- Lothal and the Indus Civilization – S. R. Rao
- National Geographic Magazine
- A Study of the Harappan Pottery – O. Manchenda
- The World's Writing Systems – Daniels Bright
- Flickr. com
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