

THE INDUS SCRIPT
Texts, Concordance and Tables

MEMOIRS OF THE ARCHAEOLOGICAL SURVEY OF INDIA No. 77

THE INDUS SCRIPT

Texts, Concordance and Tables

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PREFACE

I was awarded a Jawaharlal Nehru Fellowship in 1970 for a study of the Indus Script. I utilised the fellowship for compiling a corpus of texts in the Indus Script, a concordance to the texts and the basic statistics relating to the script, to serve as source material for further research. The results of the work are presented in this volume. I am grateful to the Trustees of the Jawaharlal Nehru Memorial Fund for the award of the fellowship which has enabled me to work wholtime for two years on this fascinating project. It has taken me nearly seven years to complete the work, both due to the complexity of the subject and my own limitations as a part-time worker in the field.

The *Texts, Concordance* and *Tables* have been compiled by the use of computer techniques developed by the Computer Group and the National Centre for Software Development and Computing Techniques (NCS DCT), Tata Institute of Fundamental Research (TIFR), Bombay. The book has been printed by computer-aided photo-composing techniques also developed by the NCS DCT at the TIFR. The computer programmes for compiling the *Texts, Concordance* and *Tables* were designed and executed by Shrimati Mythili Rangarao. The programmes for adapting the software package developed at the NCS DCT to the special requirements of printing this volume in characters of the Indus Script by photo-composing were designed and executed by Shri N.Soundararajan. I am greatly beholden to Prof. R.Narasimhan, Head of the Computer Group, and Director, NCS DCT, at the TIFR for generously providing me with computer time, programming assistance and technical advice at every stage of the work.

I also acknowledge gratefully the facilities generously extended to me for preliminary data processing at the Computer Centres in the Fundamental Engineering Research Establishment, College of Engineering, Guindy, Madras, the Government Data Processing Centre, Madras, and the Jawaharlal Nehru University, New Delhi.

Almost the entire source material from which this volume has been compiled and most of the photographs for the Plates were supplied by the Archaeological Survey of India which holds the copyright. I am deeply grateful to Shri B.B.Lal and Shri M.N.Deshpande, the former and the present Directors-General of the Archaeological Survey of India, for giving me access to original objects and unpublished photographs in the collections of the Survey. I am particularly indebted to Shri B.K.Thapar, Shri S.R.Rao and Shri W.H.Siddeque for permitting me to copy the unpublished material excavated by them at Kalibangan and Lothal. This generous gesture in the best traditions of academic scholarship will be appreciated by all students of the Indus Script hungering for more textual material. My thanks are also due to Shri J.P.Joshi, Shri B.M.Pande and Shri J.G.Mathur of the Archaeological Survey of India for assistance in my search for source material. I am grateful to the Director-General for accepting this work for publication in the series of the Memoirs of the Archaeological Survey of India.

I am thankful to the authorities of the National Museum, New Delhi, the Indian Museum, Calcutta, the Prince of Wales Museum, Bombay, Baroda Museum, Government

Museum, Madras, the Department of Archaeology, Haryana, the British Museum, London, and the Louvre, Paris, for permission to inspect and copy the original inscribed objects in their collections. I have also made use of photographs of unpublished objects by the courtesy of the institutions mentioned above, the Victoria & Albert Museum, London, and the Ashmolean Museum, Oxford. Individual credits have been given in the List of Inscribed Objects and the Plates.

The Sign List, the List of Sign Variants and the Map were drawn up under my supervision by Shri Amarnath Sharma, Research Associate in the Indian Statistical Institute, New Delhi. Shrimati Kamala Ganesh worked as my Research Assistant during the first year of my fellowship. Miss T.Rajeswari continued as my Research Assistant throughout the project and has cheerfully borne the heavy burden of work involved in collection and compilation of data, coding and proof-reading.

I have received generous assistance and advice from many other institutions and individuals over the years for the completion of this work. I have had the benefit of long and fruitful discussions with Dr. Asko Parpola during his visits to India in 1971 and again in 1975. I must in particular mention with gratitude the assistance I have received from Prof. Romila Thapar and Prof. R.Champakalakshmi of the Jawaharlal Nehru University, New Delhi, Shri A.Subbiah of the International Association of Tamil Research and the International Institute of Tamil Studies, Madras, Dr. R.Nagaswami, Director of Archaeology, Government of Tamil Nadu, and Shri N.Mahalingam, Madras.

The Tata Press, Bombay, has done pioneering work in developing a special film font for the Indus Script characters from which this volume has been printed by computerised photo-composing techniques. Shri A.G.Duble, Graphic Artist, Tata Press, adapted the artwork to the exacting specifications required for producing the film font. I also thank Shri X.S.Desai, General Manager, and Shri A.K.Manchanda, Systems Manager, Tata Press, for the care bestowed on the production of this volume and making it, in its own way, a work of art.

I shall consider my labours amply rewarded if the volume serves the purpose of advancing research in this field and making a modest contribution to the decipherment of the Indus Script in the fullness of time.

New Delhi
Dated 31st January 1977

IRAVATHAM MAHADEVAN

INTRODUCTION

1. SCOPE OF THE VOLUME

This book presents in one volume a corpus of texts in the Indus Script together with a concordance to the texts and a set of tables providing the basic statistics relating to the script. The work is intended to be a sourcebook providing material for further research. The problem of decipherment of the Indus Script is beyond the scope of the present work.

2. METHODS OF COMPILATION

2.1 The work was carried out in several stages. In 1970-71 a photographic card catalogue of the inscribed objects was assembled and the texts together with relevant background data were coded in a numerical form suitable for computer analysis. An experimental concordance (with a line of text as the unit) was prepared with the help of an IBM 1620 computer at the Fundamental Engineering Research Establishment in the College of Engineering, Guindy, Madras. A brief report on this preliminary work has already been published.¹ After an analysis of the results, the material was thoroughly revised and rearranged.

2.2 A critical edition of the texts, an improved concordance (with a whole text as the unit) and a set of statistical tables were prepared in 1972-73 with the help of a CDC 3600 computer at the Tata Institute of Fundamental Research (TIFR), Bombay. A third revision of the material was also carried out in 1976 at the TIFR to include unpublished texts, especially from Lothal and Kalibangan.

2.3 Work also commenced in 1973 to evolve a normalised signary of the Indus Script which would faithfully reproduce 'the neat monumental forms'² of the originals seen in the best seals, and at the same time be suitable for computerised printing. With the help of the concordance to the texts which was ready by 1973 and the photographic card catalogue, an elaborate exercise was undertaken to locate all the sign variants and prepare an index of occurrences for each variant. The most frequently occurring variant of a sign was chosen as its normal form which was then copied from the best available specimen. The sign variants were drawn up in another list copying from the best preserved occurrence for each variant. This was a laborious and time-consuming process which was completed in 1974. The sign list and the list of sign variants were again revised and brought up to date in 1976 after the unpublished texts from Lothal and Kalibangan were made available.

2.4 When the work was ready for publication, the formidable problem of finding out a suitable method of printing the texts and the voluminous concordance in the Indus Script characters had to be tackled. No fonts were available for printing in this script. Reproduction by computer-controlled plotting was at first tried out, but given up due to various practical difficulties, but especially because the stylisation of characters having curves and slanted lines due to the constraint of using an X-Y drum plotter was found unacceptable.

2.5 The challenge was taken up by the National Centre for Software Development and Computing Techniques (NCSDCT) at the TIFR, Bombay, where a very much more versatile computer, the DEC 1077 system, had become operational by late 1975. The Centre had developed a software package for computer-aided photo-typesetting which can be used on an Alpha-type photo-composing machine driven by paper tape. Experiments to adapt this package for typesetting of the Indus Script characters from a film font were tried out successfully. The Tata Press, Bombay, undertook the task of preparing a special film font for the Indus Script from which the *Texts*, *Concordance* and *Tables* have been printed. The availability for the first time of a font for printing in the Indus Script characters is a valuable by-product of the present project.

3. SOURCES

3.1 The List of Sources for the Texts and the List of Inscribed Objects included as appendices provide source references to individual texts (pp. 814-29).

3.2 *Publications*

The major excavation reports on Mohenjodaro, Harappa and Chanhudaro and the publications of the Archaeological Survey of India (ASI) are the principal sources for the texts included in the present volume. Additional material reported from excavations, explorations or as stray finds are taken from widely scattered publications.

3.3 *Photographs*

The Photo Library of the Director-General, ASI at New Delhi, has a very rich collection of photographs arranged in annual series according to areas or sites. In particular, the photographic albums included in the Punjab and the Sind series have proved to be a treasure trove containing an unexpectedly large number of unpublished photographs of seals and other inscribed objects from Harappa and Mohenjodaro respectively. The unpublished objects in these albums include items even from the earlier excavations by R.D. Bannerji, Marshall and Mackay at Mohenjodaro and by Vats at Harappa. Many of the miniature tablets and the smaller sealings from Harappa, left unillustrated and tabulated by Vats as 'similar to' other items in the plates of *EH*, are found in these unpublished photographs. The albums also have photographs of most of the objects from the later excavations conducted by the Official Custodians of Mohenjodaro and Harappa after the closure of the main excavations. Only a few of these later finds from Harappa have been published in the Annual Reports of the ASI³.

The ASI photo albums have also been of great help in checking and collating the readings of the published items. These albums often have several sets of photographs of the same objects, some taken directly, others from plasticine or plaster impressions and yet others, enlarged. In particular, the series of photographs in Sind, vols. XII-XIII (1926-28), XVIII (1928-29) and XXII (1929-31) and in Punjab, vols. XXXV to XXXVII (1926-28) are far superior in definition, clarity and detail to those appearing on the plates of *MIC*, *FEM*, and *EH*.

3.4 *Original objects*

Many of the inscribed objects, especially the miniature tablets and the smaller sealings, are too small to show much detail even in the best of photographs. It is almost impossible to photograph the inscribed copper tablets and bronze implements satisfactorily. Even in the case of the larger seals, finer details (e.g. the inner markings on the 'fish' group of signs) are often obscured by shadows cast by oblique lighting. Most of

the photographs of the seals are taken from impressions which determine the quality of the reproductions. For all these reasons, the desirability of examining the original objects themselves cannot be overemphasised. Only a part of the material excavated at Harappa and Mohenjodaro is now in India, mostly in the collections of the ASI and the National Museum, New Delhi. Stray specimens are to be found in various other museums in India and abroad and the remaining material is presumably in Pakistan which I could not visit.⁴ By the courtesy of the authorities of the ASI at New Delhi and Baroda, the National Museum, New Delhi, Indian Museum, Calcutta, the Prince of Wales Museum, Bombay, Baroda Museum, Government Museum, Madras, the Department of Archaeology, Haryana, the British Museum, London, and the Louvre, Paris, I was able to inspect and copy over a thousand objects included in the present volume including several unpublished items.

3.5 *Unpublished objects from Lothal and Kalibangan*

With the generous permission given by the Director-General of Archaeology, India, and by Shri S.R.Rao, Shri B.K.Thapar and Shri W.S.Siddeque, I was able to inspect and copy the still largely unpublished inscriptions from Lothal and Kalibangan and include the texts in the present volume. These inscriptions from the 'provincial' centres of the Harappan polity show several new signs, variants and combinations, and will be of great interest to the students of the Indus Script.

3.6 *Texts compiled from original sources only*

Every text included in the volume is taken from an original source. By 'original source' is meant, either the object itself directly copied by me from a museum or its mechanical reproduction by means of a plaster cast or a photograph of the original or its impression. Wherever I could not get at an original source, I have preferred to exclude the text from the corpus rather than risk multiplying errors by copying from other copies.⁵ The inscribed objects listed without illustration by Vats in *EH* as 'similar to' other items have also been excluded except where I have been able to see the original in a museum or its unpublished photograph in the ASI Photo Library. The only partial exception made to this rule is in regard to the drawings (mostly of copper tablets, bronze implements and the smaller sealings difficult to photograph) in the original publications, viz. *MIC*, *FEM*, *EH*, and *CE*. However, even in these cases I have been able to verify most of the texts from either the original objects in the museums or from unpublished photographs in the ASI Photo Library.

3.7 *Secondary sources*

The four earlier concordances listed below have been consulted for collation of readings:

1. Sign Manual by Gadd and Smith in *MIC*, vol. III, Pls. CXIX-CXXIX.
2. Sign Manual by Vats in *EH*, vol. II, Pls. CV-CXVI.
3. *The Script of Harappa and Mohenjodaro*, G.R.Hunter (1934).
4. *Materials for the Study of the Indus Script*, vol. I, *A Concordance to the Indus Inscriptions*, Seppo Koskeniemi, Asko Parpola and Simo Parpola (1973).

4. SITES

19 Harappan and 5 West Asian sites are represented in the present collection. A Map showing the location of the Harappan sites included in the volume is added (p. 29). The number of inscribed objects included in the volume from each site is given overleaf:

MAJOR HARAPPAN SITES		OTHER HARAPPAN SITES		WEST ASIAN SITES	
Mohenjodaro	1540	Alamgirpur	3	Djoka (Umma)	1
Harappa	985	Amri	2	Kish	2
Chanhudaro	66	Banawali	7	Susa	1
Lothal	165	Chandigarh	4	Telloh	2
Kalibangan	99	Desalpar	2	Ur	6
		Dholavira	1	Unknown	
		Jhukar	1	provenance	
		Kot Diji	1	(prob. from	
		Lohumjodaro	1	West Asia)	5
		Rakhigadhi	1		
		Rojdi	2		
		Rupar	2		
		Surkotada	5		
		Tarkhanawala Dera	1		
		Unknown provenance			
		(prob. from the			
		Indian sub-continent)	1		
					Total: 2906

5. INSCRIBED OBJECTS

5.1 The total number of Harappan objects in the photographic card catalogue assembled for the study is 3455. However, 549 objects without any inscriptions on them or those with totally missing, damaged or illegible inscriptions were excluded; the remaining 2906 inscribed objects with legible or partly legible inscriptions provide the corpus of texts in the present volume. An inscribed object can have, by definition, only one text consisting of one or more lines, inscribed on one or more sides of the object. Each inscribed object is given a reference number in four digits, which serves also as the number of the text inscribed on it. See Code 1 for arrangement of Text numbers (p. 30). The List of Inscribed Objects (pp. 816-29) contains full particulars of the texts included in the volume.

5.2 *Unpublished inscribed objects*

634 texts, constituting more than a fifth of the total number included in the volume, have been taken from unpublished objects.⁶ The break-up of this number according to sites is given below:

Mohenjodaro	225	Lothal	96	
Harappa	257	Kalibangan	46	
Chanhudaro	1	Other sites	9	
<hr/>				
			Total	634

6. TYPES OF INSCRIBED OBJECTS

6.1 Inscriptions in the Indus Script occur on several types of objects. However, these can be grouped under three basic types from the point of view of a study of the writings on them:

- (i) *Seals* with texts deeply engraved on them in *intaglio* in the reversed direction⁷,
- (ii) *Sealings* which are positive impressions in relief made by seals or special moulds on impressible material like clay, faience or metal, and
- (iii) *Other inscribed objects* which carry thinly incised inscriptions meant for direct reading. These objects include miniature stone, terracotta or faience tablets, pottery (incised before or after firing or sometimes painted), copper tablets, bronze implements, ivory or bone rods and other miscellaneous objects.

While seals and sealings have not been classified further, the other inscribed objects have been distinguished as their types may hold a clue to the kind of writing which appears on them. See Code 2 for object types (p. 30).

6.2 The distribution of inscribed objects according to site and type is shown below:

SITES	OBJECT TYPES*									TOTAL
	1	2	3	4	5	6	7	9		
Mohenjodaro	1232	119		13	135	5	28	8	1540	
Harappa	350	288	272	64		3	1	7	985	
Chanhudaro	58	3		4		1			66	
Lothal	89	75		1					165	
Kalibangan	56	21		20		2			99	
Other sites	13	4		17					34	
West Asian Finds	16	1							17	
TOTAL	1814	511	272	119	135	11	29	15	2906	

*Note: The Type codes represent: (1) seals, (2) sealings, (3) miniature stone, terracotta or faience tablets, (4) pottery graffiti, (5) copper tablets, (6) bronze implements, (7) ivory or bone rods and (9) miscellaneous inscribed objects. Cf. note 2 at p. 31 for details of miscellaneous objects.

7. SIDES OF INSCRIBED OBJECTS

7.1 Each distinct surface of an object bearing an inscription or a pictorial motif (termed a 'field symbol') is regarded as a 'side' of the object. Copper tablets from Mohenjodaro, and the miniature tablets and the smaller sealings from Harappa are generally found inscribed on both the flat faces. Miniature tablets also occur in the shape of prisms with three inscribed sides (e.g. 4576), or as bars (rectangular in section) with four inscribed sides (e.g. 5471). Cube sealings (2808 and 2857) have the maximum of six inscribed sides. Sometimes seals are found inscribed not only on one or both the flat faces but also on the edges (e.g. 2405) or even on the boss at the back of the stamp seals (as in 1018, 2626, and 5056). Each such inscribed surface is regarded as a 'side' of the inscribed object in question. In the case of irregular

lumps of clay with multiple and sometimes overlapping seal impressions on them (e.g. 9701), each such impression is counted as a 'side' of the sealing. Graffiti on different parts of the same pottery (e.g. 2929 and 2930) are taken as occurring on different 'sides' of the object in question.

7.2 The inscribed sides of each object are serially numbered, blank sides not being counted. As a matter of convention, sides with inscriptions are numbered before the other sides of the same object without inscriptions but featuring field symbols. A distinction has been made for purposes of analysis, between the *only* inscribed side and the *first* of more than one inscribed side of an object. See Code 3 for Side numbers (p. 30).

7.3 The serial numbering of sides of objects having more than one inscribed side should be regarded as provisional in the present state of our knowledge. However, the random side order of the original publications is not followed.⁸ The following criteria have been kept in view while fixing the side order of the lines of text:

(a) Lines of text appearing on different sides of an object may occur as a single line on another object. In such cases the side order is determined with certainty, assuming of course, that the direction of writing is known. For example, the single-line text in 4340 occurs as two lines on different sides of 4601 enabling us to fix the side order:

4340: U III † " ⊗
 4601: Side 1: † " ⊗
 Side 2: U III

(b) Frequently occurring terminal signs and sign combinations at the beginning or the ending of single lines provide clues to the real order of lines having these signs in similar positions. Study, for example, the two sides of 1475 (illustrated in *MIC* 475 and 476):

1475: Side 1 (*MIC* 476): " ◊ U U
 Side 2 (*MIC* 475): ⚡ ⚡

It will be seen from the *Concordance* that " ◊ is the most frequent initial or quasi-initial sign combination in the *Texts*, that the combination ⚡ " ◊ occurs nine times in single-line texts and that the position of ⚡ is mostly final. Hence the real side order is as indicated above and not as in *MIC*. Even when lines of text on different sides are not connected by evidence of sequence, lines beginning with initial signs are numbered before other lines ending with final signs on grounds of probability.

(c) In the absence of any evidence to the contrary, the side order given in the source publications is generally followed.

8. FIELD SYMBOLS

8.1 A pictorial representation or conventional motif (other than the signs of the Indus Script) occurring on an inscribed object is termed a 'field symbol'. See Code 4 for field symbol codes (p. 30). The List of Field Symbols gives the description of each field symbol and its frequency (pp. 793-98). The field symbols are also illustrated in Plates I to VII (pp. 799-813).

8.2 Each side of an inscribed object can have, by definition, only one field symbol (comprising all the pictorial representations occurring on that side) or none. Different sides of an inscribed object may feature different field symbols with or without accompanying inscriptions. Where the inscribed object is itself in a symbolic shape (e.g. hare, fish, tortoise, pipal leaf etc.), such shape is treated as a 'field symbol' for each of the sides inscribed with text. In such cases, other field symbols occurring on sides without texts are coded as usual.

8.3 The vast majority of field symbols depict animals occupying the centre of the field and generally facing right. (The orientation of field symbols appearing on seals is assumed to be that on the impressions of the seals.) The inscriptions are generally placed in the upper register above the animal and the lines run (with a few exceptions) from the head of the animal towards its tail over the back. By far the most frequent field symbol, especially on the seals, is the so-called 'unicorn' with 1159 occurrences.⁹ The most characteristic feature of the field symbol showing the unicorn is the presence of a special cult object (variously described as a 'manger' or an 'incense-burner') almost always occurring in front of the animal. The other animals depicted on the inscribed objects include bull with two long horns (otherwise resembling the 'unicorn'), humped bull, short-horned bull, buffalo, elephant, tiger, rhinoceros, different kinds of goat-antelopes (with short tail) and ox-antelopes (with long tail), hare, crocodile (*gharial*), fish, tortoise, frog, serpent, birds and different types of fabulous and composite animals. The kino tree, generally within a railing, is a common theme. The pipal tree and the pipal leaf are also depicted. The anthropomorphic figures include a horned personage seated on a pedestal (the so-called *Paśupati* figure) and a standing personage with bovine features. Among the 'scenes' depicted on the inscribed objects, the recurrent themes are: a man seated on a kino tree with a tiger standing on the ground below, a person grappling with two rearing tigers on either side, and sacrificial scenes. The *svastikā* and the dotted circle are among the more frequent conventional symbols figuring on the inscribed objects. Different kinds of geometrical patterns and cross-like motifs occupy the field on one side of many of the smaller sealings from Harappa. Simple borders in geometrical patterns with hatched lines, dotted circles etc., are seen, especially on the inscribed ivory or bone rods at one or both ends.

9. LINES OF TEXT

9.1 A line of text is continuously written matter occurring on a side of an inscribed object. The lines are generally written in a straight line, but occasionally radially inscribed on circular sides (e.g. 1478) or even on rectangular sides (e.g. 4254). The lines are serially numbered within each side of an inscribed object generally from top to bottom (with some exceptions in the case of irregularly inscribed lines). In numbering the lines of text, a distinction has been made for purposes of analysis between the *only* line of text and the *first* of more than one line of text appearing on the same side of an inscribed object. See Code 5 for Line numbers (p. 31).

9.2 The total number of texts in the corpus is 2906. The total number of lines of text is 3573. The majority of the texts are of single lines only. The maximum number of lines is 7 in a text (2405) and 3 on one side of an inscribed object (e.g. 1400). The length of a line of text varies from 1 to 14 signs. (The longest lines with 14 signs each occur in 2654 and 3107). The maximum length of a text is 26 signs in three lines (in two identical texts in 1623 and 2847). Most of the texts are however much shorter. The average length of a text is 5 signs only.

9.3 The unit of textual analysis (distributional statistics) is a line of text. There are two reasons why it is not possible to consider the whole text as a unit for this purpose. Firstly, there is no way of knowing beforehand whether different lines of an inscription appearing on the same object or even on the same side have continuity of sequence or to be regarded as separate texts. Secondly, it is not also possible to ascertain beforehand the real order (if any) of the lines of text appearing on the same object or even on the same side. It is therefore necessary to stress that the definition of a 'text' and serial numbering of the sides and the lines of text is provisional, though not arbitrary as explained earlier.

10. DIRECTION OF WRITING

10.1 The following conventions have been adopted in coding the direction of writing of lines of text:

- (i) The direction of writing in respect of texts engraved on seals is assumed to be that on the impressions of the seals.
- (ii) The direction of writing in all other cases is indicated as in the originals.
- (iii) The lines of text in the *Texts* and the *Concordance* are arranged to be read always from right to left. The actual direction of writing of each line on the original object, or on the impression in the case of seals, is also however indicated separately by a code. See Code 6 for Direction of writing (p. 31).

10.2 One of the few generally accepted facts about the Indus Script is that the direction of the script is from right to left. Several investigators have demonstrated this from a study of the external features of the writing and, more importantly, from the evidence of sequences.¹⁰

10.3 External evidence for the direction of writing is provided mainly by the observation that signs at the left end of the lines undergo occasional cramping, diminution in size, angular rotation or vertical displacement for want of space suggesting that the lines in question terminated at the left. Alekseev has collected a number of examples of this kind. B.B. Lal has demonstrated from a study of overlapping incisions on pottery graffiti that the inscriptions in question must have been incised from the right. Lal has also reiterated the argument (first advanced by Gadd and Smith) that the disposition of the radial line in 4254 along the top, left and bottom edges of the rectangular side shows an anti-clockwise (that is, right-to-left) direction.

10.4 While such external evidence is useful, and its cumulative effect not insignificant, it cannot be considered conclusive for the following reasons:

(a) There are too many exceptions not adequately noticed by the previous investigators. Some examples which might suggest a left-to-right direction are given below:

1336 : The signs at the right end are smaller and cramped ;

2486 : The signs get progressively smaller as one proceeds towards the right ;

1126 : The first two signs at the right end are displaced and overflow to a higher register ;

1093 : The signs occupy the top, right and bottom edges of the rectangular side in an apparently clockwise direction.

In fact such examples are quite common on the unicorn seals where the engraver had to accommodate the soaring head and the horn of the animal at the top right-hand corner of the field, by pushing the lines to the left or by displacing individual signs above or below the line or by reducing the size of the first one or two signs.

(b) A more fundamental difficulty arises from the fact that we know by simple observation that the lines run in either direction, though we may not be able to identify the actual direction of any particular line. Vats first drew attention to such bi-directional writing on the miniature tablets (which are not seals) and the smaller sealings at Harappa.¹¹ Among the examples cited by him are the following:

Hence all the external characteristics, relied upon to prove a direction, must occur (at least in theory) in the opposite direction also. For example, we may consider Lal's famous demonstration of direction of writing from overlapping incisions on pottery. We now know of several lines of pottery graffiti running in the left-to-right direction. (10 of the 85 lines of pottery graffiti with at least two legible signs included in the *Texts* run from left to right).¹² Assuming that any of these lines had overlapping incisions, Lal's criteria must indicate a left-to-right direction for the lines in question, but hardly for the script as a whole! Furthermore if two overlapping signs turn out to be a unique pairwise combination, their relative position, even when established by this most objective test, may not indicate the *normal* direction of the script, given the fact that lines of text are known to run in either direction.

10.5 What we therefore need is a universal characteristic which determines the direction of writing of the script as a whole. Such a characteristic is provided only by the sequence of signs reflecting the fixed order of speech in the language. This order remains the same whether the written text runs from right to left or from left to right or in the *boustrophedon* mode and whether we look at a seal or its impression. External evidence is necessary only to discover the fixed order of the more frequent sequences which will enable us to determine statistically the normal direction of the script.

10.6 These theoretical considerations have suggested a rather different approach in the present study. The computerisation of texts and background data has made it possible to verify the direction of writing by a comparative study of the entire known material and also to quantify the results. The study has confirmed that the general direction of writing of the Indus Script is from right to left, though exceptional cases of writing from left to right and also in the *boustrophedon* mode are known. In view of the importance of the question, the manner in which the problem was studied is described below in some detail.

10.7 *Orientation of asymmetric signs*

A visual inspection shows that the asymmetric signs (with respect to the vertical axis) occur oriented in either direction.¹³ By mere counting, it can be established that for each asymmetric sign (occurring three or more times), there is a preponderant orientation. This is defined on a statistical basis as the 'normal' orientation of the sign and the opposite as the 'reversed' orientation. It can also be established that (subject to a few exceptions) all asymmetric signs in a given line of text have the same orientation, either all normal or all reversed. (cf. the first example in para. 10.4 b.) This indicates that the lines were written in

either direction and that the orientation of the asymmetric signs changed with the direction of writing of the lines, e.g.

Signs with normal orientation: Ξ , Υ , Λ , Υ

Signs with reversed orientation: Ξ , Υ , Λ , Υ

10.8 *Sequence of signs*

Since lines run in either direction, the sequence of sign groups will also vary. By mere counting it can be established that for any given sign group (occurring three or more times) there is a majority direction and a minority direction. The majority direction is defined statistically as the 'normal' direction of the sequence and the minority direction as the 'reversed' direction. It may be clarified that at this stage we still do not know which way (from right or left) the 'normal' direction runs, e.g.

Normal sequences: $\uparrow \Lambda$, $\Upsilon \Lambda$, $\Upsilon \otimes$, $\Upsilon \diamond$

Reversed sequences: $\Lambda \uparrow$, $\Lambda \Upsilon$, $\otimes \Upsilon$, $\diamond \Upsilon$

10.9 *Terminal positions*

It can be ascertained by visual inspection and counting that certain signs and sign groups tend to occur mostly at the right end and certain others mostly at the left end. These are defined as the 'normal' positions of the signs and the sign groups in question and the opposite occurrences as the 'reversed' positions, e.g.

Normal right-end pairs: $\Upsilon \otimes$, $\Upsilon \diamond$, $\Upsilon \otimes$

Normal left-end pairs: $\Lambda \Upsilon$, $\Xi \Upsilon$

10.10 *Split sequences*

With the statistical data firmly in hand, all we require 'to break the code' for the direction are a few split sequences involving lines with frequent signs or sign groups. Split sequences are those single-line sequences which are also found split up between two adjacent lines one below the other on the same side of an inscribed object. If we *assume* that the upper line is written first and the lower line thereafter, we can establish the order of signs in the single line in question.¹⁴ It then follows that all other lines containing this sequence have to be read in the direction of the sequence determined by this test. The longer the sequence, and the more frequent its occurrence, the better it is for proving its direction. This is a cumulative process and it is possible by means of interlocking evidence in respect of orientation of asymmetric signs, sequence of sign groups and the positional distribution of the more frequent signs and sign groups to establish conclusively the normal direction of the script. We will then be able to pick out the exceptions and study statistically the extent of variations and the environments in which such variations occur.

10.11 Split sequences are however quite rare, indicating that the Harappan scribe was normally averse to split up integral sequences except when compelled to do so by limitations of space or the disposition of field symbols. The famous examples occurring in 1052 and 1247

have been cited by almost all the investigators to demonstrate the right-to-left direction of the script. It has also been shown that the text in 1247 is written in the *boustrophedon* mode as the second line runs from left to right.

10.12 A search was made during the present study to discover examples of split sequences with at least two signs in each line (necessary to indicate direction) and without the presence of any field symbol to distort the arrangement of lines.¹⁵ A unique example has been found in 6112 not previously noticed in this connection. In fact, this is an exceptionally lucky find as the split sequence involves the most frequent right-end pair of signs and the most frequent left-end sign known in the script. The text which occurs on a well-preserved seal from Chanhudaro, consists of five signs, two of them in the upper line and the other three in the lower line written in neat bold characters occupying the whole field. The *Concordance* shows that the identical text occurs in a single line on two other seals (2618 and 4090). The arrangement of the lines is as follows:

6112 line 1 : " ◊
 line 2 : ƚ 𑀓 𑀘

 2618 & 4090 : ƚ 𑀓 𑀘 " ◊

Assuming that in 6112, the upper line is written first and the lower line thereafter, it follows that 2618 and 4090 read from right to left.

10.13 The importance of this split sequence will be evident from the following statistics:

(a) " ◊ is the most frequent pairwise combination occurring in the script. The pair occurs 291 times in the *Texts*. The most characteristic position of the pair is at the right end of the lines where it occurs 245 times. It is also the pair with the highest frequency in this position.

(b) ƚ is by far the most frequent sign in the script. It occurs 1395 times in the *Texts*. The most characteristic position of the sign is at the left end of the lines where it occurs 931 times. It is also the most frequent left-end sign in the script.

Since we know from 6112 that *the most frequent right-end pair in the script is initial and the most frequent left-end sign is final, it follows that the normal direction of the script must be from right to left*. The result is statistically conclusive even from the study of this single case of split sequence (provided of course that the assumption about the line order is valid).

10.14 The breakthrough obtained from the study of 6112 can be quickly exploited by picking out all the frequent sign combinations occurring either with " ◊ in the right-end position or with ƚ in the left-end position or with both. Most of the frequent sign combinations occur in these environments and their order thus becomes known. These combinations are then used to determine the order of signs where they occur without " ◊ at the right end or ƚ at the left end. A few hours of diligent search with the help of the *Concordance* is all that is required to establish with certainty the direction of writing of virtually every line in the *Texts*.

10.15 The longest split sequence occurring in the *Texts* will be of interest:

2564 line 1 : ") ||| 𑀓
line 2 : 𑀓 𑀓 𑀓

2348 (single line) : 𑀓 𑀓 𑀓 ") ||| 𑀓

10.16 *Statistics relating to direction*

The coding of the direction of writing of the lines of text was done on the basis of the criteria established in the present study. The distribution of lines by direction of writing is shown below:

CODE	DIRECTION	NO. OF LINES	PER CENT
1	Right to left	2974	83.23
2	Left to right	235	6.57
3	Single-sign lines	190	5.32
4	Top to bottom	7	0.20
5	Symmetrical sequences (which read alike from either end)	12	0.34
9	Doubtful cases (on account of damaged or illegible portions)	155	4.34
Total:		3573	100.00

10.17 Writing in the *boustrophedon* mode (that is, alternate lines inscribed on the same side running in either direction) is rare. The *Texts* contain nine examples only.¹⁶ The evidence seems to suggest (cf. 1247 and 6402) that the second line runs in the reversed direction generally when the first line has an incomplete sequence.

11. SIGNS OF THE INDUS SCRIPT

11.1 *Sign List*

A Sign List of the Indus Script is included in the volume (pp. 32-35).

11.2 *Number of signs*

The Sign List records 417 signs in the Indus Script. It is however difficult to be precise about the total number of signs in an undeciphered script. The difficulty arises from the fact that in an undeciphered script, it is not easy to distinguish between independent signs and mere graphic variants, or even between the signs of the script and other symbols accompanying the inscriptions. The earlier sign lists compiled by Langdon, Gadd and Smith, and Vats did not distinguish between signs and sign variants.¹⁷ At the other end, Hunter arranged the signs

in large groups (comprising, according to his classification, basic signs, modified signs and ligatures).¹⁸ Dani introduced the concept of a normalised signary of the script compiled by comparing the variant signs and arriving at the normal form on the basis of the most frequent type.¹⁹ The sign list published by the Finnish Group of scholars (as part of their concordance) is also a normalised signary which however includes a few major 'recorded' variants.²⁰ The criteria adopted in the present study for compiling the Sign List are briefly dealt with below.

11.3 *Signs distinguished from symbols*

The graphic elements of the script are termed 'signs' and all other pictorial representations occurring on the inscribed objects, as 'symbols'. There is generally no difficulty in distinguishing the signs occurring in a sequence as lines of text from the much larger symbols (e.g. the unicorn) occupying the field. The matter is however not free from doubt when considering the smaller figures occurring in isolation. The rule followed in such cases is not to consider an isolated graphic form as a sign of the script unless it occurs elsewhere within a sequence of signs or appears to be a modification of an attested sign. Thus the cult objects appearing before the animals (the so-called incense-burner, trough etc.) geometrical patterns, conventional symbols and motifs and many of the graffiti marks on potsherds do not qualify as signs for this reason. In case of doubt, the test of sequence can be usefully applied. Thus the isolated human forms occurring at the lower left of the field in 2420 and 6122 are signs to be added on to the lines appearing above them judging from the sequence $\uparrow \cup$ occurring frequently within a line of text.

11.4 *Signs distinguished from graphic variants*

The Sign List included in this volume represents a normalised signary of the Indus Script. The most frequently occurring variant of a sign was chosen as its normal form which was then copied from the best available specimen of that form. The term 'sign variant' is used to denote mere graphic variations of the same sign due to the different 'hands' of the scribes, material used, the mode of writing, regional variations or evolution in course of time. A List of Sign Variants is given (pp.785-92). While it is not easy to determine what are variants in an undeciphered script, it would be meaningless to list every slight variation as a different sign. It is necessary to distinguish the graphic variants, at least in a broad manner, if we are to recognise the pattern of sign occurrences and make progress with the interpretation of the script. The criteria followed in this regard in the present study are that variant signs look similar, have the same positional and functional characteristics and the variations are either too gradual or too numerous to denote meaningful differentiation. (cf. variants of $\delta\lambda\delta$, Υ , E , \square and \square in the List of Sign Variants.) As a rule, the more complex signs tend to have more variants as the examples cited above would show. Some variants are occasionally turned through an angle upto 90 degrees (e.g. variants of \cup , \cup , \square and \square). Variations between rhomboid and oval forms are common (e.g. variants of \diamond , \diamond , \circ etc.). However, the reversed orientation of asymmetrical signs sometimes occurring even in lines with a normal right-to-left direction are not counted as variants, e.g. \sqcap in 1017, \square in 1046, ' ζ ' in 1122 and \cup in 1150 (*MIC* 17, 46, 122 and 150). In doubtful cases the variant forms have been kept apart and listed as independent signs. Out of 417 signs in the Sign List, 179 signs have variants totalling 641 forms recorded in the List of Sign Variants. The List cites one example of occurrence for each recorded variant. These have been copied from the best-preserved occurrence of each variant form and cover all the significant variations of signs known to occur in the *Texts*.

11.5 *Morphological classification of signs*

The Sign List is arranged according to a morphological classification in the following order:

CLASSIFICATION	SIGN NUMBERS
I Human beings (including parts of human body)	1-49
II Other living beings (and parts of their bodies)	50-85
III Strokes and 'numerals'	86-122
IV Other linear signs	123-203
V Triangular signs	204-235
VI Rectangular and rhomboid signs	236-286
VII Curves	287-327
VIII Cups	328-372
IX Ovals and circles	373-417

It needs to be emphasised that the classification is merely conventional and no stress is laid on any identification, even in respect of signs included in the first two categories of 'living beings'.

11.6 *Sign boundaries*

A simple rule is followed in deciding what are integral signs. A sign is separated by space from the neighbouring signs to its right and left. The exceptions to this rule are the following classes:

(a) Signs consisting of closely grouped strokes (the 'numerals' and other stroke signs with more than one line) which always occur together and whose integral character is thus obvious, e.g.

|||, ||||, ||/, ʹ, ʹ

(b) 'Bracketed' signs, i.e. compound signs with generally symmetrical modifications placed on either side. These can be recognised by a simple test, viz. that such 'brackets' must be found on both sides in all occurrences and never on one side only (leaving aside damaged texts), e.g.

|ʹ|, ʹʹ, (ʹ), (ʹʹ)

(c) Compounds of mirror-reflected pairs. A rather curious feature of the script is the occurrence of mirror-reflected pairs as bound signs. The mirror-reflection is generally along the horizontal axis as in ʹʹ, ʹʹ, ʹʹ, ʹʹ and twice along the vertical axis as in ʹʹ and ʹʹ. In the case of ʹʹ, both types of mirror-reflection occur (see List of Sign Variants) proving the integral nature of such compounds.



11.7 Reduplicated occurrences of the same sign are however counted as separate signs, e.g.

ʹ ʹ, ʹ ʹ ʹ, ʹ ʹ ʹ ʹ



Where the originals show adjacent signs sometimes ligatured and at other times separately, these are treated always as independent signs, e.g.




11.8 In doubtful cases the question about sign boundaries can usually be resolved by a comparison of pairwise frequencies of signs. This can be illustrated by an example. The possible alternative readings for 1218 can be as follows:

Reading A :  |  | | as 5 signs

Reading B :  |  || as 4 signs

Reading C :  |  | | as 3 signs

From the statistics of pairwise frequencies (Table II) it will be seen that reading C is the only tenable one as the other pairwise combinations listed above do not occur in the *Texts* (except for one doubtful occurrence of *| in 2124).

11.9 It should however be stressed that the rule about integral signs is only one of convenience, and may have to be reviewed when the script is deciphered, or at least better understood. For instance, the same signs repeated twice or more may be plurals represented by one word in the Harappan language. The super-script stroke signs ¹, ^{||}, ^{||} so often found after initial or quasi-initial signs are probably grammatical suffixes and may be integrally attached to the preceding words. In fact, there are two exceptional occurrences showing ^{||} ligatured to the preceding signs (1332 and 5067). It is however best, in the present state of our knowledge of the script, to treat each such sign as independent.

11.10 *Frequency of signs*

The following statement summarises the frequency of signs in the *Texts*:

FREQUENCY RANGE	NO. OF SIGNS	TOTAL SIGN OCCURRENCES	PER CENT (OF TOTAL OCCURRENCES)
1000 or more	1	1395	10.43
999 - 500	1	649	4.85
499 - 100	31	6344	47.44
99 - 50	34	2381	17.81
49 - 10	86	1833	13.71
9 - 2	152	658	4.92
Only once	112	112	0.84
Total	417	13372	100.00

The figures show clearly how relatively few signs take most of the functional load in the script. At one end we have 2 signs ^{||} and ^{||}, which appear to be grammatical suffixes from their frequency and positional characteristics, accounting for over 15 per cent of the total sign occurrences. 67 signs account for over 80 per cent of the total occurrences, constituting the

core of the script. At the other end, we have 112 signs each occurring only once. Many of these are compound signs. The independent status of the signs each with a single occurrence is however doubtful, and their inclusion in the Sign List is provisional until more examples are found or, as is more likely, they are recognised as graphic variants of the more frequent signs.

11.11 *Positional distribution of signs*

A sign can occur in four possible positions with respect to a line of text, viz. solus (one sign constituting the whole line), initial, medial or final. The following statement summarises the positional distribution of signs with respect to lines of text:

POSITION	NO. OF SIGNS	TOTAL FREQUENCY
Solus	88	190
Initial	290	3010
Medial	286	7196
Final	173	2976
Total	417*	13372

* A sign can occur in more than one position.

The relative larger frequency of the final signs indicates, as should be expected, the occurrence of grammatical endings among them.

11.12 *Sign combinations*

Stable sign combinations can be readily identified from the *Concordance*. The most stable sign combinations in the script are those formed by two signs. The following statement summarises the frequency range of pairwise combinations (see Table II):

FREQUENCY RANGE	NO. OF PAIRWISE COMBINATIONS	TOTAL FREQUENCY	PER CENT
100 times or more	6	949	9.69
99-50 times	13	898	9.17
49-25 times	38	1307	13.34
24-10 times	135	1953	19.93
9- 2 times	873	2998	30.60
Only once	1693	1693	17.27
Total	2758	9798	100.00

Not all the pairs are necessarily true combinations. Analysis of adjacent pairwise combinations and near-identical or similar sequences leads to the separation of 'real' pairs (corresponding to linguistic units) from random pairs. It is possible to achieve 'word-division' by pursuing this line of enquiry without having to make any *a priori* assumption as to the nature of the language of the inscriptions.

12. CODES

12.1 Each line in the *Texts* and the *Concordance* is accompanied by a number string at the left of the page giving the Text number and other relevant background data in a coded form. A set of six codes provides the explanations. The same codes are also used in the Tables. In addition, a letter code (Code 7) for the sites is used in the Tables and the Lists. Signs read doubtfully are indicated by an asterisk (*) prefixed to the sign at top right. Lost, damaged or illegible passages are marked by the symbol /// (which may stand for one or more lost signs as, in the nature of things, it is not possible to count such signs). See Codes (pp. 30-31).

12.2 *Arrangement of codes for the Texts*

The number strings accompanying the lines in the *Texts* are in ten digits. These are made up of six codes giving the following data:

NO. OF THE CODE	DESCRIPTION	COL. NO. IN TEXTS
1.	Text number	1-4
2.	Type of inscribed object	5
3.	Side number	6
4.	Field symbol on the side	7-8
5.	Line number	9
6.	Direction of writing of the line	10

Codes for Text number and Type (cols. 1-5) are not repeated for the additional sides of the same object. Codes for Text number, Type, Side number and Field symbol (cols. 1-8) are not repeated for the additional lines occurring on the same side. (See para. 13.3 below.)

12.3 *Arrangement of codes for the Concordance*

The number strings accompanying the lines in the *Concordance* are in six digits giving only the Text number (cols. 1-4), Side number (col. 5) and Line number (col. 6), the codes being the same as in the *Texts*. Code for Text number (cols. 1-4) is not repeated for the additional sides and lines of the same object. (See para. 14.5 below.)

13. THE TEXTS

13.1 The corpus comprises 2906 texts in 3573 lines with 13372 legible sign occurrences, constituting the largest collection of inscriptions in the Indus Script published so far. Texts with more than one line have been arranged with the lines shown separately one below the other. Sides with field symbols but without lines of text are also listed in separate lines. These lines are however not included in the *Concordance*. No attempt has been made to restore lost signs conjecturally. Readings have been critically collated from all available sources, both original and secondary. Consistency in readings has been checked with the help of the *Concordance*, especially in reading doubtful signs.

13.2 Arrangement of the *Texts* involves the following conventions:

(i) *Uniform orientation of texts*

All seal-texts are copied as they would appear on impressions, so that the readings have the same orientation as those copied directly from the originals in respect of all other types of objects.²¹

(ii) *Uniform orientation of lines*

All lines of text are copied in a uniform direction, that is, from right to left, irrespective of the direction on the originals (or on the impressions in the case of seals). The actual direction of writing is however indicated by a numeral code for each line of text.

(iii) *Normalisation and uniform orientation of signs*

The *Texts*, *Concordance* and the *Tables* are printed in a normalised signary and the sign variants are not distinguished. However, the List of Sign variants records all significant graphic variants with an index of occurrences (giving one example for each recorded variant). Asymmetric signs are printed with the normal orientation (See paras 10.7 and 11.4).


13.3 *A specimen passage from the Texts.*

A specimen text (2405) is reproduced below from the *Texts* (p.70) to illustrate the arrangement:

1-4	5	6	7-8	9	10	
2405	1	1	01	0	1	𐎗 𐎚 𐎛 𐎜 𐎝
		2	00	1	2	𐎞 𐎟 𐎠 𐎡
				2	1	𐎢 𐎣 𐎤 𐎥
		3	00	0	1	𐎦 𐎧 𐎨
		4	00	0	1	𐎩 𐎪
		5	00	0	3	𐎫 𐎬
		6	00	0	9	𐎭

Explanations:

COL. NO.	DESCRIPTION	CODE	KEY
1-4	Text number	2405	<i>FEM</i> 405
5	Type	1	Seal
6	Side number	1-6	Sides 1 to 6
7-8	Field symbol	01	Unicorn (on side 1)
		00	Nil (on other sides)
9	Line number	0	Only line (on sides 1, 3-6)
		1	First line (on side 2)
		2	Second line (on side 2)
10	Direction of writing	1	Right to left
		2	Left to right
		3	Only sign in the line
		9	Doubtful

Note: The symbol  indicates illegible or lost passages with one or more signs. The line of text on the sixth side is wholly illegible, but included as other lines of the same text are legible.

14. THE CONCORDANCE

14.1 The *Concordance* is a complete index of sign occurrences in the *Texts*. The *Concordance* also sets out the textual context of each sign occurrence in full by reproducing the entire text each time along with the sign occurrence.

14.2 *Earlier concordances*

The first two concordances (the Sign Manuals in *MIC* and *EH*) copy each text with the first signs aligned one below the other. There seems to be no particular order among lines with the same key sign. Hunter introduced in his concordance the principle of arranging the key signs one below the other in a central column and grouping the texts with the same environment in order to bring out uniformities in sequences. This arrangement has also been followed in the Finnish Concordance (*A Concordance to the Indus Inscriptions, Parpola et al.*, 1973), which has also introduced the convention of arranging all lines of text to run in one direction (right to left) so as not to disturb the sequences in identical texts. However, the use of pairwise combinations in the Finnish Concordance as the basis of tabulation cannot be considered to be an improvement as it has created several avoidable problems in presentation.²²

14.3 Arrangement of the present *Concordance* is as follows:

- (i) A six-digit Reference number for each line of text consisting of the Text, Side and Line numbers (in that order) is given at the left of the page. See Codes for explanation (pp. 30-31).
- (ii) Each of the legible sign occurrences (including the doubtfully read signs marked with an asterisk sign *) is listed once in the order of the Sign List in the Reference column in the middle of the page (indicated by the letter R at the top) by shifting suitably the position of the Reference line in which the Reference sign occurs.
- (iii) Preceding lines (if any) in the same text are given above the Reference line and so arranged as to end immediately before (that is, to the right of) the Reference column. Succeeding lines (if any) in the same text are given below the Reference line and so arranged as to begin immediately after (that is, to the left of) the Reference column. Thus the key signs are placed one below the other in a central column for easy reference. Each text is read from the top line to the bottom line, and each line from right to left.
- (iv) The listing order of the occurrences of the same sign is positional with reference to the whole text as the unit. The solus occurrences (a single sign constituting the whole text) are listed first, followed by the initial occurrences and thereafter the non-initial occurrences. The initial occurrences are listed in the order of the succeeding signs. The non-initial occurrences are first listed in the order of the preceding signs. Where the preceding signs are identical, the arrangement is by the succeeding signs. For purposes of sorting, signs occurring in all the lines of a text are taken into account. Identical texts are listed in the order of the Text numbers.
- (v) The *Concordance* is indexed by a Sign List which appears on the right-hand side of the page under the heading 'INDEX'.

14.4 The compilation of the *Concordance* on these lines has been a complex operation and made possible only by the use of a large computer and elaborate programming. The effort has been worth the while as a concordance is the basic and indispensable tool for a statistical-positional study of the script. The frequency and positional distribution of each sign and sign combination can be readily ascertained from the *Concordance*. The juxtaposition of near-identical sequences can be used to determine word division. Frequent sign combinations (especially, pairs and triplets) help us to determine the direction of writing of lines containing these combinations. Doubtful signs (marked with a prefixed asterisk*) can be read with a fair amount of confidence by a comparative study of identical sequences. The order of lines of text as well as the direction of writing of lines can be judged by comparing adjacent terminal signs. Sign variants can be distinguished to a large extent by the use of the *Concordance* which sets out the identical or similar environments of the variants.

14.5 *A specimen passage from the Concordance:*

A specimen text (2405) listed under the Reference Sign $\uparrow\cup$ is reproduced below from the *Concordance* (p. 192) to illustrate the arrangement:

1-4	5	6	R	INDEX
2405	1	0	$\uparrow\cup$ $\uparrow\cup$ $\uparrow\cup$ $\uparrow\cup$ $\uparrow\cup$ $\uparrow\cup$	$\uparrow\cup$
	2	1	$\uparrow\cup$ $\uparrow\cup$ $\uparrow\cup$ $\uparrow\cup$	
	2	2	$\uparrow\cup$ $\uparrow\cup$ $\uparrow\cup$ $\uparrow\cup$	
	3	0	$\uparrow\cup$ $\uparrow\cup$ $\uparrow\cup$	
	4	0	$\uparrow\cup$ $\uparrow\cup$	
	5	0	$\uparrow\cup$ $\uparrow\cup$	
	6	0	$\uparrow\cup$	

Explanations:

COL. NO.	DESCRIPTION	CODE	KEY
1-4	Text number	2405	FEM 405
5	Side number	1-6	Sides 1 to 6
6	Line number	0	Only line (on sides 1, 3-6)
		1	First line (on side 2)
		2	Second line (on side 2)

R: Reference column in which the key signs are listed.

INDEX: indicates the sign which is being listed in the Reference column. Each sign is reproduced once in the Index along with the text where the sign occurs first. Indexing is in the order of the Sign List.

Note: The Reference sign $\uparrow\cup$ occurs in the middle line. The preceding lines are placed above and to the right of the Reference sign. The succeeding lines are placed below and to the left of the Reference sign. The whole text is read from top to bottom and each line from right to left.

15. TABLES

15.1 A set of nine tables²³ is included in the volume to provide basic statistics relating to the Indus Script (pp. 717-82). The aim of the *Tables* is to make available the primary data in a compact form for further research. Interpretation of the data is beyond the scope of the present work.

15.2 *Textual analysis*

The study of an undeciphered script commences with an analysis of frequency and positional distribution of signs and sign combinations. Table I provides the relevant data for the sign with reference to a line of text. The reasons why a line of text, and not the whole text, is treated as the unit for distribution analysis have been explained earlier (para.9.3). However, the *Concordance* will enable one to gather readily similar statistics with the whole text as the unit.

15.3 *Pairwise frequencies*

A study of pairwise frequencies of sign combinations will lead to 'word division'. Table II arranges the pairwise sign combinations occurring in the *Texts* in the order of the first (i.e. right-hand side) member.

15.4 *Context analysis*

The statistical data included in Tables III to IX provide material for a context analysis of the inscriptions with reference to their background. Such an analysis will seek to explore the possible relationship between the inscriptions and the inscribed objects and between the latter and its archaeological context of occurrence. The parameters chosen for context analysis are the following:

- (i) Site of occurrence²⁴
- (ii) Type of inscribed objects
- (iii) Field symbols associated with the inscriptions.

15.5 *Site of occurrence*

The Indus Civilization was the largest known to the ancient world. Hundreds of Harappan sites have been discovered over a vast area of the Indian subcontinent stretching from the eastern borders of Iran to the Gangetic Doab and from the foothills of the Himalayas to the estuary of the Tapti. In studying the inscriptions from such a large area, it is necessary to take the provenance into account and look for any significant variations in the material available from Mohenjodaro and Harappa, the twin 'metropolitan' centres of the Indus Civilization on the one hand, and the outlying 'provincial' centres of Lothal and Kalibangan and the smaller settlements on the other. The small group of West Asian finds is of exceptional interest in this connection. The present volume includes four statistical statements showing the distribution of types of inscribed objects (cf. para. 6.2 above), signs of the script (Table III), direction of writing (Table VI), and field symbols (Table VIII) with reference to the site of occurrence.

15.6 *Types of inscribed objects*

The inscribed object is the most important of the external characteristics associated with an inscription. The typology of the inscribed object has to be studied for possible clues to an understanding of the nature of the inscriptions appearing on them. The distribution of object-types with reference to their site of occurrence (cf. para. 6.2 above), as well as

the distribution of the signs of the script, direction of writing and the field symbols with reference to the object-types are studied in separate tables (Tables IV, VII and IX).






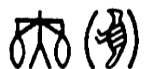
15.7 *Field symbols*

Next only to the inscribed objects, the field symbols are the most prominent of the external features associated with the inscriptions. The possible connection between the inscriptions and the associated field symbols has intrigued scholars. Not much progress has however been made in this matter beyond the obvious observation that the same text appears with different field symbols and *vice versa*.²⁵ The distribution of the signs of the script with reference to the associated field symbols is studied in Table V. (For this purpose, the whole of the inscribed object is taken as the unit, as the inscriptions and the field symbols may occur on the same or on different sides of an object.) Two other tables included here study the distribution of field symbols with reference to their site of occurrence and the types of objects on which they appear (Tables VIII and IX).

16. POSTSCRIPT

16.1 *Addendum to the Texts*

The following five inscriptions could not be included in the *Texts* in time and hence not utilised in the compilation of the *Concordance* and the *Tables* also:

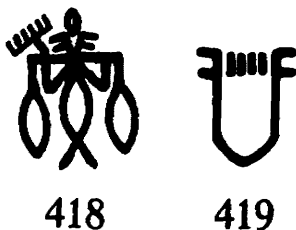
KALIBANGAN		
8123	200101	
8222	400001	
8401	910003	
	200003	
OTHER SITES		
9222	400003	
WEST ASIAN FINDS		
9853	100301	

16.2 *Notes on the additional texts*

- 8123 Sealing on a terracotta lump with one extant stamp impression. Copied from the original (ASI 68.1.70).
- 8222 Inscribed potsherd with overlapping incisions. *PT*:7(1974):Pl. VI-A
- 8401 Oval-shaped terracotta object with one large sign incised on each of the two flat sides. *ASH*, No.274.
- 9222 Inscribed potsherd found at Banawali. Copied from the original in DAH.
- 9853 A Harappan steatite square stamp seal recently found at Nippur. *Man & Environment*, vol. I (1977), Pl. VIII-C.

16.3 *Addendum to the Sign List*

After the film font for printing the present volume had been finalised, two new signs (numbered 418 and 419) have come to light from recently discovered inscriptions (cf. 8401 and 9222 in para. 16.1 above), which could not be included in the Sign List.

16.4 *Addendum to the List of Sign Variants*

These have been incorporated in a separate column at the end of the List of Sign Variants (pp. 785-92).

NOTES

1. Iravatham Mahadevan and K.Visvanathan, 'Computer Concordance of Proto-Indian Signs', *Radio-carbon and Indian Archaeology*, p.291, TIFR (1973).

2. Marshall (citing Langdon), *MIC*, vol.I.p.39. For abbreviations used for the titles of source publications, see List of Sources for Texts (pp.814-15).

3. For the later excavations at Harappa and Mohenjodaro, see *ARASI*, 1930-34, p.72; *ibid.*, 1934-35, p.31, Pl.X; *ibid.*, 1935-36, p.35; *ibid.*, 1936-37, p.39.

4. However, the ASI Photo Library in New Delhi has unpublished photographs of most of the objects excavated at Harappa and Mohenjodaro upto about 1942.

5. One of the texts from West Asian finds of Harappan seals copied by G.R.Hunter (*Script of Harappa and Mohenjodaro*, Introduction, No.11) had to be omitted as I missed copying the original during my visit to the Louvre. Some of the texts reproduced in *A Concordance to the Indus Inscriptions* (Parpola *et al*, 1973) which were copied by Asko Parpola mostly from unpublished originals in Pakistan are not also included. Such omissions, especially of unique texts, are however very few.

6. An object is considered as 'published' only when a photograph of the original or of the impression has been published.

7. A unique seal from Kalibangan (8011) is an exception to the proposed classification and deserves special mention. This is a pink terracotta object with a boss on the reverse, proving it to be a stamp seal. But the text in two lines and the field symbol of a rhinoceros looking to the left (on the original) are both *in relief* showing that the seal itself was made from a mould. In this case the seal impression would be sunken. This unique seal is therefore recognised as a distinct sub-type ('raised seal'). cf. Fig. 27 in Pl. II (p. 803).

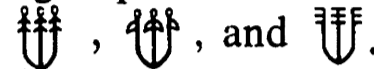
8. Compare, for example, 4447 and 4478. These objects have two sides each with identical lines of text. But *EH* illustrates the 'upper side' of 4447 as the 'lower side' of 4478 and *vice versa*. See also the illustrations of 4474 and 4518 in *EH* for similar reversal.

9. The suggestion that the animal, which is seen in profile, may have the other horn 'behind' the horn seen on the seals is confirmed by the occurrence of two-horned bulls identical in every other respect with the 'unicorn'. (cf. 2234, 2359, 4314, 5264 and 8022). cf. Figs. 8 & 9 in Pl. I (p. 801).

10. The following are the important publications on the question of direction of writing of the Indus Script: Gadd and Smith, *MIC*, p.409; Langdon, *ibid*, p.427; Hunter, *Script of Harappa and Mohenjodaro*, p.37; A.S.C.Ross, 'The Direction of the Mohenjodaro Script', *New Indian Antiquary*, vol.II (1939-40), p.554; A.H.Dani, *Indian Palaeography* (1963), p.16; B.B.Lal, 'The direction of writing in the Harappan Script', *Antiquity:XL* (1966) p.52; B.B.Lal, 'A further Note on the direction of writing in the Harappan Script', *Puratattva*, I(1967-68), p.15; Alekseev, *Soviet Studies on Harappan Script*, tr. by H.C.Pande, Paper No.6, Field Research projects (1969), p.1; Parpola *et al.*, *Decipherment of the Proto-Dravidian Inscriptions of the Indus Civilization* (1969), p.18; J.V.Kinnier-Wilson, *Indo-Sumerian, A New Approach to the problems of the Indus Script* (1974), p.30.

11. *EH*, p.326

12. cf.1904, 2929, 2930, 5505, 5507, 5508, 9061, 9062, 9063 and 9085.

13. The Indus Script has perhaps the largest number of symmetrical signs known in any ancient pictographic script. The proportion of symmetrical signs is higher in the group of the more frequent signs. Even in compound signs, a tendency towards symmetry can be seen, cf. . This evidence seems to show that the Indus Script, as we know it, is primarily a 'seal-script'.

14. It has to be recognised, as Ross (*op.cit.*) pointed out that this *is* an assumption, but one justified by universal experience. We know of scripts reading from the left or from the right, or from top to bottom, but none from bottom upwards either for single lines or for rows of lines. The occurrence of smaller signs in the lower line (1101, 1139, 1237, 1253, 2611 etc.) is also good evidence for this assumption.

15. This precaution is necessary for reasons stated in para 10.4(a) above. In fact, there are eight texts in the volume in which the disposition of the field symbols (mostly unicorn) has forced the scribe to lower the first one or two signs with the result that the lower lines have to be read first, as judged from the evidence of single-line sequences; cf. 1093, 1167, 1303, 1385 and 6118 (each with the first sign dropped below the line) and 2696, 5119 and 6108 (each with the first two signs dropped below the line).

16. cf. 1101, 1247, 2405, 2587, 2601, 6104, 6402, 8012 and 8020.

17-20. The earlier sign lists of the Indus Script are the following: (i) Langdon, *MIC*, vol.II, pp.434-55; (ii) Gadd and Smith, *MIC*, vol.III, Pls.CXIX-CXXIX; (iii) Vats, *EH*, vol.II, Pls.CV-CXVI; (iv) G.R.Hunter, *Script of Harappa and Mohenjodaro* (1934), pp.203-10; (v) G.R.Hunter, *JRAS* (1932), pp.491-503; (vi) A.H. Dani, *Indian Palaeography* (1963), Pls. I-II; (vii) Parpola *et al.*, *A Concordance to the Indus Inscriptions* (1973), pp.xxii-xxvi.

21. The source publications normally show the seal impressions on their plates, but sometimes direct photographs are reproduced, e.g. *EH* 273, 276, 279, 283 and 284. At other times impressions of directly incised objects (which are not seals) are given, e.g. *MIC* 529-533. Photographs are also occasionally reversed (as in *EH* 276, 279 etc.), or even turned upside down, e.g. *MIC* 471, 477, 559; *FEM* 579, 682; *EH* 223, etc. These errors have been corrected by critical collation with the original objects and unpublished photographs.

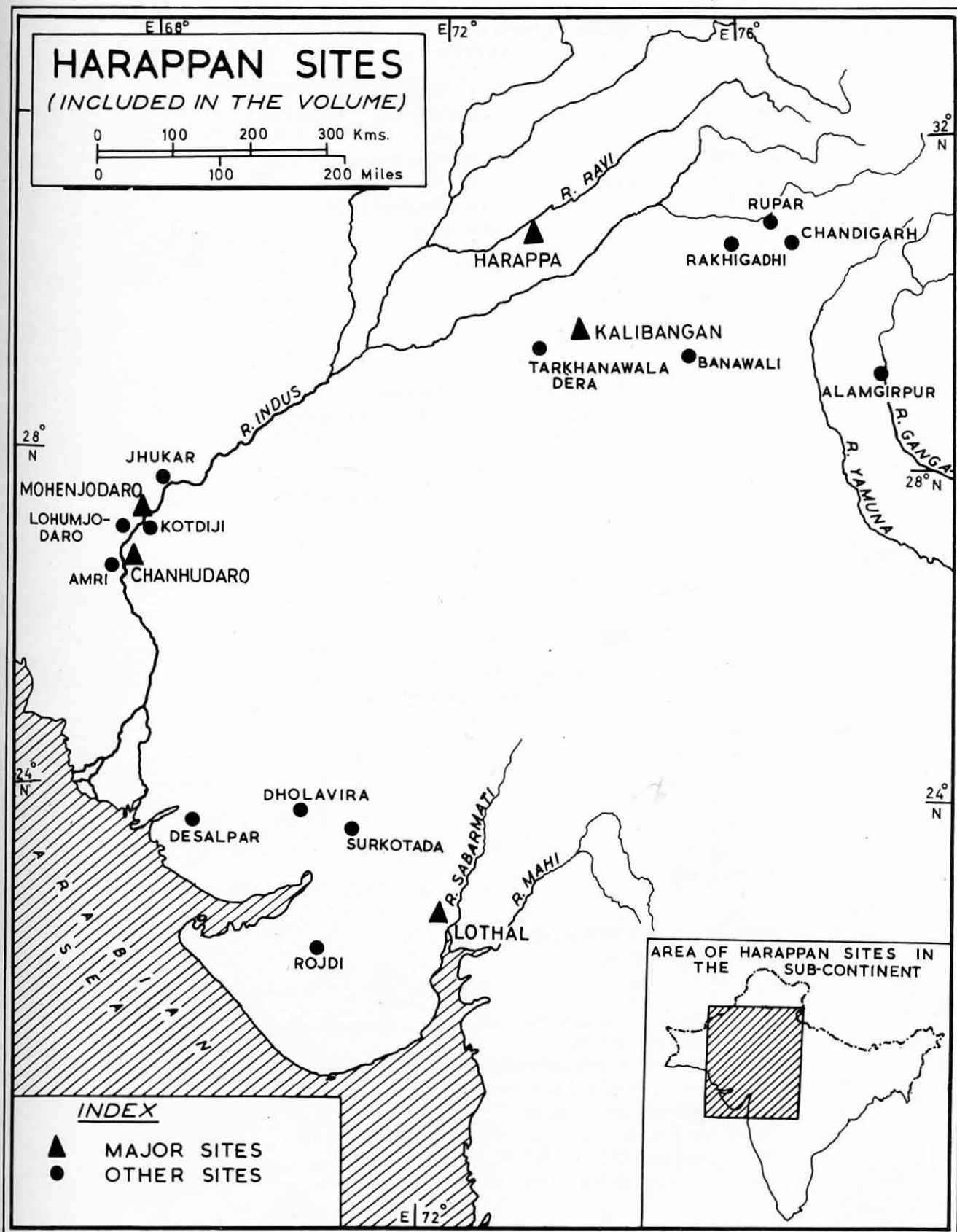
22. This arrangement violates the basic principle of concordance-making, viz. that all occurrences of a sign should be listed together. The Finnish Concordance splits up the sign occurrences in two parts, 'depending upon whether the sign in question is the first or the second member of a pair. The second-member occurrences are listed together, while the first-member occurrences are spread out in the order of occurrence of the second member. Single-sign lines are not listed in the central columns of the key signs and cannot be looked up by themselves. Single-sign texts are altogether omitted from the concordance as a result of this peculiar arrangement. Finally, much space is wasted on the listing of 'pairwise combinations' consisting of a real sign with conventional symbols invented by the authors representing lost or illegible signs. However, notwithstanding these limitations of presentation and the absence of full documentation (to be included in a forthcoming volume), the Finnish Concordance is the most accurate so far published and I have extensively consulted it for collation of doubtful readings.

NOTES

23. Several other tabulations have been prepared on the computer at the TIFR, but could not be included in the present volume due to pressure on space. It is proposed to publish them as separate papers in due course.

24. The input data file also stores information on locus (sub-divisions of the archaeological sites) and level (stratigraphy recorded by the excavators) in respect of objects published in the major sources, viz. *MIC*, *FEM*, *EH* and *CE*. Tabulations have also been prepared on the computer containing distributional statistics with respect to these two parameters. It has however not been possible to include them in the present volume due to pressure on space.

25. Two sides of 1227 (*MIC* 227 and 230) have the same field symbol, but different texts. The two sides of 1252 (*MIC* 252 and 378) have the same text but different field symbols. However, the same field symbols generally occur with the same texts in the copper tablets.



CODES

1. CODE FOR TEXT NUMBERS (Summary)¹

(Numerical cols. 1-4 of *Texts* and *Concordance*)

1001-1905	Mohenjodaro	: Texts published in <i>MIC</i> , vol.III
2002-2952	Mohenjodaro	: Texts published in <i>FEM</i> , vol.II
3001-3513	Mohenjodaro	: Other texts
4001-4905	Harappa	: Texts published in <i>EH</i> , vol.II
5001-5601	Harappa	: Other texts
6104-6306	Chanhudaro	: Texts published in <i>CE</i>
6402-6405	Chanhudaro	: Other texts
7001-7301	Lothal	
8001-8302	Kalibangan	
9001-9701	Other Sites	
9801-9905	West Asian Finds	

2. CODE FOR TYPES OF INSCRIBED OBJECTS

(Numerical col.5 of *Texts*)

- 1 Seals
- 2 Sealings
- 3 Miniature tablets (made of stone, terracotta or faience)
- 4 Pottery graffiti
- 5 Copper tablets
- 6 Bronze implements
- 7 Ivory or bone rods
- 9 Miscellaneous inscribed objects²

3. CODE FOR SIDES OF INSCRIBED OBJECTS

(Numerical col.6 of *Texts* and col.5 of *Concordance*)

- 0 Only side
- 1 First side
- 2 Second side
- 3 Third side
- 4 Fourth side
- 5 Fifth side
- 6 Sixth side

4. CODE FOR FIELD SYMBOLS (Summary)³

(Numerical cols.7-8 of *Texts*)

- 01-35 Animals
- 36-43 Reptiles, fish, birds etc.
- 44-46 Trees and leaves
- 47-59 Anthropomorphic (divine, semi-divine or human) forms
- 60-81 'Scenes' with anthropomorphic and animal figures, trees and other objects
- 82-98 Various symbols, motifs and geometrical patterns
- 99 Damaged or illegible field symbol
- 00 No field symbol on the side

5. CODE FOR LINES OF TEXT

(Numerical col.9 of *Texts* and col.6 of *Concordance*)

- 0 Only line of text on the side
- 1 First line
- 2 Second line
- 3 Third line
- 9 The side has no line of text, but only a field symbol

6. CODE FOR DIRECTION OF WRITING⁴

(Numerical col.10 of *Texts*)

- 1 Right to left
- 2 Left to right
- 3 Single sign in the line of text
- 4 Top to bottom
- 5 Symmetrical arrangement of signs
- 9 Doubtful (on account of damaged or illegible signs)
- 0 No line of text

7. LETTER CODE FOR SITES

(in *Tables* and *Lists*)

- MD Mohenjodaro
- HP Harappa
- CD Chanhudaro
- LL Lothal
- KB Kalibangan
- OS Other Sites⁵
- WA West Asian Finds⁶

8. CONVENTIONAL SYMBOLS

(in *Texts* and *Concordance*)

- * Sign read doubtfully
(asterisk prefixed to the top right of the sign)

/// Illegible or lost passage with one or more signs.

NOTES:











































































































1. See the List of Inscribed Objects for the detailed codes (pp. 816-29).
2. The following have been classified as miscellaneous inscribed objects: 6 stone objects (1471, 4599 and 4854 to 4857), 4 fragments of bracelets (3510 to 3513), 1 ivory plaque (1905), 1 ivory dice (2951), 1 imitation carnelian tablet (2952), 1 terracotta ball (4709) and 1 inscribed brick (4811).
3. See the List of Field Symbols for the detailed codes (pp. 793-98). The field symbols are illustrated in Plates I-VII (pp. 799-813).
4. Right and Left refer to impressions of seals and originals of other inscribed objects.
5. 'Other Sites' are the smaller Harappan sites in the Indian subcontinent listed in para. 4 of the Introduction (p. 6).
6. 'West Asian Finds' are Harappan inscribed objects found in West Asia from sites listed in para. 4 of the Introduction (p. 6).

SIGN LIST OF THE INDUS SCRIPT

















































































 1†	 2†	 3	 4	 5	 6	 7	 8†	 9†	 10
 11	 12†	 13	 14†	 15†	 16	 17†	 18	 19†	 20
 21-	 22	 23	 24	 25	 26	 27	 28†	 29†	 30
 31	 32†	 33	 34	 35†	 36	 37	 38†	 39	 40†
 41	 42	 43	 44	 45	 46	 47	 48†	 49†	 50†
 51†	 52	 53†	 54†	 55†	 56†	 57†	 58	 59†	 60†
 61	 62	 63	 64	 65	 66	 67†	 68†	 69†	 70†
 71	 72†	 73†	 74†	 75	 76†	 77	 78†	 79	 80
 81†	 82	 83	 84†	 85	 86†	 87†	 88	 89†	 90†
 91†	 92	 93	 94†	 95	 96†	 97	 98†	 99	 100
 101	 102†	 103†	 104†	 105	 106†	 107†	 108	 109†	 110

111†	112†	113	114	115	116	117	118	119†	120†
121†	122	123†	124†	125†	126	127†	128†	129	130†
131	132†	133	134	135	136†	137†	138	139	140
141†	142†	143†	144	145	146†	147	148	149†	150†
151	152	153	154	155†	156	157	158†	159†	160
161	162†	163	164	165	166	167†	168	169†	170
171†	172	173†	174	175†	176†	177†	178†	179	180†
181†	182†	183	184†	185	186†	187	188	189	190†
191	192	193†	194†	195	196	197†	198†	199	200
201†	202†	203	204†	205†	206†	207	208	209	210†
211	212	213†	214†	215	216†	217†	218	219†	

SIGN LIST OF THE INDUS SCRIPT

SIGN LIST OF THE INDUS SCRIPT


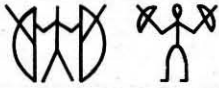






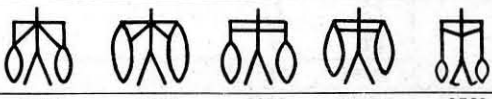
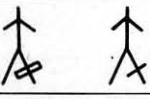



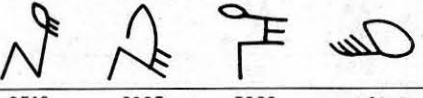
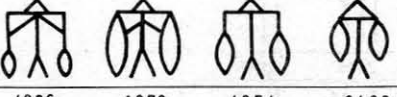

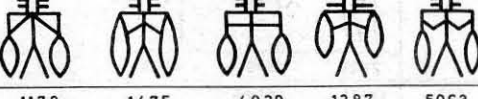

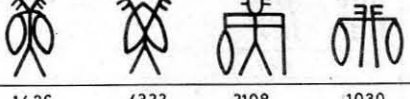

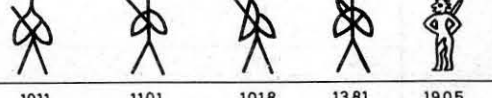

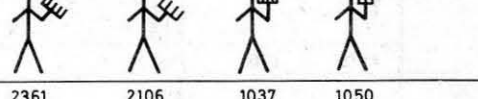
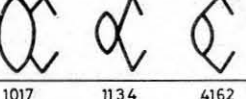
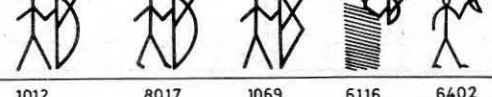
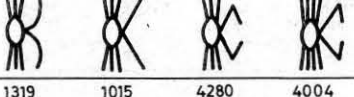
									
330†	331†	332†	333	334†	335	336†	337†	338†	339
									
340†	341†	342†	343†	344	345†	346	347†	348†	349
									
350	351	352	353	354	355	356	357	358†	359†
									
360	361	362	363	364	365†	366	367†	368	369
									
370	371†	372	373†	374†	375†	376	377	378	379†
									
380	381†	382	383	384†	385	386	387†	388	389†
									
390	391†	392	393†	394†	395†	396	397	398	399
									
400†	401	402†	403†	404	405	406	407	408	409
									
410	411	412	413	414	415	416	417†		

NOTES:

1. Signs marked † in the Sign List have graphic variants recorded in the List of Sign Variants (pp. 785-92).
2. See Postscript (p. 25) for addendum to the Sign List.

APPENDIX I

LIST OF SIGN VARIANTS

SIGN No.	VARIANTS	SIGN No.	VARIANTS
1		29	
	2538 1386 6122		2049 6402
8		32	
	1010 6122 7080 1393 1339		7202 2264
			
	1401 1407		3248 1260
9		38	
	2634 4035 1011		2546 2630 2058 2285
12		40	
	7053 2293 2678 1563 2569		2266 5271
			
	1360 4815 2421 8013 5515		1058 1010 4312 6301 1187
			
	5123 9842		2518 2395 5268 8218
14		49	
	4036 1079 4254 2428		1194 2442
15		50	
	1178 1475 4029 1287 5063		2527 3118 2313 1544
			
	1436 4322 2108 1030		4296 1067 1100 6304 9845
17		51	
	1011 1101 1018 1381 1905		1400 2918(?)
19		53	
	2361 2106 1037 1050		1017 1134 4162
28		54	
	1012 8017 1069 6116 6402		1319 1015 4280 4004

SIGN No.	VARIANTS				
55					
	2398	2687			
56					
	2204	4345	4701		
57					
	1182	2002	2117	2451	4290
	9801				
60					
	1177	7025			
67					
	2026	9071	2426	1088	
68					
	2199	1036			
69					
	2153	2929			
70					
	1447	2584			
72					
	1075	1001			
73					
	8025	2226			
74					
	1395	9832			
76					
	1338	1207	5471	2077	

SIGN No.	VARIANTS				
78					
	1342	1237	2141		
81					
	2028	2696	4228	1006	
84					
	3083	4227	2614	1289	2527
86					
	1030	1385			
87					
	1008	4583			
89					
	1003	2573			
90					
	2167	2931			
91					
	2699	2617			
94					
	2620	4573	4103		
96					
	1037	2179			
98					
	4001	2515			
102					
	2470	1116	2657		
103					
	1366	2481	4564		

APPENDIX I: LIST OF SIGN VARIANTS

SIGN No.	VARIANTS			
104				
	1019	2524	2926	2928
106				
	1051	1092		
109				
	1035	2565		
111				
	1231	2011		
112				
	1344	1025		
119				
	5498	4094	4444	5401
			8013	4456
120				
	1273	7074		
121				
	1404	1415	3505	
123				
	2065	1041	1100	2190
				9822
124				
	1086	2121	2293	1535
				1448
125				
	4693	1110		
128				
	5087	7069	2118	
132				
	1253	4037		

SIGN No.	VARIANTS		
136			
	2157	1471	2018
137			
	1179	2847	
141			
	7025	7094	4077
142			
	4481	4472	
143			
	3119	2098	
146			
	1536	9042	
149			
	1370	4001	3108
			2229
			2505
150			
	1100	1102	
155 ^a			
	1006	1225	
158			
	4808	1016	6201
			7048
159			
	1320	2407	
162			
	1076	1361	2934
			1539
			2648
167			
	5123	7034	8038
			8201























































































SIGN No.	VARIANTS						SIGN No.	VARIANTS				
169							184					
	1025	2525	1011	1055	1467	1006		3378	3398	9832	2515	2092
								186				
4107	8213	4269	9061	2542	7072	4006	7202		3151	1191	2052	2665
171							190					
1010	1310	4254	1399			4091		2175	2395	4380	2077	
173												
1494	1360	1234	2421			2601	193					
175								1058	1140	1438	2563	2562
1139	1047	1420	1167									
176							4451	2018				
1046	2674	4320	6213	1227			194					
								4002	1014			
2121	2140	1118	8208	2289				197				
177							1015		4271	2518		
2577	1219	3151					198					
178								4584	6227	2355	4583	
1401	1051	2039	2170	3109				201				
							2661		2103			
4341							202					
180								1262	2654			
1552	1069	2049	1033	2495				204				
							1416		1066	4079	1022	2290
2616	2465	1175	6402				205					
182								4460	1090	2548	2079	6210
1161	9071	2470	2428	2296	2220							

APPENDIX I: LIST OF SIGN VARIANTS

SIGN No.	VARIANTS					SIGN No.	VARIANTS					
206		1049	5064			245		1424	2072	1542	1159	1242
210		4315	2119	2490				9902	8204			
214		2120	2018	4008		247		1444	2409			
216		1096	8212			252		1463	1018	4220	1337	
217		2311	8039			253		1201	4541	1346	1054	
219		1033	2651	9092		254		1244	1096	1319	4260	9832
224		4223	2469					2545	1447	4713		
228		2074	6120			258		2341	1438	7020	4411	
229		2420	8043			261		4006	5090			
230		1459	1054	1186	1139	4823	264		1227	2574		
244		1038	1002	4040	1337	2502	267		1057	1022	8106	
		2334	1034	4042	1550	5073	272		7025	4359		
245 Contd.		4002	2431	2294	4240	1004	275		4447	4480		

SIGN No.	VARIANTS			SIGN No.	VARIANTS				
277				303					
	2187	4107	4871		1403	1209			
284				305					
	2579	1338	1059	2522	4871	2554			
286				307					
	1387	2422	7042		1340	4573			
287				312					
	1036	4618	2851		2923	4802			
289				322					
	1074	1162			1537	2171	4055		
292				324					
	2358	5060			8056	8056			
294				326					
	1023	2706			1126	2461	4004	1150	1340
295									
	2106	2471			8121	2673			
296				327					
	1005	1711			1244	1161	2908		
297				328					
	1043	9832			4371	1206	2815	4543	4497
298				330					
	1072	4713			1248	2560			
302				331					
	2002	1471	1444	4008	4230				
				334					
	3512				2364	1403			

APPENDIX I: LIST OF SIGN VARIANTS

SIGN No.	VARIANTS					SIGN No.	VARIANTS					
336						347						
	1038	1337	1056	1061	1603		1089	2045				
							348					
1030	1065	1094	1374	2065	2414	4270		2591				
337						358						
	4322	2126			2125		1415	2213	1708			
338						359						
	2216	1392			4088		3102					
340						365						
	4337	1494	9011				9102	4691				
341						367						
	4069	4102	1464	2225	1426		1022	6306				
							371					
2644	1340	4344	4446			1071	2004	2184				
342						373						
	4001	1401	1405	7029	1093		4379	3387				
							374					
	1904	2269	8206	8216	8217			1135	2332			
					375							
4827	8071			2500		2281	2185					
343						379						
	2115	4386	7025				1084	4423				
345						381						
	1016	1434	1710	6104	2936		2069	1028	4266	6402		
347 Contd.						384						
	1060	1093	4262	7042	1298		2043	2940	4123			

APPENDICES

ADDENDUM

SIGN No.	VARIANTS				
387					
	1111	1080	2272		
389					
	1430	1204	1467	1401	1006
391					
	1010	2651	1186		
393					
	2431	1016	4901	4902	
394					
	2318	1394			
395					
	2206	1330	1203		
402					
	1008	1036	1069	1029	1103
	2373	1394			
403					
	1099	2363	4555	5103	
417					
	4034	2827			

SIGN No.	VARIANTS			
2				
	1117	8059		
59				
	1032	8211		
107				
	1157	7072		
127				
	1004	4012	8054	8072
130				
	1012	4019		
181				
	2191	1052		
213				
	2086	9103		
259				
	1470	7301 (?)		
278				
	4695	8033		
290				
	2656	3016		
332				
	3116	3032		
400				
	1012	7063		

8. KALIBANGAN—Contd.

(b) SEALINGS

REF. NO.	EXC. NO.	PUBL., PH. OR MUS. NO.
8101	868	ASI 68.1.76
8102	976	IAR:1961-62:Pl.LXIX.A
8103	3712	ASI 68.1.69
8104	3844	IAR:1961-62:Pl.LXIX.A
8105	5105	ASI 68.1.65
8106	11024	IAR:1960-61:Pl.XLVIII.B
8108	16047	Exp.17:2(1975):p.29, Fig.2
8109	16060	ASI 68.1.26
8110	16946	ASI 68.1.16
8111	17780	ASI 68.1.31
8112	18352	ASI 68.1.28
8113	18705	ASI 68.1.56
8114	19085	Exp.17:2(1975):p.29, Fig.2
8115	19182	ASI 68.1.29
8116	19348	ASI 68.1.57
8117	19527	ASI 68.1.47
8118	21425	ASI 68.1.74
8119	21505	ASI 68.1.82
8120	17892	Exp.17:2(1975):p.29, Fig.2
8121		Exp.17:2(1975):p.29, Fig.2
8122		KB.1:99/61

(c) POTTERY GRAFFITI—Contd.

REF. NO.	EXC. NO.	PUBL., PH. OR MUS. NO.
8202	2C(2)	ASI
8204		IAR:1960-61:Pl.XLIX.A
8205		IAR:1960-61:Pl.XLIX.A
8206		IAR:1960-61:Pl.XLIX.A
8207		IAR:1960-61:Pl.XLIX.A
8208		IAR:1960-61:Pl.XLIX.A
8209		IAR:1960-61:Pl.XLIX.A
8210		IAR:1960-61:Pl.XLIX.A
8211		IAR:1960-61:Pl.XLIX.A
8212		IAR:1960-61:Pl.XLIX.A
8213		IAR:1960-61:Pl.XLIX.A
8214		IAR:1963-64:p.38, Fig.10
8215		KB.1:82/61
8216		PT:7(1974):Pl.VI.B
8217		PT:7(1974):Pl.VI.B
8218		PT:7(1974):Pl.VI.B
8219		NM 3000
8220		NM 12871
8221		PT:1(1967-68):Pl.I

(d) BRONZE IMPLEMENTS

(c) POTTERY GRAFFITI			REF. NO.	EXC. NO.	PUBL., PH. OR MUS. NO.
8201	2A-2	KB.1:2/63	8301	14983	Exp.17:2(1975):p.30, Fig.1
			8302	16948	Exp.17:2(1975):p.30, Fig.1

9a. OTHER SITES

REF. NO.	SITE	PUBL., PH. OR MUS. NO.	REF. NO.	SITE	PUBL., PH. OR MUS. NO.
9001	Jhukar	ES:Pl.XVII:1	9094	Surkotada	IAR:1971-72:Pl.XXX.C
9011	Lohumjodaro	ES:Pl.XXXIII:8	9095	Surkotada	IAR:1971-72:Pl.XXX.C
9021	Rupar	IAR:1953-54:Pl.VI.B	9101	Chandigarh	PT:6(1972-73):Pl.I.1
9022	Rupar	ARM:Pl.II.A	9102	Chandigarh	PT:6(1972-73):Pl.I.2
9031	Tarkhana-wala Dera	MP.1:397/53	9103	Chandigarh	PT:6(1972-73):Pl.I.3
9041	Rojdi	IAR:1957-58:Fig.10A(1)	9104	Chandigarh	PT:6(1972-73):Pl.I.4
9042	Rojdi	IAR:1957-58:Fig.10A(2)	9111	Rakhigadhi	AO:35(1973):p.103
9051	Kot Diji	KD:p.6:Fig.2	9121	Dholavira	BBM:XXV(1973-74):Pl.XI.1
9061	Alamgirpur	IAR:1958-59:Pl.LXV.A	9201	Banawali	DAH
9062	Alamgirpur	IAR:1958-59:Pl.LXV.A	9202	Banawali	DAH
9063	Alamgirpur	IAR:1958-59:Pl.LXV.A	9203	Banawali	DAH
9071	Desalpar	IAR:1963-64:Pl.VIII.B	9204	Banawali	DAH
9073	Desalpar	IAR:1963-64:Pl.VIII.C	9205	Banawali	DAH
9084	Amri	FA:Vol.II:Fig.90.466	9211	Banawali	DAH
9085	Amri	FA:Vol.II:Fig.90.467	9221	Banawali	DAH
9091	Surkotada	IAR:1971-72:Pl.XXX.D	9701	Unknown prov.	NM 35/35
9092	Surkotada	IAR:1971-72:Pl.XXX.E			
9093	Surkotada	IAR:1971-72:Pl.XXX.C			

APPENDIX V : LIST OF INSCRIBED OBJECTS

9b. WEST ASIAN FINDS

REF. NO.	SITE	PUBL., PH. OR MUS. NO.	REF. NO.	SITE	PUBL., PH. OR MUS. NO.
9801	Susa	<i>CCO</i> :vol.I:Pl.XXV.15	9846	Ur	<i>PBA</i> :18(1932): p.191:No.16
9811	Djoka (Umma)	<i>RA</i> :XXII(1925):p.56	9851	Telloh	<i>RA</i> :XXII(1925):p.99
9821	Kish	<i>JRAS</i> :1925:p.698:Pl.X	9852	Telloh	<i>CCO</i> :vol.I:Pl.II.8
9822	Kish	<i>JRAS</i> :1931:p.595:Fig.B	9901	prob.WA.	<i>PBA</i> :18(1932): p.191:No.17
9832	Ur	<i>PBA</i> :18(1932): p.191:No.2	9902	prob.WA.	<i>PBA</i> :18(1932): p.191:No.18
9833	Ur	<i>PBA</i> :18(1932): p.191:No.3	9903	prob.WA.	<i>JRAS</i> :1932:p.48
9834	Ur	<i>PBA</i> :18(1932): p.191:No.4	9904	prob.WA.	<i>AOS</i> :Pl.III.23
9842	Ur	<i>PBA</i> :18(1932): p.191:No.12	9905	prob.WA.	<i>Iraq</i> : III(1936):p.101.Fig.1
9845	Ur	<i>PBA</i> :18(1932): p.191:No.15			

Tables