Special Lecture

Study of the Indus Script[1)]

Asko Parpola

Introduction

The International Conference of Eastern Studies has this year its 50th jubilee session. To deliver a special lecture on this occasion is a great honour, and I accepted the Tōhō Gakkai's kind invitation with hesitation, fully aware that there are many scholars who would be much more worthy of this honour. But I did not want to dismiss this opportunity to speak to a wide gathering of orientalists, as the study of the Indus script would certainly profit if experts in East Asian writing systems could be inspired to contribute with their insights.

The Indus Civilization

First a few words about the historical context of the Indus script. The Indus or Mature Harappan Civilization was the most extensive urban culture of its time, about 2600–1900 BCE. Its area comprized one million square kilometres, and more than one thousand of its settlements have been identified so far. Yet the very existence of this Bronze Age Civilization was unknown until 1924, when Sir John Marshall announced its discovery on the basis of excavations that were started at the two largest sites, Harappa in the Punjab and Mohenjo-daro in Sind. Ever since, archaeological and other research has been constantly en-

1) Paper read at the 50th ICES Tokyo Session on 19 May 2005 in Tokyo. I have shortened the text distributed at the conference and made a few additions (in particular, note 14 and consideration of two papers by Massimo Vidale that I received in a preliminary form in July 2005).

larging our knowledge of this early civilization.[2] Particularly important have been the long-continued recent excavations at Harappa[3] and Dholavira.

The Indus Civilization came into being as the result of a long cultural evolution in the Indo-Iranian borderlands. From the first stage of development,[4] about 7000–4300 BCE, some twenty relatively small Neolithic villages are known, practically all in highland valleys. People raised cattle, sheep and goats. They cultivated wheat and barley, and stored it in granaries. Pottery was handmade, and human and bovine figurines attest to fertility cults. Ornaments reflect small-scale local trade.

Stage two, about 4300–3200 BCE, is Chalcolithic. Village size grew to dozens of hectares. Settlements spread eastwards beyond the Indus to Cholistan to the delta of the ancient Sarasvati river, apparently with seasonal migrations. Copper tools were made, and pottery became wheel-thrown and beautifully painted. Ceramic similarities with southern Turkmenistan and northern Iran also suggest considerable mobility and trade.

Stage three is the Early Harappan period about 3200–2600 BCE. Many new sites came into existance, also in the Indus Valley, which was a challenging environment on account of the yearly floods, while the silt made the fields very fertile. Communal granaries disappeared, and large storage jars appeared in house units. Potter's marks suggest private ownership, and stamp seals bearing geometrical motifs point to development in administration. Irrigation canals were constructed, and ad-

2) The results are being collected in a book series in progress called *The Indus Age* by Gregory L. Possehl, with a monumental volume on *The Beginnings* (1999). Possehl has recently produced a summary for the general public (2002). Several other good surveys have come out during the past few years as well: Jansen et al. 1991; Kenoyer 1998; *Indus Civilization Exhibition*, 2000; McIntosh 2002. There are also two good websites, one of them in Japan, providing up-to-date information: http://www.harappa.com; http://bosei.cc.u-tokai.ac.jp/~indus/english/index.html.

3) See reports of the Harappa excavations by Meadow et al. and http://www.harappa.com.

4) I am following here the periodization suggested by Possehl (2002).

vances were made in all crafts. Similarities in pottery, seals, figurines, ornaments etc. document intensive caravan trade with Central Asia and the Iranian plateau. There were already towns with walls and a grid pattern of streets, such as Rahman Dheri. Terracotta models of bullock carts attest to improved transport in the Indus Valley. This led to considerable cultural uniformity over a wide area.

A relatively short but still poorly known transition phase, between 2700–2500 BCE, turned the Early Harappan culture into the Mature Indus Civilization. During this phase the Indus script came into being. The size of the burned brick, already standardized during the Early Harappan period, was fixed in the ratio 1: 2: 4 most effective for bonding. Weights of carefully cut and polished chert cubes form a combined binary and decimal system.[5] The society became so highly organized that it was able to complete enormous projects, like building the city of Mohenjo-daro around 2500 BCE.

The acropolis of Mohenjo-daro, a cultural and administrative centre, has as its foundation a 12 metre high artificial platform of 20 hectares. Just the platform is estimated to have required 400 days of 10,000 labourers. The lower city of at least 80 hectares had streets oriented according to the cardinal directions and provided with a network of covered drains. Many of the usually two-storied houses were spacious and protected from the dust and crowd of the streets and had bathrooms and wells. The water-engineering of Mohenjo-daro is unparallelled in the ancient world: the city is estimated to have had some 700 wells constructed with tapering bricks so strong that they have not collapsed in 5000 years. The Great Bath was made watertight with bitumen and a high corbelled outlet made it possible to empty it easily. The massive city walls are supposed to be mainly defenses against flood water.

The absence of palaces and temples — which may well be illusory[6] —

5) The ratios are 1/16, 1/8, 1/6, 1/4, 1/2, 1 (= 13 g), 2, 4, 8, 16, . . . 800.

6) Massimo Vidale (in press b) suggests the presence of a palace complex that consists of "houses" (including a private bath resembling the Great Bath) in the HR area of Mohenjo-daro.

makes the Indus Civilization strikingly different from its counterparts for instance in Mesopotamia and Egypt. Another reason is the Harappan concern for civic amenities such as wells and drains, with the result that their cities attest to considerable social egality. It is thought that the political power was less centralized and more corporate.[7)]

Development of water traffic made it possible to transport heavy loads along the rivers, and to start direct sea trade with the Gulf and Mesopotamia. Over thirty Indus seals and other materials of Harappan origin, such as stained carnelian beads, have been found in Western Asia. On the other hand, a single Gulf seal excavated at the Harappan port town of Lothal is the only object of clearly Western Asiatic origin discovered in the Greater Indus Valley.

Around 2000–1900 BCE the Indus Civilization came to an end in the Indus Valley, although it lingered some centuries longer in Gujarat and Maharashtra. Multiple reasons are assumed to have caused this downfall of urban life, which led also to the disappearance of the Indus script. The Harappans are estimated to have numbered about one million. This population continued to live, but the culture gradually changed. One important factor of change was that new people started coming to Greater Indus Valley. First among these were the long-time neighbours of the Indus Civilization, people of the Bactria and Margiana Archaeological Complex (c. 2600–1400 BCE).[8)]

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7) Cf. Possehl 2002: 56–57, 148–149. — One could compare the 'republics' of northeastern India in early historical times, governed by a *gaṇa* or *saṃgha*, and described by Sharma (1968). They have roots in Vedic times, when *"the many rājan-s . . . denied permanent overlordship to any in their midst"* (Scharfe 1989: 233; cf. Sharma 1968: 8–12). *"According to a later Buddhist tradition there were 7,007* rājan-s in *Vaiśāli ruling jointly through their assembly; K[auṭilya's] A[rthaśārastra] XI 1, 5 speaks of the men of the saṃgha-s that live on the title* rājan" (Scharfe 1989: 233). Strabo (Geography 15,1,37), referring to anonymous writers in the plural (Megasthenes is mentioned as the source in the next sentence), states: *"They tell also of a kind of aristocratic order of government that was composed outright of five thousand counsellors, each of whom furnishes the [[new]] commonwealth with an elephant"* (tr. Jones 1930: VII, 65; I suggest deleting the word *new* in Jones' translation of *tôi koinôi*) (cf. Scharfe 1989: 233, n. 24).

8) For the BMAC, see especially Sarianidi 1986; 1990; 1998a; 1998b; 2001; 2002; 2005; Amiet 1986; Hiebert 1994; Kosarev et al. (eds.) 2004 [2005]; for new evidence from

Attempts at Deciphering the Indus Script

Attempts at deciphering the Indus script started even before the existence of the Indus Civilization was recognized. When Sir Alexander Cunningham reported the first known Indus seal from Harappa in 1875, he assumed that this unique find was a foreign import. A few years later he supposed that the seal might bear signs of the Brahmi script from its unknown early phase. After Cunningham, many scholars have connected the Indus script with the Brahmi script, which was used in India about 1500 years later. Among them was G. R. Hunter, who in the late 1920s studied the Indus inscriptions at first hand in Harappa and Mohenjo Daro, and analyzed them structurally in his valuable doctoral dissertation, where he also compared the script with other early writing systems. The archaeologist S. R. Rao in his book *The decipherment of the Indus script* (1982) maintains that the Indus script is the basis of not only the Brahmi script but also of the Semitic consonantal alphabet, which most scholars derive from the Egyptian hieroglyphs and take as the basis of the Brahmi script. Like so many other Indian scholars, Rao reads the Indus texts in an Aryan language close to Vedic Sanskrit.

Immediately after the discovery of the Indus Civilization became known in 1924, the British Assyriologists A. H. Sayce, C. J. Gadd and Sidney Smith pointed to its resemblance to the Elamite and Mesopotamian civilizations and compared the Indus signs with the pictograms of the Proto-Elamite and archaic Sumerian scripts. In 1974, the British Assyriologist James Kinnier Wilson tried to revive the hypothesis that the Indus language is related to Sumerian in his book *Indo-Sumerian*.

The Czech Assyriologist Bedřich Hrozný in his youth recognized that the cuneiform tablets found in Anatolia were written in an Indo-European language, Hittite. He immediately became famous and later on tried to decipher many unknown scripts, including the Indus script. Hrozný's starting point was an Indus-like seal with three somewhat

Gilund, a site of the Chalcolithic Ahar-Banas Complex of Mewar, Rajasthan, see Possehl et al. 2004. See also Parpola 2002a; 2002b.

obscure cuneiform characters, and the resemblance that he saw between the Hittite hieroglyphs and the Indus signs. He reads many different signs with the same phonetic value; the resulting texts reproduce a few alleged divine names in endless variations.

In 1932, a Hungarian engineer, Vilmos Hevesy compared the Indus script with the *rongorongo* tablets of the Easter Island. Because the similarities made an impression on the French Orientalist Paul Pelliot, this comparison has been taken seriously although the two scripts are separated by more than 20,000 kilometres and some 3500 years. The comparison is useless also because the *rongorongo* tablets have not been deciphered.

Sir John Marshall thought that the language of the Indus script most likely belonged to the Dravidian family, which is still represented in the Indus Valley and Baluchistan by the Brahui language. Piero Meriggi, later an acknowledged authority of the Hittite and Proto-Elamite scripts, agreed with Marshall about the linguistic affinity in his paper on the Indus script from 1934, but refrained from a phonetic decipherment and tried to understand the signs from their pictorial forms. The Dravidian hypothesis was the basis of Father Henry Heras's ambitious attempt, which culminated in a large book published in 1953. In my opinion, Heras was right in his readings of a couple of signs, but these could not be distinguished from a great number of nonsensical interpretations.

By coincidence, in 1964 two teams of computer-assisted scholars started working on the Indus script independently of each other, one in Russia, and one in Finland. Both teams came to the conclusion that the language was Dravidian. The Russian team was led by Yurij Knorozov, who initiated the decipherment of the Mayan script, and included a Dravidian specialist, Nikita Gurov. The Russians initially proposed only few interpretations, but in their final report from 1979, meanings are assigned to all the Indus signs. Their use of the computer seems to be limited to a comparison of samples of the Indus and Egyptian scripts. The Russians never published a text corpus or any computer

analysis of Indus sign sequences.

Our Finnish team consisted of Seppo Koskenniemi, a computer specialist, my Assyriologist brother Simo Parpola and myself. We were inspired by the decipherment of the Mycenaean Linear B script without the help of bilinguals in the 1950s. We started by preparing a machine-readable text corpus, and published an automated method to classify characters of unknown ancient scripts in 1970, and the first computer-concordance of the Indus texts in 1973. A revised computer corpus and concordance was published by Seppo's brother Kimmo Koskenniemi and myself in 1979–82. In 1971 I went to Pakistan and India in order to verify our readings from the original objects kept in museums. After discovering there hundreds of unpublished inscriptions, I initiated the project of publishing a comprehensive photographic *Corpus of Indus Seals and Inscriptions* in international collaboration under the auspices of the Unesco. We proposed some Dravidian readings in 1969–70. My own efforts to develop these readings culminated in a book published in 1994.

The Tamil scholar Iravatham Mahadevan, who has done remarkable work in the field of Old Tamil epigraphy, started working on the Indus material in Indian museums in 1971. In 1977, Mahadevan brought out his very useful computer-corpus and concordance. He has published also several papers proposing Dravidian readings for Indus signs.

It is not possible for me to mention all attempts at decipherment here, let alone to criticize them. Gregory L. Possehl has published a fairly comprehensive and in many ways very useful survey in 1996.[9] Possehl's final verdict is that all attempts are invalid.

Is the Indus Script a Writing System?

Quite recently, students of the Indus script have been confronted with

9) *"Possehl's book is a valuable survey, but the reader should be warned that it contains some serious factual errors and many misprints"* (Robinson 2002: 331a). For a competent shorter survey, see Robinson 2002: 264–295.

the question: Is it really a script? Does it constitute a real writing system in the sense of being tightly bound to language? This is categorically denied in an article provocatively entitled *"The collapse of the Indus-script thesis: The myth of a literate Harappan Civilization."* The paper, published in December 2004 by Steve Farmer, Richard Sproat and Michael Witzel, was discussed one week later in a longer noncommittal note by Andrew Lawler (2004) in the *Science* journal.

Lawler's Review

"Outsider revels in breaking academic taboos" is Lawler's heading for a page-long characterization of the main author, Steve Farmer, who is a historian by training. Farmer turned his attention to India in 1999, and Lawler quotes him saying, *"I did't know anything about this stuff. I was the naïve outsider too dumb not to recognize the field's taboos."* Lawler quotes several scholars who are unconvinced, among them Gregory Possehl, who says: *"I don't think his ideas are interesting or viable, and I'm surprised they have raised interest."*[10)]

"At this point, however, that interest is undeniable," concludes Lawler (p. 2028), who points out that Farmer *"has attracted important converts, including his coauthors."* In an interview with Lawler, Michael Witzel, Professor of Sanskrit and Indian Studies at Harvard University, *"says he was shocked when he first heard Farmer's contention in 2001. . . . 'So I was very skeptical'. Now he is throwing his scholarly weight behind the new thesis . . . ."* (p. 2026–7).

Richard Sproat: Conclusions from General Statistics

One of the authors, Richard Sproat, is a noted computer linguist. He seems to be responsible for the comparison of the Indus sign frequencies with Egyptian, Sumerian and Chinese texts and Scottish heraldic blazons. Sproat's conclusions are that *"such studies can show that the Indus system could not have been a Chinese-style script, since symbol*

10) Lawler 2004: 2028.

frequencies in the two systems differ too widely, and the total numbers of Indus symbols are too few. But studies of general sign frequencies by themselves cannot determine whether the Indus system was a 'mixed' linguistic script . . . or exclusively a system of nonlinguistic signs" (p. 29).

Thus Sproat actually does not deny the possibility that Indus signs may represent a script similar to the Mesopotamian type, though he thinks it is different from the Egyptian type. This difference is demonstrated in a statistical table, which shows that signs are repeated within a single inscription much more often in Egyptian cartouches than in Indus seals of a similar length. In later times, many cartouches were written with uni-consonantal signs virtually amounting to an alphabetic script, where this type of repetition is natural. If Sumerian seals were similarly analysed, undoubtedly the figures would be closer to those of the Indus seals.

The Principal Arguments of Farmer et al.

The principal arguments of Farmer et al. for the drastic conclusions of the paper are the following. *"Indus inscriptions were neither able nor intended to encode detailed 'messages', not even in the approximate ways performed by formal mnemonic systems in other nonliterate societies"* (p. 42) because they are too short — on the average only five signs long — (p. 22, cf. also Lawler 2004: 2028) and because they contain too many rare signs — between 25 to 50 per cent of the around 400–600 different signs are attested only once.[11] Moreover, they miss the kind of sign repetition evidenced in the Egyptian cartouches: *"Most importantly, nowhere in*

11) *"Further evidence that clashes with the Indus-script thesis shows up in the large number of unique symbols (or 'singletons') and other rare signs that turn up in the inscriptions. . . . A number of inscriptions also contain more than one singleton in addition to other rare signs, making it difficult to imagine how those signs could have possibly functioned in a widely disseminated 'script' (Fig. 7)"* (Farmer et al. 2004: 36). Among the three examples quoted in Fig. 7, MS 2645 is claimed to have two 'singletons'; however, if this seal is genuine and not a forgery, as I strongly suspect (it comes from antiques trade, not from excavations), the two signs are variants of the signs no. 11 and 337 in the sign list in Parpola 1994: 70–78. — Most of the rare signs occur in the midst of more frequent signs.

Indus inscriptions do we find convincing evidence of the random-looking types of sign repetition expected in contemporary phonetic or semi-phonetic scripts" (p. 29–30; cf. also p. 48).

None of these arguments is conclusive, and can be easily controverted. The Chinese writing system has a very large number of signs that are rarely used in newspapers. All ancient scripts, but especially the logo-syllabic ones, had their rare signs. The repetition argument needs a longer discussion.

Sign Repetitions within Single Inscriptions

Although Farmer et al. in passing refer to logo-syllabic writing systems of the Mesopotamian type and their functioning, their argumentation implies that in order to represent a language-based script the Indus signs should largely be phoneticized in the manner of the Egyptian cartouches. However, in early logo-syllabic scripts one sign often stands for a complete word. Even a seal with a single sign can express its owner, and there is mostly little reason for sign repetition in short seal texts written in an early logo-syllabic script of the Sumerian type.

Farmer et al. themselves admit that *"some Indus signs do repeat in single inscriptions, sometimes including many repetitions in a row"* (p. 31). However, they do not accept the evidence of such duplications: *"Whatever the origins of these different types of duplications,*[12] *all that is critical for our purposes is to note again the lack of any suggestions in them of the random-looking repetitions typical even of monumental scripts like Luwian or Egyptian hieroglyphs"* (p. 36).

Yet sign repetition within single inscriptions does occur, also repetition of the type so vociferously missed by Farmer et al. The sequence of two signs and a third sign are repeated in a ten-sign text in M-682. A

12) I agree with Farmer et al. that some of these duplications imply quantification (cf. Parpola 1994: 81). The duplication of some other signs is surmised to *"emphasize their magical or political power."* Farmer et al. do not mention that such sign reduplications can reflect linguistic reduplications — often emphatic as in Dravidian (and other Indian languages) in onomatopoeic words, or grammatical, as in Sumerian nominal plurals. See also the interpretation of the 'eye' + 'eye' sequence in the final section of this paper.

different sequence of two signs is repeated in the ten-sign text K-10. One sign is repeated three times, but not in a row, in the ten-sign text M-634, and a different sign is similarly repeated three times but not in a row in the six-sign text 1093.[13] Two further signs in addition to those already mentioned occur twice but not in a row in the eleven-sign text M-1169 and the eight-sign text M-357 respectively. The last mentioned text is a "bar-seal," a category considered particularly crucial for the script thesis by Farmer et al. (p. 33).

Lost Texts

When Farmer et al. wonder how a script with so many single-occurrence signs could possibly have worked over a wide area, they speak as if our present corpus of texts would represent everything there ever was. But thousands of seals come from Mohenjo-daro alone and yet less than one tenth of that single city has been excavated. The number of single-occurrence signs would surely be reduced if the whole city was excavated.

Indeed, an integral part of the thesis of Farmer et al. is the claim that the types of inscriptions we know from the excavated material is everything there ever was. They categorically reject the much repeated early assumption that longer texts may have been written on *"birch bark, palm leaves, parchment, wood, or cotton cloth, any of which would have perished in the course of ages"* (Marshall 1931: I, 39).

Alexander's historians mention cloth as writing material used in the Indus Valley. Cotton has been cultivated there since Chalcolithic times, and is supposed to have been one of the main export items of the Harappans. Yet all the millions of pieces of cotton cloth produced by the Harappans have disappeared, save just a few microscopic fibers preserved in association of scrap pieces of metal. Along with seed finds, however, those fibers do preserve the information that cotton was actually cultivated and processed. In the same way, the thousands of

13) I.e., Marshall 1931: III, pl. 106, no. 93. For the other texts quoted here see Joshi & Parpola 1987 and Shah & Parpola 1991.

short inscriptions on durable materials have preserved the information that the Indus Civilization did have a script of its own.[14)]

That the Indus script changed very little in 600 years is taken as evidence that there were no manuscripts, as the scribes everywhere tended to develop a cursive style. However, allographs show that Indus signs were occasionally simplified very much. Moreover, the Egyptian hieroglyphs preserved their monumental pictographic shapes for 3000 years.

Farmer et al. also miss evidence for Harappan writing equipment. They discredit four respected Indus archaeologists — Ernest Mackay, George Dales, Masatoshi Konishi and B. B. Lal — who have interpreted some finds as writing equipment, because these interpretations *"are no longer accepted by any active researchers"* (p. 25). Konishi's paper was published in 1987 and B. B. Lal wrote as recently as 2002.[15)]

The Parallel of Non-Linguistic Symbolic Systems

If the Indus signs do not form a language-based writing system, what was their function? Farmer et al. see in them *"a relatively simple system of religious-political signs that could be interpreted in any language"* (p. 45). The non-linguistic symbols of Mesopotamian iconography are mentioned as a particularly close and relevant parallel. These are images representing various deities, celestial phenomena, animals and plants, tools and commodities, and more abstract symbols like the swastika and an omega-looking sign. There is no question that these symbols — which are arranged in regular rows with a definite order only in stelae and boundary stones dated between 1500 and 600 BC — do resemble

14) A fragment of a convex partially burnt sealing with two impressions of one and the same stamp seal on the outside preserves faint script signs on the inside (DK 12145 = Mackay 1938: I, 349 and II, pl. XC: 17 = M-426 in Joshi & Parpola 1987: 105; now in the care of the Archaeological Survey of India as ASI 63.10.201). The inside of this sealing should be carefully examined with microscope to determine whether it really was fixed on a wooden rod and whether the script signs were written on that rod.

15) Lal's book does not count because it is popular and politically biased (Farmer et al. 2004: p. 25).

the Indus signs, and are therefore highly useful for their pictorial understanding, but the same applies to the pictograms of other ancient scripts.

Massimo Vidale (in press) stresses the fact that the Indus script — with its 400 standardized signs, which occur with recurring sequences in standard rows that have a preferred direction — is far from being "simple" when compared to non-linguistic symbolic systems closer to the Indus script in space and time. Vidale discusses in detail the different systems of potter's marks and iconographic symbols used during the third millennium at the Namazga V sites (southern Turkmenistan), Shahr-i Sokhta (Iranian Sistan), Tepe Yahya, Shahdad, Jiroft (all in Iranian Kerman), Rahman Dheri (in northwestern Pakistan), Mehrgarh and Nausharo (in Pakistani Baluchistan) and the more than 400 Dilmun seals of the Gulf used in early second millennium BC. *"It is clear that the inclusion of such restricted (but in their contexts presumably efficient) symbolic systems in their samples would have highlighted the non-comparability of the Indus script to such codes, thus lessening the impact of a good part of the Authors' [i.e., Farmer et al.] arguments. This is why, I believe, these systems were not considered. It is also clear that in the known contemporary systems, non-linguistic symbols behaved quite variably, and that archaeological data question the superficial claim that positional regularities are easily found in 'countless non-linguistic sign systems',"* concludes Vidale.

Why Did the Harappans not Adopt Writing?

"The critical question remains of why the Harappans never adopted writing, since their trade classes and presumably their ruling elite were undoubtedly aware of it through their centuries of contact with the high-literate Mesopotamians" (Farmer et al. 2004: 44).

That the Harappans should have intentionally rejected writing like the Celtic priests of Roman times, being averse to encode their ritual traditions in writing like the Vedic Brahmins (p. 44), is not an overwhelmingly convincing explanation. It is true that some complex socie-

ties did prosper without writing, for example the Incan empire which instead used a system of knotted strings (p. 47; Lawler 2004: 2029). But writing has been a most effective tool of administration, and the Indus script was created in the transitional period as part of a thorough reorganization of the Harappan culture, which included also standardization of weights and measures and led to the expansion and 500 years' duration of the Mature Harappan Civilization over a million square kilometers. The Harappans are not likely to have committed long literary texts to writing, and may have restricted themselves to recording economic transactions and other administrative affairs (as was done, for example, in Mycenaean Greece).

Pointers to a Writing System in the Indus Texts

One of the first testimonies of phonetic writing in Egypt is the famous palette of Narmer (c. 3050 BCE). Above the head of the king, who smites his enemy with a mace, is depicted the façade of his palace inside which are depicted a 'catfish' and an 'awl'. These signs, placed in the picture like the iconographic symbols of Mesopotamia, identify the king, but on a linguistic basis. Through the rebus or picture puzzle principle, the pictograms supply the phonetic values *n'r* and *mr*, respectively, yielding the king's name Narmer.[16)]

Both in Mesopotamia[17)] and in Egypt the application of the rebus principle meant a breakthrough in the creation of language-based writing. The signs used in writing were standardized and written in regular lines following the order of spoken words and sounds.

That the Indus signs form a standardized system and that the signs are written in regular lines are very important pointers to a language-based writing. But the most important characteristic of the Indus texts in this respect becomes evident if we do not limit their consideration to single inscriptions, as Farmer et al. do. This is the fact that the Indus signs form a very large number of regularly repeated sequences. The

16) Cf., e.g., Gardiner 1957: 7; Ray 1986; Ritner 1996: 73.

17) Cf. Michalowski 1996: 35; Cooper 1996: 42.

signs do not occur haphazardly, but follow certain rules. Some signs are limited to the end of a sequence, even when such a sequence occurs in the middle of an inscription, while other signs are usually found in the beginning of a sequence, some others are never found there, and so on.

It must be admitted that it is very difficult to construct even parts of the Indus grammar on this basis.[18] Nevertheless, the positional sequences can be profitably exploited to analyse the Indus texts syntactically, to define the textual junctures, and to classify the signs into phonetically or semantically similar groups. Such analyses can be carried out with automated methods.[19] Data accumulated in this way will certainly be useful in decipherment once a decisive breakthrough has been achieved — in other words when the language has been identified and some signs have been read phonetically in a convincing manner. But analyses of this kind are themselves unlikely to provide that breakthrough.

Conclusion

Perishable archaeological material being involved, and taking into consideration the very limited amount of surviving monumental art, negative evidence is not sufficient to prove wrong the hypothesis that the Harappans wrote on palm leaves or on cloth. Richard Sproat, the computer linguist of the Farmer team, admits that by statistical means it is not possible to distinguish a logo-syllabic script of the Mesopotamian type from non-linguistic symbol systems.[20] The question of whether the Indus signs are script or not, ultimately depends on whether one can

18) Cf. Parpola 1994: 86–97.

19) See Parpola 1994: 97–101.

20) My colleague Kimmo Koskenniemi, who is Professor of Computer Linguistics at the University of Helsinki and has participated in research on the Indus script, asked by e-mail Dr. Richard Sproat the following question: *"It appears that we agree that plain statistical tests such as the distribution of sign frequencies and plain reoccurrences can (a) neither prove that the signs represent writing, (b) nor prove that the signs do not represent writing. Falsifying being equally impossible as proving. But, do I interpret you correctly?"* In an e-mail sent to Kimmo Koskenniemi on Wednesday 27 April 2005, Dr. Sproat answered to this question with one word: *"Yes."*

demonstrate that the language-based rebus principle was utilized. Demonstrating this successfully will actually amount to a partial decipherment. The material presently available will not, in my opinion, allow a full decipherment, or one covering most texts.

Screening and developing ideas rashly published in the first flush of enthusiasm in 1969, I have in 1994 presented coherent interpretations of more than twenty Indus signs. These interpretations based on the hypothesis that the underlying language is Proto-Dravidian are in accordance with the generally accepted theories of script and decipherment and make sense within the framework of the Indus Civilization and Indian cultural history. My main concern has been to find different ways to check the interpretations. One basic goal has been to achieve internal control comparable to that applied in solving crossword puzzles. I have targeted especially signs that come together in ligatures (complex signs formed by combining two or more simple signs or sign elements) or signs that together constitute compound words. If both signs of a potential compound can be interpreted, the result is controlled externally by checking whether such a compound is actually attested in the known vocabulary of Dravidian languages. Semantically the results should make sense in their historical context, and at best they might even solve old problems. Personally I am convinced that this approach is correct, because it has been possible to go on expanding these interpretations systematically. I trust that the end of the road has not yet been reached, although the available material sets severe restrictions.

Without caring to demonstrate in detail what is wrong with these specific interpretations,[21] Farmer and his colleagues dismiss them off-

21) I expect detailed criticism which points out specific faults in theory or in factual data. In the present case the rules are very few indeed, in accordance with the generally accepted theory, and do not change from case to case but are the same throughout, so I refuse to accept the implication that the general criticism leveled against all attempts (including that of Hrozný) applies here too: *"by exploiting the many degrees of freedom in the ways that speech maps to scripts, it is possible by inventing enough rules as you go to generate half-convincing pseudo-decipherments of any set of ancient signs into any language — even when those signs did not encode language in the first place. The absurdity of this*

hand in one single phrase, speaking of *"the failure of the Dravidian model to generate verifiable linguistic readings of a single Indus sign"* (Farmer et al. 2004: 21). I do not find this quite fair, as the rebus interpretations have such a pivotal importance for the question of whether the Indus signs are script or not, and as many reviewers and other scholars have taken my 1994 book very seriously. But being an involved party, the matter is of course not for me to decide. I am all the more grateful to the Tōhō Gakkai for this opportunity to present some of the interpretations to this distinguished audience (Comment: the printed paper is addressed to the readers, no more to the listening audience).[22] My main purpose here is to give an idea of the methods and controls.

Evidence for Writing and Dravidian Language

Obstacles to Decipherment

How can the Indus script be deciphered? We must turn to successful decipherments of ancient scripts and to the known history of writing for methodological guidance. Becoming acquainted with decipherments of other ancient scripts, one also becomes conscious of the immense obstacles in the case of the Indus script.

Most ancient scripts have been deciphered with the help of translations into known scripts and languages. But here no such translations exist. Even worse, historical information, such as was available from the Bible and the Greek historians in the case of the Persian cuneiform, is

method only becomes obvious when it is extended to large bodies of inscriptions, and the number of required rules reaches astronomical levels; hence the tendency of claimed decipherments to provide only 'samples' of their results, prudently restricting the number of rules to outwardly plausible levels." (Farmer et al. 2004: 20f.). The small number of interpretations in my case simply results from the limitations of the available material, which does not allow any extensive decipherment.

22) For detailed documentation and illustrations, I refer to my earlier publications (Parpola 1994; 1997). As I will not be discussing the study of the Indus script in all its aspects, I would like to make a reference also to relevant chapters of various recent books: Robinson 1995: 144–148; 2002: 264–295; Kenoyer 1998: 68–79; McIntosh 2002: 140–155; Possehl 1996; 2002: 127–139; Rogers 2005: 201–203.

almost totally missing. The script was forgotten long before the earliest preserved literary records of South Asia were composed, so the later Indian sources tell us nothing about the Indus Civilization.

The Indus script is not closely and obviously related with any other known writing system which could help defining the phonetic values of the Indus signs. In addition, several further facts make the problem of the Indus script unusually difficult to tackle. As already stated, all surviving texts are very short — even the longest text is merely 26 signs. This means that we probably have no complete sentences but mostly just noun phrases. There are no clearly distinguishable word dividers, which have been of great help in the analysis of for instance the Aegean scripts. And though numerous signs are clearly pictographic, many are so simplified that it is virtually impossible to understand what they depict.

No wonder, then, that after about one hundred published attempts at deciphering the Indus script, the problem remains unsolved — that at least is the general verdict.[23] Why have these attempts failed? Very often the material has been manipulated in unacceptable ways to fit preconceived ideas. Apart from this, the most popular method has been to equate Indus signs with similar-looking signs of other, readable scripts, and to read the Indus signs with their phonetic values. This method, however, works only when the scripts compared are closely related, and even then there are pitfalls. It is true that some Indus signs have close formal parallels in other ancient scripts. For example, the Indus sign looking like a mountain can be compared with signs occurring in Sumerian, Egyptian, Hittite and Chinese scripts. But each of these parallel signs represents a different language and has a different phonetic value, even if the meaning is the same or similar.

Methodology

What, then, is sound methodology? Some preparatory tasks have proved

23) Cf. Possehl 1996; Robinson 2002: 264–295.

useful in the decipherment of all kinds of scripts. They include collecting all available texts into a comprehensive and reliable text edition. In the case of the Indus script, the texts are being published both in photographs and in standardized, computer-drawn form.[24] Concordances systematically recording all occurrences of individual signs and their sequences in the texts, and various other kinds of statistics have been prepared.[25] Compilation of a reliable sign list, which distinguishes between distinct signs and their merely graphical variants, belongs to the most fundamental tasks.[26] All these tasks are interrelated and affect each other, and revisions are required.

Fundamentally, there are two principal unknowns to be tackled in the decipherment of any ancient script, namely the script type and the underlying language or languages.

The Language Problem

The language problem is most crucial. If the language of the Indus script belonged to a language family not known from other sources, the Indus script can never be deciphered. Compare the case of Etruscan: though written in an easily read alphabetic script, this isolated language is not much understood beyond the texts covered by copious translations. But as the Harappan population numbered around one million, there is a fair chance that traces of the language(s) have survived in the extensive Vedic texts composed by Indo-Aryan speakers who came to the Indus Valley from Central Asia during the second millennium BCE.

Aryan languages have been spoken in the Indus Valley ever since, but an Aryan language could not have been spoken by large numbers of Mature Harappan people. The culture reflected in the Ṛgvedic hymns is quite dissimilar from the Indus Civilization. Particularly important is

24) For the first two volumes of the *Corpus of Indus Seals and Inscriptions*, see Joshi & Parpola 1987; Shah & Parpola 1991. The third volume is due to appear shortly.

25) For the time being, see Mahadevan 1977; Koskenniemi & Parpola 1979–1982.

26) For the present, see Parpola 1994: 68–82. Bryan Wells is preparing a new sign list as his Ph. D. thesis (Wells 1998 is his M. A. thesis on the same topic).

the fact that the domesticated horse has played an important role in the culture of the Indo-Iranian speakers, and there is no unambiguous evidence for the presence of *Equus caballus* in South Asia before the second millennium BCE.[27)]

While various minority languages are very likely to have been spoken in the Greater Indus Valley,[28)] there appears to have been only one written language. The sign sequences of the Indus texts are uniform throughout their area of distribution in South Asia.

The argument is reinforced by the fact that some of the Indus seals found in the Near East contain typical Indus signs and sequences — this concerns especially the square seals most common in South Asia — while on some other Indus seals — especially the round seals similar to those of the Gulf and Elamite culture, and the cylinder seals of the Mesopotamian type — have common Indus signs but in sequences completely dissimilar from those occurring on native Harappan texts. Statistically, one would expect that the most frequently attested sign (the occurrences of which constitute almost 10% of the Indus texts) would very often be found next to itself, but this is never the case in the Indus Valley. The combination is attested on a round seal probably found in Mesopotamia, which contains only frequently occurring signs of the Indus script, but in unique sequences.

This suggests that Harappans residing in the Near East had adopted the local language(s) which differed from the Indus language. The cuneiform texts speak not only of a distant country called Meluḫḫa, which most scholars identify with the Greater Indus Valley, but also of

27) For the horse, cf. Meadow 1991; Meadow & Patel 1997. For the prehistory of the Aryan languages and their introduction to South Asia, see now Carpelan & Parpola 2001; Parpola 2002a; 2002b (for the Aryan affinity of the Dāsa language); 2004 [2005]; 2005; Kochhar 2000; Driem 2001: II, 1070–1103.

28) Cf. Kuiper 1991: 89–96 for a list of 383 "foreign words in the Rigvedic language"; Lubotsky 2001; Parpola 2002a: 92–94; and Witzel 2003 [2004] for the original non-Indo-European language of the Bactria and Margiana Archaeological Complex (BMAC); for the Austro-Asiatic, Tibeto-Burman and Burushaski languages, cf. Parpola 1994: 142 and van Driem 1999; 2001: I, 295–297; 421–433; II, 1202f.

Meluḫḫa people who resided for generations in southern Mesopotamia. According to its inscription, one Old Akkadian cylinder seal belonged to *"Su-ilishu, interpreter of the Meluḫḫan language."* Thus the Meluḫḫan language did differ from the languages commonly spoken and understood in the ancient Near East, above all Sumerian, Akkadian and Elamite. The Harappan trade agents who resided in the Gulf and in Mesopotamia became bilingual, adopted local habits and local names, and wrote their names in the Indus script for the Harappans to read.

Historically the most likely candidate for the written majority language of the Harappans is Proto-Dravidian. The 26 members of the Dravidian language family are now mainly spoken in Central and South India. However, one Dravidian language, Brahui, has been spoken in Baluchistan for at least a thousand years, as far as the historical sources go.[29] Even areal linguistics of South Asia supports the hypothesis that the Indus language belonged to the Dravidian family. The retroflex consonants, which constitute the most diagnostic feature of the South Asian linguistic area, can be divided into two distinct groups, and one of these groups is distributed over the Indus Valley as well as the Dravidian-speaking areas.[30] Most importantly, numerous loanwords and even structural borrowings from Dravidian have been identified in Sanskrit texts composed in northwestern India at the end of the second and first half of the first millennium BCE, before any intensive contact between North and South India. External evidence thus suggests that the Harappans most probably spoke a Dravidian language.[31] Tools for reconstructing Proto-Dravidian are available.[32]

Clarifying the Type of Script

From the history of writing we know that the writing systems of the world have evolved historically and stagewise, in three successive steps.

29) Cf. Elfenbein 1987, and Parpola 1994: 160–167.

30) Cf. Tikkanen 1999.

31) Cf. also e.g., Driem 2001: II, 1012–1038; Rogers 2005: 203.

32) See Burrow & Emeneau 1984; Krishnamurti 2003, with further references.

We can ask if the script is logo-syllabic (in which the signs represent complete words or syllables), syllabic (in which the signs almost exclusively have a syllabic value), or alphabetic (in which the signs represent separate phonemes, in the oldest scripts of this type mainly consonants)? The main criteria that can be used to define the type are the number of distinct signs, the word length measured in the number of signs, and the age of the script.

In the Indus script, the number of known signs is around 400, with about 200 basic elements. This number corresponds fairly well to the number actively used in logo-syllabic scripts at one time; it is too high for the script to be syllabic or alphabetic. Word divisions are not marked, but there is a good number of inscriptions comprising only one, two or three signs, and many of the longer ones can be subdivided into such units. In logo-syllabic scripts, one to three signs is a very typical word length, but in syllabic and alphabetic scripts, many words are much longer.

As to the age of the Indus script, the Mature Harappan phase, in which the fully developed Indus script was used, is assumed to have started between 2600–2500 BCE. A baked seal impression and a potsherd with short inscriptions that include the most frequently attested sign of the Indus script were recently excavated at Harappa. They suggest that the Indus script was created during the last phase of the Early Harappan period, between 2800–2600 BCE. Inspiration, restricted to the basic principle of logo-syllabic writing, is likely to have come from the Proto-Elamite script (c. 3100–2900 BCE), which was widely used on the Iranian Plateau.[33] The creators of the Indus script seem to have mainly resorted to traditional local symbols of the Greater Indus Valley.

The Indus script is thus much older than the earliest known syllabic scripts, the Eblaite cuneiform of Syria and the Linear Elamite of Susa, which date from around 2350 and 2250 BCE respectively. The earliest

33) Cf. Driem 2001: II, 998–1000.

alphabet was created c. 1600 BCE. The syllabic and alphabetic systems came into being as simplifications of the logo-syllabic scripts used in Mesopotamia and Egypt.

Thus all three criteria agree in suggesting that the Indus script belongs to the logo-syllabic type. The prospects and methods of deciphering such a script without translations differ in some essential respects from those of syllabic and alphabetic scripts. The syllabaries and alphabets form closed systems that cover the entire phonology of the language, and can be decoded as a systemic whole.

In logo-syllabic scripts, there are many more signs and variables to take into account, and the phonetic bond between the signs is weaker. There is no chance of building phonetic grids of the kind invented and realized in the decipherment of the Linear B. A complete phonetic decipherment of the Indus script is not possible with presently available materials. We can only hope for a partial phonetic decipherment covering individual signs. But to reach even this limited goal we need a valid method and good starting points.

The Rebus Principle and Its Implications

If it can be recognized from its outward shape what a pictographic sign represents,[34] this gives its "pictorial meaning." Contextual clues may suggest what a particular sign in a particular context approximately meant; this "intended meaning" may or may not have been the same as the pictorial meaning. If the pictorial and intended meanings of a particular sign can both be determined, and they turn out to be identical, this strengthens the assumed shared meaning, but yields no phonetic reading. But if the two meanings differ, they may be connected by homophony. Logo-syllabic scripts used rebus puns, which are language-specific and can thus identify the Indus language.

34) As noted above, comparison of similar-looking signs of other ancients scripts. and non-linguistic symbol systems! — is very useful for determining the pictorial (iconic) meaning of the Indus signs.

(Fig. 1)

The outward shape of the U- or V-shaped Indus sign suggests 'pot' as its "pictorial meaning." A contextual clue suggests that the "intended meaning" also is 'vessel', or more exactly 'sacrificial or offering vessel'. The iconographic scene accompanying an inscription where this sign is preceded by a number, shows a human being who extends a similarly shaped pot towards a sacred tree in front of which he or she is kneeling (see Fig. 1).[35] Here the intended meaning of the sign appears to be the same as its pictorial meaning, and it can be understood directly, without any linguistic postulations. We need not know what the object was called in the original language to understand the sign.

But a sign is not fully deciphered as long as its ancient pronunciation has not been recovered. In logo-syllabic scripts, a sign can stand for the thing that it depicts, as well as for any other thing which has the same phonetic value. The use of this rebus principle is necessary particularly when abstract concepts have to be expressed. Homophony in the form of puns undoubtedly played a role in folklore long before it was utilized in writing. Importantly, puns usually are language-specific: we have a chance to identify the language that underlies the Indus script and to recognize the phonetic value of the sign(s) involved only in those cases, where the rebus principle has been applied.

35) Cf. M-478 A and M-479 A in Joshi & Parpola 1987: 115.

A Case for the Rebus: The 'Fish' Signs of the Seal Texts

The function of an inscribed artifact provides one of the most important clues to the general meaning of its text. The vast majority of the Indus texts are seals or sealings. Impressions of cloth, strings and other packing material on the reverse of tags with seal impressions indicate that the Harappan seals were used to control economic administration and trade.[36] One such clay tag stamped with an Indus seal has been found in Mesopotamia, where seals were used in the same way. The historical contact with the Near East makes it highly probable that the Indus seal inscriptions also chiefly contain proper names of persons with or without their occupational or official titles and descent, as do the contemporaneous readable Mesopotamian seal inscriptions.

That the signs looking like a 'fish' have this pictorial meaning is certified by the Indus iconography, in which fish (both more naturalistic fish and fish looking exactly like the Indus sign) is placed in the mouth of a fish-eating alligator. The plain fish sign probably has the intended meaning 'fish' on Indus tablets that seem to mention offerings of one to four pots of fish. But although Mesopotamian *economic texts* often speak of fish, fish is never mentioned in Mesopotamian *seal inscriptions*. The 'fish' sign, both plain and modified with various diacritic additions, occurs so frequently on Indus seals that almost every tenth sign belongs to this group. This suggests that they denote something else than fish on the seals. A reasonable guess for the "intended meaning" is 'god', for names of gods are used to form Mesopotamian as well as later Hindu proper names of persons.

The most commonly used word for 'fish' in Dravidian languages is *mīn*, and this word was pronounced in Proto-Dravidian like the word *mīn* meaning 'star'. This homophonic meaning suits the expected meaning 'god', for in the Mesopotamian cuneiform script every name of a deity is marked as such by a prefixed sign depicting 'star' but meaning 'god'. Astronomy, including the use of a star calendar, played an important

36) Cf. Parpola 1986: 401–402; 1994: 113–114. My analyses are now being updated by Dennys Frenez (see Frenez and Tosi, in press).

role in Mesopotamia, and deeply influenced the religion: all the main gods were symbolized by particular stars or planets. The orientation of streets and buildings according to the cardinal directions in Harappan cities provides concrete evidence for the practice of astronomy, which, as the basis of time-reckoning, was an integral part of all early civilizations. In Hindu religion, too, stars and planets have important divinities as their 'overlords'. The domestic manuals of the Veda further prescribe that children should be given secret 'star names'. Thus it is not far-fetched to suppose that the 'fish' signs on the Indus seals could stand for Proto-Dravidian names of stars, used as symbols for gods and as parts of human proper names.

(Fig. 2)

There is some external evidence that supports this hypothetical rebus reading. The association of fish and star (based on the homophony between the two Proto-Dravidian words both pronounced *mīṉ*) seems to be reflected on Harappan painted pottery from Amri, where the motifs of fish and star co-occur. In the Near East, the star symbol distinguished divinities even in pictorial representations. A seal from Mohenjo-daro (M-305, see Fig. 2) depicts an Indus deity with a star on either side of his head in this Near Eastern fashion.

A Numeral Sign + 'Fish'

Assuming that the language underlying the Indus script is Dravidian, it is difficult to avoid certain readings and conclusions. Long ago, Father Henry Heras suggested that the plain fish sign is to be read as *mīn*. This reading has been proposed by Russian students of the Indus script as

well as by myself. But our agreement is not limited to this, it comprises also the sequences in which the plain fish sign is preceded by a numeral sign. The numerals belong to those few Indus signs whose function and meaning can be deduced with fair certainty, partly from the fact that they consist of groups of vertical strokes, which is the way numerals are represented in many ancient scripts, partly from their mutual interchangeability before (i.e., to the right of)[37] specific signs, including the plain 'fish'. The sequence '6' + 'fish' yields the Old Tamil name of the Pleiades, *aṟu-mīṉ*, literally '6 stars'.

'7' + 'fish' corresponds to the Old Tamil name of the Ursa Major, *eḷu-mīṉ*. This sequence forms the entire inscription in one large seal from Harappa. This seal can be compared to the large dedicatory seals presented to divinities in Mesopotamia, for the stars of Ursa Major are since Vedic times identified with the ancient "Seven Sages." These mythical ancestors of priestly clans play a very important role in Indian mythology, including myths related to the origins of the phallic linga cult, which seems to originate in the Harappan religion. The Seven Sages moreover have a counterpart in the Seven Sages of the Mesopotamian religion: both groups are said to have survived the mythical flood.

A 'Fish' Sign with Diacritics

But even non-numeral attributes of the 'fish' signs can be interpreted systematically from the same premises. Among the diacritical marks added to the basic 'fish' sign to form compound signs is one placed over the 'fish' sign. It looks like a 'roof'. The most widespread root for words denoting 'roof' in Dravidian languages is **vay-* / **vey-* / **mey-* 'to cover a house with a thatched roof'. In Proto-Dravidian **vey-* / **mey-* 'to roof' was thus nearly homophonous with the root **may-* 'black'. The compound Indus sign consisting of the pictures of 'roof' and 'fish' can be read as **mey-mīn* 'roof-fish' in the sense of **may-mīn* 'black star'. What

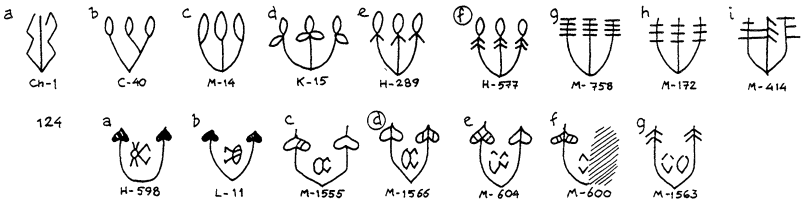
37) Right to left is the normal direction of writing in the Indus script. Seal stamps were carved in mirror image, so the normal writing direction is in the seal impressions.

makes this reading really significant is that the compound *mai-m-mīn* 'black star' is actually attested as the name of the planet Saturn in Old Tamil.[38] Such a name is natural for Saturn, a dim planet.

But Saturn is also a slow planet. For this reason it is usually called *śani* or *śanaiścara* 'slowly-going' in Sanskrit. In the iconography of both the Buddhists and the Jains, the planet Saturn rides the proverbially slow turtle. The association may well go back to Harappan times, for the pictogram depicting a fish with a roof over it could symbolize the planet Saturn not only phonetically but even pictorially, through his vehicle, that is, the turtle, which is an aquatic animal (i.e., a kind of 'fish') covered with a shell (i.e., a kind of roof)!

The Banyan Tree and the North Star

On the seals M-172 and M-414, the plain fish sign is preceded by a sign which has several variant forms in the Indus texts (see Fig. 3). Their comparison with the motifs of Early Harappan painted pottery suggests that this pictogram represents a fig tree. Except when combined with another sign ('crab'), which is placed inside it omitting the central 'branch', the tree is shown as three-branched, just as on the painted pottery. In the combined sign, the branches end in fig leaves as on the painted pottery, but in the variants of the basic sign the branches seem to bear either fig fruits or simplified fig leaves, or hanging aerial roots, or both.



(Fig. 3)

38) Cf. Puṟanāṉūṟu 117.

Rope-like air-roots are characteristic of the banyan tree or *Ficus indica*. One of the Sanskrit names for this tree, *vaṭa*, indeed seems to be derived from the Proto-Dravidian word *vaṭam* 'rope, cord'. As a name of the banyan tree, *vaṭam* appears to be short for the compound *vaṭa-maram*, or 'rope-tree', which is attested in Tamil. This Dravidian etymology for *vaṭa* makes it possible to find a Dravidian homophone fitting the above assumed astral context where the 'fig' pictogram is followed by the 'fish' sign.

In the Purāṇa texts written in Sanskrit the banyan fig is the tree of the northern direction. Why? Proto-Dravidian had another, homophonous word *vaṭa*, which means 'north'; but there is no such linguistic association between 'banyan' and 'north' in Indo-Aryan languages. The compound consisting of the signs for 'fig tree' and 'fish' thus yields the compound *vaṭa-mīn* 'north star'. This compound is actually attested in Old Tamil literature, as the name of the tiny star Alcor in the constellation of Ursa Major. In Sanskrit this star is called Arundhatī and it is supposed to represent the faithful wife of Vasiṣṭha, one of the Seven Sages with which the constellation Ursa Major is associated. This star is to be shown to the bride in the marriage ceremony according to both Vedic and Old Tamil texts. It is likely that originally *vaṭa-mīn* denoted the nearby pole star (Thuban, the 'immobile' center of the rotating heavens in 3000 BCE). The Sanskrit name of the pole star is *dhruva* 'fixed, firm, immovable, constant', and the pole star is also shown to the bride as an exemplar to be emulated.

The Purāṇa texts contain an interesting conception about the pole star, which seems to be explained by its Dravidian name *vaṭa-mīn*. In reply to the question, why the stars and planets do not fall down from the sky, these heavenly bodies are said to be bound to the pole star with invisible 'ropes of wind'. These 'ropes' seem to refer to the air-roots of the cosmic banyan tree, which God Varuṇa is said to hold up in the sky in the earliest Indian text dating from c. 1000 BCE,[39] a conception

39) Cf. Ṛgveda 1,24,7.

naturally following from Dravidian *vaṭa-mīn* 'north star' = 'banyan star' = 'rope star'.

The 'Crab' Sign

We can try to verify this interpretation by attempting to understand the sign sometimes inserted in the middle of the 'fig' sign, omitting the central one of its three branches. The said sign occurs more than 125 times as a separate grapheme. It seems to depict a 'crab', mostly simplified to a round body with claws, but sometimes with feet added. That the signs with feet are allographs of those without feet is indicated by the presence of this variation even when combined with the 'fig' sign, while the identity of these combined variants can be seen from the similarity of the context in two seals, one from Harappa (H-598), the other from Lothal (L-11).

The clear emphasis laid on the claws makes it likely that the sign expresses the concept of 'grasping' or 'seizing', for the crab is consistently associated with 'grasping' in Indian folklore. In the Baka- and Kakkaṭa-Jātaka, the crab's claws are compared with the pincers of a smith. The same comparison is found in Old Tamil texts,[40] where the verbal root *koḷ* 'to seize, grasp, take' is used of the crab's 'seizing' with its claws,[41] while the Pāli and Sanskrit texts use the semantically corresponding root *grah-* and its cognates, related to English *grab*.

In the Indus texts, the 'crab' sign usually occurs in the immediate vicinity of the 'fish' signs assumed to denote stars and planets. It might therefore stand for Proto-Dravidian *kōḷ* 'seizure' (from the verbal root *koḷ* 'to seize'), which refers to planets and eclipse demons.[42] In Indian folk religion, the planets are believed to 'seize' people and make them sick.

Instead of *kōḷ* 'planet', a synonymous compound, *kōṇ-mīṉ* (with *ḷ* changed into *ṇ* before the following *m*), 'seizing star', is used in several

40) Cf. Perumpāṇāṟṟuppaṭai 206–208.

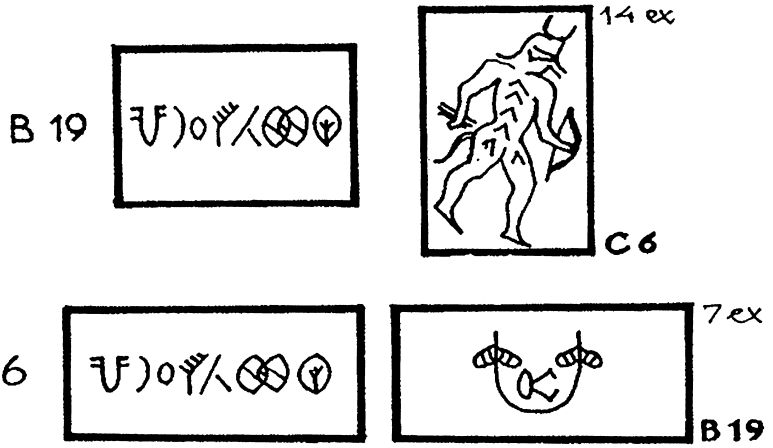
41) Cf. Naṟṟiṇai 35; Ainkuṟunūṟu 27.

42) Cf. Puṟanāṉūṟu 260.

Old Tamil texts.[43] It is remarkable that not only does the sign combination 'crab' + 'fish' (corresponding to the Tamil compound *kōṇ-mīṉ*) occur three times in the Indus inscriptions, but the identity of the subsequent sequence in two parallel inscriptions (M-57 and M-387) suggests that this combination, 'crab' + 'fish', is synonymous with the plain 'crab' sign, as is Tamil *kōṇ-mīṉ* with *kōḷ*.

The Combination of 'Crab' and 'Fig'

The interpretation of the 'crab' sign can be further checked by examining its combination with the 'fig' sign. The 'fig' + 'crab' ligature is among the few Indus signs for which the copper tablets of Mohenjodaro function as 'semi-bilinguals', mediating their intended meaning visually, through an iconographic image. The copper tablets constitute a rare category of objects with a clear interdependence between the inscription on the obverse and the iconographic motif on the reverse. This is certified by the existence of numerous duplicates, forming sets of identical tablets. In some sets, an isolated sign on the reverse has the same inscription on the obverse as an animal or human-shaped icono-



(Fig. 4)

43) Ciṟupāṇāṟṟuppaṭai 242–4; Puṟanāṉūṟu 392,17; Paṭṭiṉappālai 67–68.

graphic motif in another set. This seems to mean that the isolated sign stands for the name of the divinity depicted through the iconographic motif. The 'fig' + 'crab' ligature is thus equated with a male figure armed with bow and arrows, anthropomorphic apart from having a bull's horns and tail, and with long eyes.

In the Near Eastern scripts, an inserted sign often functions as a semantic or phonetic determinative. If this is the case here, the 'crab' sign could indicate that the 'fig' sign is not to read with its usual phonetic value as *vaṭa* 'banyan tree'. The meaning 'fig' is retained, but the phonetic shape of the word is similar to that expressed by the 'crab' sign, i.e., *kōḷ*. Old Tamil, other South Dravidian languages and Tulu possess such a word: *kōḷi* 'banyan, pipal, all kinds of fig trees which bear fruit without outwardly blossoming, epidendron, grasping plant (some figs are of this nature)'. The meaning 'grasping plant' suggests its derivation from the Proto-Dravidian root *koḷ* 'to grasp, seize'.

But how can the word *kōḷi* be connected with the Harappan archer-god depicted on the copper tablets? Its basic meaning is 'grasping epiphytic fig', and in early Vedic texts such figs — which strangle their host trees and break buildings — are implored for help in crushing enemies. It is a fitting symbol for the war-god Skanda and his Vedic predecessor Rudra. Rudra has been suspected to descend from a Pre-Aryan deity. He is described as a cruel hunter and raider, who with the bow, his characteristic weapon, shoots arrows at cattle and people. Euphemistically, Rudra is called Śiva 'kind, benevolent' in the Veda. Another common name of Śiva is *Hara* 'seizer, taker, robber', which is likewise used of Rudra.[44] Sanskrit *Hara* could reflect the Dravidian word *kōḷ* 'seizure, taking, pillage, plunder, robbery', derived from *koḷ* 'to seize, take, rob'.

The word *kōḷi* in the sense of 'a fig tree which bears fruit without outwardly blossoming' must be compared also with Old Tamil *kōḷ* 'the act of bearing fruit'.[45] Both are derived from the root *koḷ* 'to take',

44) Cf. Āśvalāyana-Gṛhyasūtra 4, 8, 19.

45) Cf. Akanāṉūṟu 2,1; 162,19; 335,14; 382,10; 399,14.

which here has the same sense as the Sanskrit root *grabh-* in the Vedic phrase *óṣadhayaḥ phálaṃ gṛbhṇanti* 'the plants get (lit. take) fruit',[46] in the past participle *gṛbhītá-* 'fructified, fruit-bearing'.[47] And in *garbha* 'fruit, embryo'.[48] The ligature of 'fig' + 'crab' thus seems to express the deity even iconically: the 'seizing' / 'fructifying' deity or his 'embryo' is placed inside the fig tree, just as anthropomorphic deities are often depicted inside fig trees in the Indus glyptics. Particular attention may be drawn to such a deity with a goat's or ram's head, who seems to be the Harappan predecessor of the god Skanda in his goat- or ram-headed fertility aspect, Viśākha or Naigameṣa, whose cult is intimately connected with fig trees.

New Interpretations

A number of tentative interpretations not included in my book of 1994 have been presented elsewhere.[49] It is possible to propose some more readings that have reasonable credibility, so to label this line of approach abortive because it has stagnated and made no further progress is incorrect. I shall add one new interpretation here.

I have earlier suggested that the sign 'dot-in-circle' depicts 'eye', *kaṇ* in Dravidian. The sign could also stand for the corresponding verb, *kāṇ* 'to see'. Two such signs one after the other is a frequently occurring sequence in the Indus texts, which clearly forms a phrase. It can be matched with the Tamil compound *kaṇ-kāṇi* 'overseer'.[50] Another phrasal sequence ending in the 'eye' sign constitutes the entire inscription on a seal from Harappa (H-602), and the last two signs on several

46) Taittirīya-Saṃhitā 6, 3, 4, 3.

47) Said of the wood-apple tree in Aitareya-Brāhmaṇa 2,1.

48) Sanskrit *gárbha-* m. 'fruit, embryo' seems to result from a contamination of the root *grabh-* in this Dravidian-influenced meaning with Sanskrit *gárbha-* m. 'womb,' younger Avestan *gerəβa-* m. 'womb', from Proto-Indo-European *g^{w}olbh-o- / *g^{w}elbh-, cf. Greek *delphús* f. 'womb'.

49) Cf. Parpola 1997; 1999: 107f.; 2003: 555–560.

50) Cf. Parpola 1994: 215.

other seals.[51] The first sign in this sequence is 'two parallel curved or winding lines'[52] probably depicting 'river' or 'water', like the similar-looking sign of the archaic Sumerian script. The phrase corresponds to the Tamil compound *nīr-k-kaṇṭi* 'a village servant who looks to the distribution of water for irrigation'. Such an occupational title makes sense in the context of the Indus Civilization.[53] The proposed interpretation of the 'water' sign can be tested in several other contexts, but I will stop the examination here.

The self-imposed demand of verification makes me reluctant to propose Dravidian interpretations that cannot be supported by actual linguistic evidence, such as compounds attested in Dravidian languages. Suspected compounds may actually exist, or have existed, but limitations of our sources and dictionaries may make them inaccessible to researchers. Really ancient texts not much affected by Indo-Aryan exist only for a single Dravidian language, Old Tamil, and the vocabulary of most Dravidian languages, especially their compounds, is, generally speaking, still very incompletely recorded. Thus it is not only the Indus texts that are scanty and make progress difficult.

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51) Cf. H-396 and H-568 from Harappa and M-205 from Mohenjo-daro in Joshi & Parpola 1987 and Shah & Parpola 1991.

52) Sign no. 175 in Parpola 1994: 73.

53) Cf. Kenoyer 1998: 38; 42; 163; Possehl 2002: 35; 64f.

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