Indus Seals and Glyptic Studies: An Overview

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Abstract

This chapter introduces Indus seals, and provides a chronological overview of seals in the various phases of Indus civilization. It then addresses various aspects of Indus seals, including inscriptions, the photographic Corpus of Indus Seals and Inscriptions, seals as badges of authority and amulets, seals as administrative tools, and seal manufacture. As such, the chapter provides a brief but thorough introduction to the more detailed studies that comprise the rest of the volume.

I. Introduction: Discovery of the Indus Civilization

A. In the beginning were seals

An unusual "stone seal" was among the few antiquities in Alexander Cunningham's 1875 account of Harappa, the largest ruin mound of the Punjab. Two further seals
were acquired at Harappa in 1884 and 1886. After all three had been presented to the British Museum, their photographs were published in 1912 by J. F. Fleet. Inscribed with the same unknown script, they caught the interest of Sir John Marshall, who as Director General of the Archaeological Survey of India (ASI) got excavations started at Harappa in 1921. More seals were immediately discovered, and they came from beneath Mauryan levels, at that time the oldest known in India. In 1922-23, R. D. Banerji examined the ruins of Mohenjo-daro in Sind and found similar seals there, some 650 km from Harappa. In 1924 Marshall announced that a new civilization had been discovered, and started large-scale excavations at both sites.

B. Excavations in the Greater Indus Valley

The numerous seals with their beautiful images and enigmatic script were the most exciting objects in Marshall's 1924 article in *The Illustrated London News*. The true identity of some Indus seals found in Western Asia was now realized, which established the Bronze Age affinity of the Indus Civilization and its contacts with Mesopotamia and the Gulf. In 1925, after Ernest Mackay had reported a typically Harappan square stamp seal unearthed in his excavations at Kish, Marshall invited him to direct excavations at Mohenjo-daro 1925-1931. Mackay described in detail the seal finds in the successive excavation reports of the site (Mackay 1931; 1938), while Marshall (1931: 52-73) also commented some important glyptic motifs, calling one "Proto-Śiva" (fig. 1) and suggesting continuity from Harappan religion to later Hinduism. Both found iconographic parallels in Western Asia, an avenue explored further by Heinz Mode in 1944. In 1935-36, Mackay directed American excavations at Chanhu-daro; the seals found there included the previously unknown Jhukar type seals of the post-urban period (Mackay 1943). M. S. Vats, in charge of the Harappa
excavations after D. R. Sahni, published the numerous seals found there in his report (Vats 1940).

Large-scale excavations at Mohenjo-daro and Harappa stopped in 1931 and 1934, but the site custodians continued digging. Their short annual reports were virtually forgotten in 1971, when I and Iravatham Mahadevan studied inscribed Indus materials in the museums of Pakistan and India, and to our surprise discovered more than 400 seals and inscriptions that had never been published (cf. CISI 1: xx). The study of these sites was revived by Sir Mortimer Wheeler, who in his excavations trained a new generation of Indian and Pakistani archaeologists in modern excavation methods. At Harappa in 1946 he exposed the 'citadel' walls and cemetery R37, and at Mohenjo-daro in 1950 the 'Great Granary'. Wheeler's Indian students B. B. Lal and B. K. Thapar excavated the major Early and Mature Harappan site of Kalibangan between 1960 and 1969 (Lal et al. 2003, 2015), while S. R. Rao in 1954-1963 unearthed significant finds discussed below at the Harappan harbour town of Lothal in Gujarat.

Of the later Indian excavations I single out those by R. S. Bisht at Dholavira and Banawali, which besides other interesting features have produced a fair number of Indus seals and inscriptions. In addition to the ASI, State Departments of Archaeology, universities (particularly in Pune and Vadodara) and some foreign collaborative projects, notably those of Gregory Possehl in Gujarat and Rajasthan and Toshiki Osada's Japanese Indus Project (see Current Studies on the Indus Civilization I-XII, 2010-2012) have much furthered Harappan studies in India. By now more than a thousand Indus sites have been located in Greater Indus Valley (cf. Possehl 2002b-c). Even small habitation sites, such as Kanmer measuring just 115 x 105 m, have yielded Indus seals and seal impressions (cf. Kharakwal et al. 2012: 484-490).
In Pakistan, F. A. Khan excavated in 1955-58 Kot Diji, a small site with key importance for the "Early Harappan" phase recognized by M. Rafique Mughal in 1970: the presence of several urban characteristics justified changing the name of some "Pre-Harappan" cultures. A number of prehistoric cultures had been traced in surveys of the Indo-Iranian borderlands since the 1920s. They could be ordered chronologically only after French excavations directed by J.-F. Jarrige at the sites Mehrgarh, Sibri, Nausharo and Pirak on the border of Baluchistan and Sind had yielded an unbroken cultural sequence c 7000-800 BCE (Jarrige et al. 1995; Jarrige 1991; Jarrige et al. 1979). Mundigak, Amri and Nindowari, important sites in Afghanistan and Pakistan, had been excavated already by Jean-Marie Casal (Casal 1961, 1964; Jarrige et al. 2011), while Roland Besenval has continued French archaeological research on the Makran coast (Besenval 2011).

The American archaeologists Walter Fairservis and George Dales both carried out surveys in Afghanistan and Pakistan. Fairservis also excavated the small Harappan site Allah-dino near Karachi, publishing its seals and inscriptions in 1976. Dales (1962) discovered the westernmost Harappan sites on the Makran coast, conducted a small excavation at Mohenjo-daro in 1964 and then dug at the coastal site of Balakot. In 1986 he established a research station at Harappa and started important excavations which after his death have been co-directed by Richard Meadow and Mark Kenoyer (Kenoyer & Meadow 2010). The German-Italian Mohenjo-daro documentation project started by Michael Jansen in the 1970s has also significantly furthered the study of Indus seals (Jansen & Urban eds. 1984, 1985, 1987).

C. Seals and Harappan contacts with Western and Central Asia

After Mackay (1925) had reported a square Indus seal from Kish and Scheil (1925) a clay tag with the impression of a square Indus seal from Umma, C. J. Gadd (1932) in
a major paper published several round seals that had Indus script and the typically Indus type grooved knob on the back, cylinder seals, and several uninscribed round seals of somewhat different kind. The affinity of the round seals with the Gulf started being understood only after Danish excavations on Bahrain and Failaka islands began to produce more seals of both kinds (cf. Bibby 1958; 1969; Kjaerum 1983). When Dales (1962) moreover reported the Harappan outposts on the Makran coast and Rao (1963) published the 'Dilmun' seal from Lothal, attention focused on cuneiform documents on maritime trade with the foreign countries Dilmun, Magan and Meluhha (Oppenheim 1954). It is now generally agreed that Dilmun principally refers to Failaka and Bahrain, Magan to the Oman peninsula and Iranian Makran, and Meluhha to Greater Indus Valley (cf. Maekawa & Mori 2011).

Steffen Terp Larsen (2010) has examined 121 'Gulf type' seals (27 bearing Indus script) and their relationship to the later 'Dilmun' seals; this is his topic also in this book. The Joint Hadd Project directed by Serge Cleuziou and Maurizio Tosi has documented Harappan presence in Oman, and Frenez and Tosi (2005) have identified further seals at Lothal associated with the Gulf trade: the square copper seal (L-44) has a parallel in the square Indus seal found at Ra's al-Hadd in the copper-rich Oman, and the rectangular stone seal decorated with concentric circles at the back like 'Dilmun' seals (L-100).

Besides stained carnelian beads, Indus-related seals discovered in Western Asia have provided most important chronological and geographical evidence of the intercultural relations between these regions (cf. Collon 1996; Possehl 2002a: 221-229; Reade 2008). Harappan presence in Central Asia is attested by two square seals (with swastika and two signs of Indus script respectively) and other objects of Harappan affinity from Altyn Depe in Turkmenistan (cf. Masson 1984; Possehl
In 2004, a square Indus seal with elephant and a line of Indus script with native Harappan sequences was excavated at Gonur in Turkmenistan. It probably belonged to a high-ranking Harappan 'diplomat' like a cylinder seal from Gonur possessed (according to its cuneiform inscription) by the cup-bearer of an Akkadian king (cf. Parpola 2006). In Afghanistan, the Harappan colony of Shortughai near the lapis lazuli mines also produced a classical Indus seal (Francfort 1989).

II. Evolution of Indus seals: Types and motifs

A. Pre-Harappan phase c 3500-3000 BCE

For the Pre-Harappan and the first part of the Early Harappan phase this sketch is based on Akinori Uesugi’s recent paper (2011). During the latter half of the fourth millennium BCE, the regional cultures of the Greater Indus Valley reached a high level of development, and interregional interaction began. Round, square and rectangular button seals having geometric motifs and two holes in the middle for threading, are attested from Mehrgarh IV and V in Baluchistan. They have close parallels on the Iranian Plateau, especially at Shahr-i Sokhta II in Seistan and at Mundigak III in southern Afghanistan. One (broken) bone seal of this type (H-1521) comes from Harappa I. An ivory seal from Rahman Dheri IB has two holes in the middle but figurative motifs (including a pair of scorpions). The early seals at Mehrgarh were found in compounds dedicated to craft activities and possible storage (Frenez 2004); this is compatible with the evidence of the earliest seals from Harappa (Kenoyer and Meadow 2010).

B. Early Harappan phase c 3000-2500 BCE

During the first half of the third millennium BCE, button seals with geometric motifs and two holes in the middle continue in Mehrgarh VI and VII; in period VII, there are also stylized human and animal figures. The later layer also has seals with geometric
motifs and a perforated knob on the reverse. Both types spread over the northern part of the Greater Indus Valley as far east as Kunal in Haryana.

Uesugi underlines the diagnostic importance of a new type of seal. Square and quatrefoil seals have in each corner the previously unattested motif of concentric circles; the centre may have a four-pointed star and/or a fifth dot-in-circles. From Mehrgarh VI (3000-2900 BCE) this seal type has spread through Rahman Dheri and Tarakai Qila in the NWFP, Harappa II & Manorama in the Punjab, Tarkhanewala Dhera and Baror I in Rajasthan to Kunal in Haryana (fig. 2). The motif continues in the Mature Harappan period, on seals with two holes in the middle at Nausharo II (c. 2500-2300 BCE) in Baluchistan and at Nagwada in Gujarat, and on seals with a knob on the back at Harappa (period 3B) in the Punjab, in Baror II in Rajasthan and Bagasra in Gujarat.

The new excavations at Harappa have much clarified the evolution of Indus seals. Besides seals with geometric motifs (including one with concentric circles), the Kot Diji levels (2800-2600 BCE) have the earliest example of a seal with an animal (elephant) as the main motif, clumsily cut into this unfinished and unfired steatite seal (H-1533, fig. 3) (cf. Kenoyer & Meadow 2010: li).

The origin of animal motifs on Harappan seals and pottery can be traced to the Indo-Iranian borderlands. From Nausharo I B (c. 2900-2800 BCE) in Baluchistan comes a compartmented copper seal representing a humped bull and loop on the back (Ns-1). Such seals with geometrical and animal motifs come from female burials of the "Shahi Tump cemetery culture" of the Kech-Makran coast, period IIIa (3100-2800 BCE) (cf. Besenval 2011: 48-51 and 119-124 with pl. 97-103a). Comparable animal motifs, including humped bulls and felines, appear on painted pottery of the following "Dasht culture 1", Kech-Makran period IIIb (2800-2600 BCE) and they have parallels

To these sites can be added Nindowari I (2800-2600 BCE) in southern Baluchistan; the following Nindowari II period (c. 2600-2300 BCE) represents the early "Style A" phase of the Kulli culture, with bulls tethered to trees or the ground, a motif adapted at Nausharo ID and Amri ID (c. 2600-2500 BCE) in a style heralding that of the Indus Civilization (cf. Jarrige et al. 2011: 82-88, 182-186).

C. Early Mature Harappan phase c. 2500-2300 BCE

Only two fragmentary seals can be ascribed to the Early Mature Harappan phase 3A at Harappa. Both have an animal motif: H-1688 probably represents the water buffalo. H-1689 with a finely carved elephant already has the shape of the dominant type of the following peak phase of the Indus Civilization. Kenoyer & Meadow (2010: xlv) date period 3A to c 2600-2450 BCE. It seems to correspond to the "transition period" of Nausharo ID (2600-2500 BCE) plus "Indus I" of Nausharo II (2500-2300 BCE) in the chronology of Jarrige et al. (2011: 208). I follow the latter chronology here, although the scarcity of 3A seals at Harappa suggests a shorter duration of this Early Mature phase.

D. Middle Mature Harappan phase c. 2300-2100 BCE

Jarrige et al. (2011: 208) date "Indus 2" corresponding to Nausharo III, Amri III B and the first half of Nindowari III with "Kulli style B" to c. 2300-2100 BCE, while Kenoyer & Meadow (2010: xlv) date the 3B phase at Harappa to c. 2450-2200 BCE. With Harappan carnelian beads in the Royal Graves of Ur and of classical Indus seals in Akkadian contexts, the latter dates agree better with the traditional Mesopotamian
chronology and the former better with the recently suggested lower chronology (cf. Reade 2008: 15 fig. 2).

Predominantly the most typical Indus seals, stamp seals with a square face, belong to this phase. The reverse side normally has a bisected, oval, perforated knob; rarely, the reverse side is flat and also engraved or not, while the seal body may be transversely pierced or be without a hole. The side of the largest seal (M-1203) measures 68 mm and that of the smallest 12 mm, but for most seals the side length is between 20 and 30 mm; the thickness varies between 18 (with the knob 30) and 2 (6) mm. Normally the face has one line of Indus script at the top (a second line - often just one sign - is not uncommon, but three lines are very rare, and then occupy the whole face). Beneath the text, or without it, is usually a pictorial motif. Rarely, there is engraving on one or more edges in addition to the face(s). The knob on the reverse in some seals has a short inscription, a partial repetition of that on the face (cf. Parpola 1994: 92). Three seals (M-319 and M-1204 from Mohenjo-daro and a seal from Bagasra in Gujarat) have a hollow case with a lid.

The naturalistic animals of Indus seals rank very high among the artistic achievements of the Harappans. Seal glyptics also constitute one of the principal sources for understanding Harappan religion (on this topic, see Parpola 2012a). Depicted in more than half of the seals is a 'unicorn' bull, usually facing right (in the impression) towards a 'cult object' (two different superimposed containers on a stand) (fig. 4). Among the other motifs, most common are other male animals: the zebu, elephant, and (usually with a trough) bison, water buffalo, rhinoceros and tiger; rarer animals include goats of various kind, chinkara (Indian gazelle), long-spouted crocodile (gavial), wild ass, and two kinds of 'mythical' beasts, either with one body and three different heads, or one animal with a human face and other body parts
coming from different animals. Rarely depicted are (one or more) anthropomorphic deities, heroes or priests, with or without animals and/or trees; one more often repeated scene shows a man with chignon squatting in a tree while a tiger beneath looks backwards at him. I would like to add a few comments on these glyptic motifs while referring to Marta Ameri's paper in this book, where she is examining Indus iconography from a new angle.

The 'unicorn' is a new motif in the iconography of Greater Indus Valley, including painted pottery, and probably comes from Mesopotamia, where the aurochs bulls have been represented in this fashion since Uruk times. That the single horn is intentional is proved by three-dimensional figurines, and related Eurasian 'unicorn' legends and later South Asian parallels confirm its phallic symbolism. Humpless cattle did not exist in South Asia, where this foreign animal was identified with the native cow-like nilgai antelope, in Vedic religion a prominent symbol for the creator god Prajāpati (cf. Parpola 2011b).

The 'cult stand' is likewise a new motif. On some molded tablets, it is carried by worshippers, once (M-490) in a procession behind the 'unicorn' image also carried on a shaft. The 'cult stand' resembles the tree-like post to which humped bulls are tethered on "Kulli style B" painted pots, whereas the earlier "Kulli style A" bulls are tethered to a tree (often a fig) or to the ground (cf. Jarrige et al. 2011: 73-74, 89, 195). In the "transition period" pots of Nausharo ID, humped bulls are tethered to a fig tree, and caprids to a fruit tree (cf. Jarrige et al. 2011: 88). Perhaps the stand and the tree correspond to the sacrificial stake to which animal victims were tied in Vedic and Hindu religion.

One clearly Mesopotamian motif adopted by the Harappans is the 'contest': a human hero holds back by bare hands two felines. Such details as the hairdress of the
hero (either six locks of hair or the chignon), or the 'victory pose' (in the buffalo-killing scene) date the adoption to Late Early Dynastic or Early Akkadian period (cf. Parpola 1984; 2011c; 2012a).

Harappan anthropomorphic deities often squat in "yoga posture", which may ultimately come from the "sitting bulls" of Proto-Elamite art (cf. Parpola 1984).

Contact with Proto-Elamite culture is attested by bevel-rimmed vessels at Miri Qalat (c2800 BCE) in Pakistani Makran (cf. Besenval 2011: 49 and 133 with figs. 121-122).

**E. Late Mature Harappan phase c. 2100-1900 BCE**

Jarrige et al. (2011: 208) date "Indus 3" of Nausharo IV, Mehrgarh VIII, Amri III C-D and the latter part of Nindowari III to 2100-1900 BCE, while Kenoyer and Meadow (2010: xlv) date phase 3C at Harappa to 2200-1900 BCE.

The second major type of Mature Harappan seals (about 10% of the material) is the so-called "bar seal". Its rectangular face is engraved with text only. The back is usually convex and perforated in the middle (fig. 5). Among several variants is a flat back with a perforated knob. "Bar seals" come at Harappa from phase 3C only. Also practically all seal stamps impressed on pottery vessels before firing come from phase 3C; most of them have text only and occur chiefly on the mass-produced "pointed base goblets" characteristic of this late layer (cf. Kenoyer & Meadow 2010: L).

Square stamp seals with just a geometrical motif (swastika, cross of various kinds, concentric circles) resurface in this late phase. They continue Early Harappan tradition somehow kept alive in the meanwhile. Simultaneously, seals typical of the BMAC (Bactria and Margiana Archaeological Complex) alias Oxus Civilization of southern Central Asia (on these cf. Baghestani 1997 and Sarianidi 1998) are found at Indus sites. One is H-166 at Harappa, a bifacial steatite seal with the shape of stepped cross and the motif of eagle and snake. From Mohenjo-daro come two BMAC-type
compartmented metal seals (Franke 2010) and some terracotta "passports", one side stamped with a compartmented metal seal, the other side with an Indus seal (Parpola 2005). A perforated cylinder seal from Kalibangan (K-65) is of the type prevalent in Mesopotamia, the homeland of cylinder seals (cf. Collon 1987), and its rare motif has a Mesopotamian feature in the chignon of the warriors depicted, but the seal is carved in Harappan style and bears an Indus inscription with native Harappan sign sequence. Some other cylinders, such as those from Sibri (CISI 2: 412-3) are unperforated and have stamp seal at one or two ends, conforming thus and in motifs to the BMAC-type cylinders. Bifaced, rectangular, transversely perforated BMAC seals come from Sibri on the border of Baluchistan and Sind (CISI 2: 411), and from Prabhas Patan (Somnath) in Gujarat, the latter depicting horses (CISI 1: 359).

The round 'Gulf' type Indus seal (2100-2000 BCE) is rare in Greater Indus Valley; four come from Mohenjo-daro. Lothal in Gujarat is rather exceptional among the excavated Indus sites in having many very poorly made Indus seals, predominantly of terracotta, and mostly containing just script or geometrical motifs. That they represent the very latest Mature Harappan phase is suggested by the 'Dilmun' seal from Lothal, datable to 2000-1900 BCE.

**F. Late or Post-Harappan phase 1900-1300 BCE**

The Late Harappan or Cemetery H phase at Harappa has not yielded any seals. From the southernmost Indus site of Daimabad in Maharashtra comes an unperforated cylinder seal and two round seals, dating perhaps 1800 BCE. One of the round seals bears a single sign, identical in shape to one of the most diagnostic signs of the Indus script and one that occurs most frequently in Indus inscriptions, yet in earlier texts never alone as here.
At the Ahar-Banas culture site of Gilund in southern Rajasthan, a "warehouse" was exposed in 2001-2003. It contained a bin with over 100 clay tags with single and multiple seal impressions. The seals are both round and rectilinear and contain geometrical motifs similar to BMAC seals and to the Jhukar type seals of Late Harappan (post-urban) Chanhu-daro in Sind (cf. Shinde & al. 2005).

The terracotta seals of Pirak I-III (1700-800 BCE) continue in a rough fashion Early Harappan geometric motifs (including 'eyes' in four corners), and have high perforated knobs on the reverse (CISI 2: 379-386).

While the spread of the BMAC culture and its seals to Greater Indus Valley after 2000 BCE reflects the coming of an early wave of Indo-Aryan speakers to South Asia, the terracotta models of horse riders in Pirak I-II should be connected with the post-BMAC Yaz I culture of southern Central Asia and the coming of the first wave of mounted Old Iranian (Proto-Saka) speakers to these parts, reflected also in the references to inimical people called Dāsa and Dasyu in the Rigveda (cf. Parpola 2012b).

III. Study of specific aspects of Indus seals

A. Seal inscriptions and the Indus script

One of the most important and fascinating aspects of the Indus seals consists of their inscriptions. Roughly 60% of Indus texts are seal inscriptions (including ancient seal impressions). Apart from some odd inscribed objects, other text categories are small ivory or bone sticks; copper or bronze weapons; stoneware bangles; pre- and post-firing graffiti on pottery; and small tablets, the two last mentioned groups being the largest after seals. Many seals share identical inscriptions with other kinds of text, and molds for making tablets include seals.
The tablets apparently have both religious and economic significance. Incised copper tablets characterize late layers of Mohenjo-daro, other kinds come chiefly from Harappa (not early layers as previously maintained but from the middle of 3B onwards): 2-sided tablets of various shapes, or 3- or 4-sided rectangular bars; they are either incised into steatite, or molded of terracotta or faience. Sometimes many identical copies come from one and the same find spot. The incised steatite tablets were earlier (cf. Vats 1940; Wheeler 1968: 106) wrongly considered to be "tiny seals" (cf. Kenoyer & Meadow 2010: xlix-l.)

The Indus inscriptions on round 'Gulf' seals and cylinder seals from Mesopotamia often have sign sequences that differ from those of South Asian Indus texts, while especially the typically Harappan type square 'unicorn' seals from Western Asia have typically Harappan sign sequences. This suggests that many Indus people living in the west not only knew local languages but also adopted local names, just as they adopted local seal types (cf. Parpola et al. 1977; Parpola 1994b).

The Indus script and inscriptions hold crucial keys to Harappan language and religion. So far there are no bilingual texts, which usually have opened up forgotten ancient scripts, though tablets may turn up mentioning in cuneiform Harappan names stamped on them with Indus seals (cf. Buchanan 1967; Parpola 1994: 273-4). Yet valid decipherments have been achieved even without bilinguals, as in the case of the Mycenaean Linear B script; this encouraged me and my colleagues to embark upon the study of the Indus script in 1964. There is no space here to go deeper into the problems and results connected with this study, and just a few words must suffice. A full decipherment is impossible with present materials, but one can penetrate into the Indus script to some extent, find out its type of writing (a logo-syllabic script) and the underlying language (Proto-Dravidian) and obtain some readings, which agree with
later South Asian (Vedic, Hindu and Old Tamil) traditions (see Parpola 1994 and 2009 through 2015.)

B. Photographic "Corpus of Indus Seals and Inscriptions"

To decipher any forgotten ancient script, a fundamental task is to collect all existing material in as reliable a form as possible. Dissatisfaction with the quality of documentation in the excavation reports of Mohenjo-daro and Harappa, and the hundreds of unpublished seals and inscriptions discovered in museums, made me start the project of a comprehensive photographic Corpus of Indus Seals and Inscriptions (CISI) in international collaboration. All sides of all objects, including seals without inscriptions, and modern impressions of the seals, were to be (re)photographed and selectively published, if feasible, in twice the natural size. Pictures of hundreds of seals that had disappeared after the excavations were to be collected from the photographic archives of the ASI and identified. To enable studies of many kinds, "Indus" was defined broadly to include also all prehistoric seals and inscriptions before and after the Indus Civilization proper in the Greater Indus Valley, thus including also BMAC and 'Dilmun' seals found there. The material is arranged according to the owner countries, sites of discovery, chronological periods (if possible), and then according to object typology, iconography and size. Introductions contain corresponding classifications, descriptions of sites and other topics. The provisional documentation of the objects gives their excavation and museum numbers. So far three volumes have appeared, comprizing collections in India (1/1987), collections in Pakistan (2/1991) and a supplement to materials from Mohenjo-daro and Harappa (3.1/2010); a global supplement (3.2 in preparation) will complete the photographic documentation. Updated computerized concordances to the inscriptions (to replace the outdated ones of Koskenniemi et al. 1973 and
Mahadevan 1977) and other supplements are also planned. Some Indus seals are cited in this paper with CISI references.

C. Seals and inscriptions of Mohenjo-daro

Mohenjo-daro covers at least 100 hectares and its excavated area of 10 hectares is the largest among all Indus sites. It has also yielded the greatest number of Indus seals, just over 1500 in all. Unfortunately the real stratigraphy of the site was not properly recorded in the early mass excavations, but in his Mohenjo-daro project initiated in the 1970s, Michael Jansen has tried to reconstruct it. The original field registers that he has located record the three-dimensional coordinates of the excavated finds. They enable placing the seals in their find spots on streets and within buildings, whose other contents may throw light on the seal owner's profession or rank (cf. fig. 6a, 6b, and 7, and Parpola 1994: 117-118).

Using the field registers, Ute Franke-Vogt wrote her dissertation (1991) on the temporal and local distribution of the seals and other inscribed material from Mohenjo-daro. Her principal aim was to find out whether any meaningful patterns would emerge, particularly regarding variation in the typology and iconography of the objects. Die Glyptik aus Mohenjo-daro in two large volumes will remain a major reference work in the study of Indus seals and inscriptions. Franke-Vogt refines earlier classifications of object types and iconographic motifs (such as in CISI 1-2 and Mahadevan 1977). She illustrates each object type and motif with excellent line drawings, and discusses them thoroughly with reference to material found outside Mohenjo-daro (in Greater Indus Valley and Western Asia), reviewing the views of many scholars. She has compiled manifold statistics displayed in tables, diagrams and crosswise correlations. Data related to each object are listed and the find spots are plotted with symbols of different shapes and colors on the maps of the excavated
areas. In studying these maps, however, one must bear in mind that the excavated layers at Mohenjo-Daro belong almost exclusively to Middle and Late Mature Harappan phases. Critical analyses of the stratigraphy at the site has revealed the presence of secondary deposits, resulting in mixed seals and other materials from different stratigraphic layers, in some cases for depths of several meters. Consequently, primary floors with direct and undisturbed chronological associations are nearly absent in the urban compound.

Among Franke-Vogt's main conclusions is that the absolute predominance of the 'unicorn' bull motif in the seals and their random distribution does not support interpretations that see in the iconographic motifs guild marks, totems of kin groups, or caste emblems. The absence of clear local distributions rather suggests rank and status distinctions and a hierarchical division of the society. The extreme poverty of finds in the 'citadel' (excepting the L area and the Great Bath) likewise makes it unlikely that it served as the residence of the elite or as the administrative center.

D. Seals as badges of authority and amulets

The great concentration of seals and inscribed objects in the southern part of DKG area of Mohenjo-daro (cf. Franke-Vogt 1991: I, 145, 152-154; II, Tafel LIII-LIV) agrees with the previously suggested identification of a 'palace' in this area. Two seals with most impressive iconography of anthropomorphic deities come from this very location (cf. Possehl 2002: 209 with fig. 11.21). Both seals have inscriptions that end in the "man" sign, recalling Mesopotamian priestly titles ("Man of god NN"). Indeed, their "Proto-Siva" and "Fig-deity" motifs may convey pictorially the message expressed in writing in their inscriptions (cf. Parpola 1994: 261; 2012a: 16). In Western Asia, kings ruled on behalf of gods as their high priests, and the Harappans have adopted the 'contest' motif which in ancient Western Asia had an explicitly royal
association (cf. Parpola 2011c; 2012a). Moreover, the "Proto-Siva" and "Fig-deity" seals are carefully carved and relatively large, criteria which suggest the high rank of their owners. Such seals contrast with the small and more roughly made seals with much repeated inscriptions or motifs (cf. Parpola 1986b).

The Indus seals had holes for suspending them by cords on person. The ownership of a seal was a mark of prestige, and seals undoubtedly functioned as badges of rank and authority. It is possible that the different animal motifs were linked with different social positions or occupations. The association of the gaur bison with the 'Gulf type' seals (Vidale 2004) may be seen as evidence of this. Being carried on person they should have had an amuletic function, too, protecting their owners as well as their property. The case seals probably contained some talisman, and the seal's iconographic motif undoubtedly also had a religious significance (compare the association of the bull with Śiva in later Indian seals). From some larger seals the inscription has been removed by sawing; perhaps the text indicated a high position that the seal owner lost for instance through death, while his family could keep the rest of the seal as a status mark. In any case it is remarkable that the Indus seals have been found scattered all over habitation sites, while elsewhere seals were often buried with their owners. (Cf. Parpola 1997: 49-50.)

E. The Indus seals as administrative tools

Originally seals came into existence as administrative tools, to secure property (cf. Collon 1997). That this was their primary function also in the Indus Civilization can be deduced from preserved ancient sealings and seal impressions. A terracotta tag impressed with a seal containing script (H-1538) comes already from the Kot Diji layers at Harappa. From the same period there is evidence of writing (different from simple potter's marks), and standardized cuboid stone weights were used to control
economic actions (cf. Kenoyer & Meadow 2010: xlviii). In ancient Mesopotamia, textual sources give detailed information for the use of seals to protect packed merchandise against pilfering. On the arrival of the goods at their destination, the seals were broken open and the contents weighed and checked, in the presence of witnesses. 'Gulf' seals and stone weights of Harappan type were found in remarkable numbers in the customs house right next to the city gate in Bahrain (cf. Bibby 1972: 368; Parpola 1994: 113-5).

Round clay lumps with a seal impression and a smoothed back were probably "passports". Some such passes from Mohenjo-daro bear on opposite sides impressions of an Indus seal and a BMAC seal (cf. Parpola 2005). Three "passes" from Kanmer have the impression of one and the same Indus seal on one side, and different incised inscriptions on the other (cf. Kharakwal et al. 2012: 487). Kauṭilya's Arthaśāstra, an ancient Indian handbook of statecraft, details the procedures at the customs houses near the city gates; these include checking whether stamped sealings are intact, and "road-passes" are also mentioned (cf. Parpola 1994: 114-5).

A clay tag with the impression of a square Indus seal and marks of coarse cloth on the reverse comes from Umma in Mesopotamia (Scheil 1925). The excavations at Lothal (Rao 1979 & 1985) uncovered a large (210 x 35 x 4.5) water tank lined with baked bricks and connected through a channel with the Sabarmati river flowing to the sea. Next to this dockyard was a 50 x 40 m mud-brick platform with the remains of a burnt-down "warehouse" with ventilation arrangements under an assumed wooden floor. Collected in one place, probably as an archive from the past season, were 70 fire-baked clay tags, with 26 additional tags coming from elsewhere in Lothal (CISI 1: 268-289). These 96 tags bear evidence of how Indus seals were used and of Harappan bureaucratic and administrative practices, in which
several persons took part as participants or witnesses of transactions. One tag bears five seal impressions (all broken off or indistinct), two tags (L-189, L-193) bear four seal impressions made with four different seals, three tags bear three seal impressions, 26 tags bear two seal impressions, and 63 tags bear a single seal impression; among the readable seal inscriptions, twelve occur more than twice in the Lothal tags.

Overlapping of seal impressions show that it was the text portion of the seal that mattered (cf. L-211). Two of the actual seal stamps used in making these impressions have been identified among the seals excavated at Lothal. (Parpola 1986; 1994: 114; 2007.)

Sealings are much rarer in the Indus Valley than they appear to be in West Asia, Egypt and across the Iranian Plateau. While some argue that this hints to a different way of using seals and sealings, others rather believe that this is an accident of preservation. It is possible that unfired clay sealings, in the moist layers of the Indus basin, are much more difficult to see and to recover than their western counterparts. The known Indus sealings were all strongly fired, either purposefully, or accidentally, as in the burnt warehouse of Lothal.

In addition to the seal impressions, these lumps of clay have impressions of the objects on which they were attached. Dennys Frenez and Maurizio Tosi (2005) have studied them with the help of comparative material from Mesopotamia and Shahr-i Sokhta in Seistan. Their results suggest that the tags sealed doors bound with strings to pegs fixed to holes in wooden walls; joints between movable parts or doors or furniture or crates (without any strings); cane wrappings of packages with strings; pottery closed with textile covers tied with strings under the rim; and finely polished wooden surfaces, perhaps boxes. The last mentioned twelve items (L-161 to L-172) all bear impressions of a single seal, unique with its elephant motif. The lumps
impressed with this elephant seal also have fingernail tallies, apparently to record how many objects were kept inside the sealed box closed with knotted strings.

Indus seals were used also to control craft processes producing valuable goods. Thus at Mohenjo-daro, a sealed clay tag closed a container in which stoneware bangles were manufactured by a difficult process by heating them at very high temperature. (Halim & Vidale 1984.) The production of seals must also have been kept in tight control. It has already been mentioned that the earliest seals at Mehrgarh and Harappa were found in compounds dedicated to craft activities.

F. Seal manufacture

A seal-making workshop has been discovered at Chanhu-daro (Mackay 1943). Unfinished seals in different stages of completion enable conclusions about the process of manufacture. The typical material for making Indus seals was the soft stone steatite. It is easy to carve, but has the drawback of becoming easily worn. This could to some extent be remedied by baking the completed seal. Rarer materials of manufacture include agate, lapis lazuli, copper and silver. Analyzing and sourcing the materials of which the Harappans made their seals and other artefacts has provided important information on Harappan activity sphere and trade routes (Law 2011).

Blanks for seals were first sawn from larger blocks by means of copper saws. Smooth flat surfaces were then made with grinding stones of different grades, from coarse to fine. The iconographic motif was carved first, using incising tools of stone and metal, then the inscription. In C-14 (CISI 1: 331) the inscription was sketched before carving. The ready seal was heated to harden the steatite, and glazed by adding a silica coating. The hole, whether through the body of the seal or through the knob on the reverse (in this case in an angle from two sides) was made with drills of stone
or metal. Microscopes and silicone impressions taken of the seals have been used in order to catch the finest tool traces.

Paul Rissman (1989) assuming chronological and local significance in the variations of the most popular iconographic motif tried to use them as a means to penetrate into the history and organization of Harappan seal carving. Franke-Vogt (1991: 111-124) elaborated the analysis of this motif of 'unicorn' + 'cult stand'. Mark Kenoyer's research in this field (cf. Kenoyer & Meadow 2010: lv-1v) has paid particular attention to carving techniques and chronological aspects of boss types. In this book, Gregg Jamison hunts for idiosyncracies of individual artisans and workshops, and Adam Green studies sequencing and styles in inscription carving.

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