ESSAYS ON HARAPPA
CULTURE
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Sankarprasad Hajra

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To the memory of
my grandmother

SIRINATA RAJA.
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INTRODUCTION

Sir John Marshall—a great name in the field of researches on Harappa Culture, and his general views about Harappa and Mohenjodaro are accepted by the Indologists of the world. Again it is a well-known fact that a belief based on ill-logic can hardly be abolished in a short period of time even by rigid analyses. The Indus Valley Civilization (Harappa Culture) is depicted by the Marshallians far more mysterious than what it is. Marshall concluded that the civilization was non-Aryan in character and a contemporary of the Assyrian and Sumerian ages. Then he tried to annul the historical contradictions of his views by an interesting, imaginative description which gave birth to a new history void of a vestige of predetermined historical fact.

In fact, Marshallians tell us a purpose mythological story veiled in the curtain of mysticism in order to describe the creation and the period of the civilization by rampant scholasticism. All these speculations are logically criticised in the essays.

To me, it seems that the civilization is basically different and comparatively recent and it may have certain possibility to be a distinct and developed phase of Vedic civilization.

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The last chapter of the book is the tentative decipherment of the mystic inscriptions of Harappa and Mohenjodaro. I have tried to decipher the inscriptions by attributing tentative phonetic values to the pictographs. There may be defects in some cases to do so, but I am sure that the defects will be corrected through criticism by learned readers. I think that exact phonetic values have been attributed to $\pi$, $\lambda$, $\beta$, $\gamma$, $\delta$, $\epsilon$, $\zeta$, $\eta$, $\theta$, $\iota$, $\kappa$ and to $\psi$. The language of the inscriptions is Sanskrit, which will be clear from the tables. Almost all the inscriptions contain distinct Aryan names, few place names.
III.

For about 45 years we are inclined to the mysticism of Marshallsians, but even now we have found out nothing substantial from it. It is as mystic as it was before, an unsolvable puzzle of the age. Now, I think, it is necessary to grasp new hypotheses and to judge the validity of the hypotheses from new outlooks. Marshallsians think that the civilization was something highly developed emerging from out of nothing. I think that the civilization was an inevitable event, following of the necessity in the chain of historical development.

Old pedantic Marshallsians from all parts of the world, I am afraid, will launch severe attack upon my hypothesis as their beloved mythological 'palace of cards' will be endangered by my arguments. But I deserve congratulations from fresh young scholars who are highly energetic to frame out new hypotheses to solve the puzzle of the age.

To decipher the scale tentatively, I was highly inspired by Mr. Indranath Bajumoir to whom I am really grateful. I wish to thank now Mr. Subhashkr Bijre, Mr. Saradindu Ghosh and Mr. Prabhabro Sinha-thakur who helped me in various ways to represent the essays.
Dying Harappa and the New-Comers

(There were two cemeteries in Harappa: Cemetery R - 37 and Cemetery H (H_I + H_{II}). According to specialists Cemetery R-37 - the earlier cemetery was the cemetery of the Harappans, whereas Cemetery H (H_I + H_{II}), the later cemetery was the cemetery of the New-Comers - the Vedic Aryans.

I have tried to establish that the Cemetery R-37 was not the cemetery of the Harappans. It was the cemetery of the New-Comers - the Irano-Caspian i.e. the second wave of the Aryans who entered India marching through Iran. From different sources, it can be proved that those Irano-Caspian entered India ca 1000 B.C. or even later.

This conclusion has far reaching effect on the study of Harappa Culture, as the New-Comers dwelt - on the ruins of the Harappans at a time when the centre of Vedic culture was shifting from the Indus valley to the Gangetic plain, definitely leaving the ruins of their cities in the region.

This has forced me to infer that the Harappans were the Vedic Aryans - the first wave of the Irano-Caspian in India.

This paper is written from this standpoint).

Problem:

Before the excavations at Harappa and Mohenjodaro, it was settled by the scholars that the Aryans were the creators of Indian civilization in ancient time (6 preface V) and though there was practically no doubt that they came from somewhere outside India, yet the time of their arrival was a matter of some speculative discussions without any rigid set of reasons. After the establishment of relationship between the Hittite Kings and Aryans, it was common among the specialists to consider the arrival of the Aryans in India at least after 2000 B.C.
When the chalcolithic culture of Harappa and Mohenjodaro came to light, Marshall (6 preface V-VI; pp. 102-112) and sayce; (19, p.6) the veteran Assyriologist recognised startling similarities between this non-Aryan (also Pre-Aryan) Indian civilization and Sumerian civilization and considered this Indian civilization flourishing before 2500 B.C. with the support of the then archaeologists (6, p.218).

But actually, studying of the Indian materials in western setting started from 1933 when Childe compared the chalcolithic pottery with the pottery of West Asian sites (8, pp.165-26).

In the year 1931, Stalin discovered the cemetery of Shahi Tump and observed that the graves (associated with different foreign objects not known to Harappan people) had been dug into the ruins of the Harappan period (7, pp.188-105).

In 1934, Mejdander found out the type site Jhukar where a post Harappan culture - late Jhukar culture was stratified just over the Harappa level (12, p.9) and a good number of pottery found in this level was quite alien to Harappan people. During the excavations of 1933-34 at Harappa a cemetery which is now known as Cemetery - H with complete burials and post exposure pot burials associated with a beautiful polychrome pottery different from that of Harappa culture was discovered. The cemetery as thought by the excavator was contemporary with the time of the last occupational level (not reached at Mohenjodaro) of the city (Harappa), and related with foreign conquest (22, p.233).

Thus it was being apparent that a new culture different from that of the Harappans existed in the region, after the dissipation of Harappan culture.

In 1934 Childe the well known contributor to the history of the Aryans equated the Cemetery H people with the Aryans (10, p.223). In the same paper he also pointed out the uses of (i) mace heads at Mohenjodaro and at Babylon (10, p.217), (ii) beads of frit or stone of specialised types at Mohenjodaro and in the Early
Dynastic graves of Sumer (10, pp. 268-269) and (iii) the axe adze, at Mohenjodaro and at Tepe Hissar III (10, pp. 268-269). One thing should be clear here that Childe would think that the Aryans entered India circa 1400 B.C. (or later, 4, p. 31) and he accepted that Harappa culture ceased to exist circa 2500 B.C. (19, p. 5) and as Cemetery H was thought to be related with the New-comers, so he put the hypothesis that the Cemetery H people might be the Vedic Aryans. In 1936 Childe realised the exotic character of Chanhudaro pins and wrote an illuminating commentary on the distribution of the type (14, pp. 113-115).

In the same year R. Heine-Geldern studied four weapons, e.g. (i) a truncheon axe from Kurram Valley, (ii) a bronze dagger from Fort Munro, (iii) copper swords with antennae hilts from the Gangetic plain and (iv) a bronze axe-adze from Mohenjodaro. After comparisons with the similar weapons from ancient cultural zones outside India he decided that those Indian weapons indicated a date between 1200 B.C. and 1000 B.C. or even later. Heine-Geldern attributed the users of these foreign influenced articles to the Vedic Aryans and tried to indicate the arrival of the Vedic Aryans in India after 1200 B.C. (15, pp. 57-113). In this year B. V. Mehta pointed out the different modes of disposal of the dead prevailed among the Vedic Aryans and their similarities with the system of disposal of the dead of Cemetery H people (16, pp. 223-307; 17, pp. 1-63) in order to defend the hypothesis that Indus culture and Vedic Aryans belonged to the same ethnic cultural group. In 1939 Childe compared round bead seals of baked clay and a few button seals of stone from Jhukar culture with those of Tepe Hissar (19, pp. 13-14) and thought that Shashi Tump burials might foreshadow the still inferential Aryan invasion in India (19, p. 15).

In the year 1930 Mr. Vats in course of analysis of the paintings on the prehistoric pottery of Cemetery H excavated at
Herappra compared the paintings of post-exposure pot burial pottery with rites, rituals and beliefs contained in the hymns 14, 16 and 18 of the Xth Mandala of the Rigveda, though it was "not intended to suggest more than a comparison" on account of the characteristic system of disposal of the dead (22, pp.209-210) of the Cemetery H people. Gordon in this year studied the animal headed pins obtained from different Indian sites in western background (31, p.65).

In 1943 Mackay published the reports of the excavation 1933-36 at Chanhu-daro where Jukar Culture (Chanhu-daro II) was confirmed over Herappra period (Chanhu-daro I; 27, p.102).

In the meantime a site of exceptional importance - Tape Hissar was excavated in the Northern Persia.

In 1926 Childe supported the orthodox view that the eastern wing of the Indo-Iranian people descended into India not much later than the arrival of the western wing of the Indo-Iranian into Mitanni (4, p.41).

Tape Hissar was excavated in 1931 and Schmidt suggested the following dates for its first three periods (from below) of the site:

- Hissar I - before 3000 B.C. to Ca 2500 B.C.
- Hissar II - Ca 2500 B.C. - Ca 2000 B.C.

In 1934 Kappers published his famous work "An Introduction to the Anthropology of the Near East" which placed sufficient reasons to consider the neolithic longheads of central Europe, the dolicho-cranials of Hissarlik III and Alishe IV, Daqian people (Tape Hissar), the dolicho-cranials of Mohenjodaro and Mal, the Punjabi, the Zoroastrians, the Hattis and the Carians, coming from the same ethnic stock which might be called by the name - the Indo-Europeans (11, p.124). Kappers suggested the dates of Tape Hissar as follows:

- Period I - 3500 B.C. - 3000 B.C.
- Period II - 3000 B.C. - 2500 B.C.
- Period III - 2500 B.C. - 1500 B.C. (11, p.94).
Later on, Krogman and Schmidt modified the chronological position of the periods and suggested as follows:

Hissar I - Before 4000 B.C. to Ca 3500 B.C.

Hissar II - Ca 3500 B.C. to 3000 B.C.

Hissar III - Ca 3000 B.C. to Ca 2000 B.C. (23, p. 6).

Thus the existence of the Indo-Europeans in Tepe Hissar up to 1500 B.C. (as suggested by Schmidt) or 2000 B.C. (as modified by Krogman and Schmidt) was not going against the hypothesis that the Cemetery H people were the Vedic Aryans.

In 1935 Herzfeld writes that after the beginning of the 1st millennium B.C., a new people, the Aryans brought the change of the composition of the population of Iran (13, pp. 6-7). Herzfeld also writes that three great movements of the Aryans took place from the Aryan homeland 'Branvej' - the land of the two rivers Oxus and Ixartes, Khwarizm and Samarkand: first, the Indo Aryan migration which happened between 1500 B.C. and 1450 B.C., the second, Iranian migration which took place after the beginning of the 1st millennium B.C. and the third, the Sak migration (13, pp. 7-8).

But in 1942 D.C. McCown suggested that Hissar might have ceased to be inhabited at the very beginning of the Akkadian period (24, p. 52). Thus the disappearance of the Indo-Europeans before of 2500 B.C. from Tepe Hissar makes the appearance/anthem in Cemetery H after 1500 B.C. chronologically incompatible. So in 1942 Childe from Indian standpoint disputed feebly on the McCown's dating of Tepe Hissar III C (25, pp. 357-358). It is Stuart Piggot who through many research papers has established a close connection between Hissar III and Jhukar Culture (26, p. 180) and has tried to adjust the so called gap between the disappearance of Tepe Hissar people and the appearance of the New comers in the Indus Valley.

He has suggested a late date for Tepe Hissar (- 'not earlier than Akkadian probably some centuries later', 26, pp. 176-177) and has equated Hissar III with Jhukar Culture and has established the contemporaneity of Jhukar, Shahi Tump, the last phase of Mohenjodaro, Anau III and Hissar III and has regarded the site of India.
Baluchistan as representatives of a diffuse movement of peoples eastward in the first half of the second millennium B.C. "But whether the authors of the culture spoke Indo-European dialects" according to Pigott "is another question" (28, pp. 24-25).

During the excavation of 1937 at Harappa a cemetery/- R-37 was accidentally discovered. Excavation of 1946 by Wheeler proved that Stratum I of Cemetery R was much subsequent to the Cemetery R-37 and combining report and observation Wheeler showed that Stratum II of Cemetery R also was stratigraphically later than R-37 — the cemetery of Harappans (30, p. 85). For the destruction of Harappan civilization Wheeler accused Indra, i.e. the Aryans on circumstantial evidence (30, p. 22).

In 1946 Ross described the Ranaghundai tell in North Baluchistan, whence stratified sequences of human occupation were discovered (29, pp. 234-316). In the year of 1947 Gordon classified Cemetery R pottery as Ravi I and Ravi II pottery. He placed Ravi I, Shahi Tump and Chanhu-daro II (Jhukar) Culture in the chronological scale — little earlier than 1500 B.C. and Ravi II and Jhanger culture — little later than 1500 B.C. (31, p. 212, p. 238).

In the years 1947-48 Pigott wrote detailed notes on certain pans and a moat head from Harappa (32, pp. 59-32); which were touched by Childe before many years of the publishing of this paper. In 1948 Schaeffer assigned the date of Hissar III to the period 2000-2100 B.C.

In 1949 Pigott agreed to the date scheme of Hissar III as given by Schaeffer (33, p. 63) and related the New comers of Harappa culture and the people of the cairn burials of Baluchistan with Hissar people and Sialk III cemetery people respectively assigning the date of new comers to 2000 B.C. — subsequent few centuries for the former and to 1100 B.C. — 1000 B.C. for the later (33, pp. 240-241).

In 1950 Gordon suggested that the people of Jhukar culture invaded the Indus valley circa 1500 B.C. (35, pp. 56-57) and this people might be 'human munda' (known from Babylonian, Assyrian and Hittite texts) — a mixed people which included a branch of Indo-Aryan stock (35, p. 57).
He also suggested that Cemetery H (more specifically Ravi II people) people were the Vedic Aryans coming much after the arrival of first Aryan speaking mixed people umman manda, (Jhukar people) in the region (35, p. 58).

In the same paper Gordon pointed out that the cairn burials of Dambkoh, Jiwanri, Zangian and Mohul Ghundai are reminiscent of Necropole B at Sialk and the contents of some of the cairns of Mohul Ghundai are similar to those of the graves of the Cemetery B at Sialk (35, p. 66). The people of cairn burials would use iron objects and their earlier date, according to Piggott is ca 700 B.C. in Baluchistan.

In 1950 Lel pushed the date of PG ware (generally thought to be associated with the Aryans) towards 1000 B.C. to fill up the vast interval of 1500 years between the Hareppa culture/the third-second millennia B.C. and the early historic periods of circa fourth-fifth centuries B.C. (34, pp. 89-93).

In 1951 Lel has pointed out that it is only mixing up of issues to consider the weapons of the Gangetic copper hoards as connected with the Aryans. He showed that these Copper hoards might have been associated with ill-fired ochre washed ware and the author of these weapons might be Proto-Australoid (37, p. 89) tribes. His conclusion that the hoards need no longer be associated with the Vedic Aryans as was thought by Heine-Geldern and S. Piggott previously, has been supported by Childe, Piggott, Wheeler and Weismendof (33, p. 33). Leel is right definitely in connecting the Gangetic Copper hoard with the Proto-Australoid tribes, but the predominant western influence in the antenemia swords as shown by Heine-Geldern is undeniable.

In the same year Beatrice De Cardi showed the affinities of London ware with the Persian Pottery of Sialk VI Cemetery B and assigned the site London (discovered by her) to about 1100 B.C. or later (38, pp. 71-72; 45).
In 1954 Chirnocks wrote on Tepe Hissar — "If it is dated to the middle of the 2nd millennium, the cause of this destruction could be attributed to the movements of Indo-Europeans described above. If it is brought down to the last centuries of the same millennium, it may be that the cause was a new wave of Indo-Europeans, this time bringing the Iranians on the plateau" (39, p. 63).

Thus, just like Herzel, he points out that two waves (excepting the Sakas) of the Indo-Europeans might have come in Iran in two different times.

In 1956 Saina-Geldem has successfully shown, that the trunnion axe from the Kurram valley, a bronze dagger from Fort Munro, Copper swords with antenose hilts from the Genetic Valley, an animal headed copper rod from the upper most level of Harappa, a pin topped by two deer heads from Mohenjodaro and the much discussed bronze axe adze from Mohenjodaro indicate a date between 1200 B.C. and 1000 B.C. So he advocates for his previously stated hypothesis that Vedic Aryans came to India between 1200 B.C. and 1000 B.C. (40, pp. 126-139). In the same year Walter A. Fairseve had thought, as a whole, the date 1500 B.C. for the end of Harappa culture is too early and suggested probably more accurate date near 1300 B.C. for the disappearance of the Harappans (41, p. 155). He also made suggestion to consider the Londo-ware people as candidate for "maker of the period of the Aryan civilization" (41, p. 155).

In 1959 Wheeler has thought that if the Aryans concerned with the F.C. were are dragged into the picture, then, they may represent the second phase of their invasion of India (44, p. 28).

In 1962-63 Lal has published the results of C-14 dating (50, pp. 202-221) worked out by different laboratories which have gain pushed the final phase of Harappa towards 1300 B.C. Thus the reconstruction of the so called archaeological gap between the disappearance of Harappa culture and the arrival of the Aryan has been solely dismissed. Really, the so called C-14 datings of ancient periods of different
archaeological sites have given a shock to the systematic thoughts and works of many well known archaeologists and they seem now to reconcile their archaeological researches with this 'Scientific method' of dating. But we beg to state, that this C-14 dating of ancient Indian sites, what misfortune it may be, is solely worthless; either for the chosen defective standard or for inaccurate laboratory works or for any other unknown causes.

In 1964 D.P. Agarwala has sought to relate the Panasians with the first wave of the Aryans (54, p.200).

In the same year Ghirshman has put the hypothesis that the Iron user Sielk VI Cemetery B people was the Iranians who entered Iran in 1000 B.C. at a time when the Vedic Aryans entered India (52, pp.3-4).

In 1965 N.R. Banerjee has tried to show that the Vedic Aryans would know the use of iron when they entered into India (57, p.144). He has also argued to condense the two distinct migration of the Caspians into one which disintegrated into two - the Indo Aryans and the Indo Iranians when they reached Iran or just before the Iranians marched into Iran shortly after 1200 B.C. (57, p.126).

In 1966 Kennedy and Malhotra pointed out striking similarity of the Novass people with the people of Harappa Cemetery R-37 (59, p.120) and Sankalia noted the survival or a continuation both of physical types and burial practices from Harappa to Novass stretching from about 2500 B.C. to 1000 B.C., though there was a great difference between the cultures of these two places (59 Foreword). At the 1st half of this decade Sales (51, p.36) and Reines (53, pp.281-297; 58, pp.296-299) have raised objections against Wheeler's hypothesis of the destruction of Harappan cities by the Aryans (60, p.348, F.N.27).

In 1968, D. K. Chakrabarti has published a paper on the Aryan hypothesis in Indian Archaeology (60, pp.343-358). This paper has been much helpful to us to construct the shape of this problem.

We are no trying in the following paragraphs to solve the problem, mainly depending upon the view of Kappers.
We have used the terms - the Casprians for the Indo Europeans and their synonyms; the Indo Casprians for the Vedic Aryans and their synonyms; the Irano-Casprians for the Iranian Aryans and their synonyms taking into account the suggestions of S.S. Sarkar (55, p. 94).

2. Both the peoples of Cemetery R-37 and Cemetery H of Harappa were new comers:

Now let us try to solve the problem who the peoples of the Cemetery R-37 and Cemetery H were and whether they were the local peoples or New comers. Harappan pottery associated with the Cemetery R-37 does not necessarily mean that they were the Harappans as pottery is generally non-portable for a great migration and there is fair possibility that the New-comers might use the pottery of the local people of that region at least for some time where they migrated from a very distant land. Thus we see that it is not possible at the present state of knowledge to answer the question precisely.

But a tentative conclusion can be drawn from the analysis of Marshall on the problem.

(i) It is apparent from the work of Stein that cremation was the chief process of disposal of the dead among the people of the Indus culture (49, pp. 54-57) and inhumation was the dominant method of disposal of the dead among the people of the 'Persian' culture (6, pp. 89-90) and also of the Irano Casprians before their conversion to Zoroastrianism (1, p. 605). And so it can be decided that the Harappans would cremate the dead bodies and this wretched process has made much disadvantage to discover their skeletal remnants. It comes then that both the Cemetery R-37 people, and the Cemetery H peoples were New-comers to Harappa (11) The racial analyses of the peoples of Tepe Hissar, Anau, Shahi Tump, Cemetery R-37 and Cemetery H support this conclusion. The problem is connected to a large extent with the north Persian sites e.g. Hissar and Anau.

From the excavations of Tepe Hissar we know that a homogeneous population of cranial index 70-71.9 (average 70.8) for the male (and 72.8 for the female) was living in Tepe Hissar I, II and III (11, p. 96);
in the period II, almost all the indices are dolichocephalics whereas in the period III, though the majority are dolichocephalics, yet a 77-79 cranial strain can be observed (II, p.125).

During the final phase of the Harappa culture peoples entered into Beluchistan; and whether they were responsible for the disappearance of the Harappans is a separate issue. Shahi Tump man as Piggot has pointed out can be considered as one representative of the New comers (33, p.221) who on their way to reach India buried one of their warriors.

It will be seen from the analyses of the cranial indices of the skulls of Cemetery R-37 and Cemetery H - open and jar burials, that it is the skulls of Cemetery R-37 which show close resemblance with Tepe Hissar skulls, but not with the Cemetery H skulls to such a large extent (open and jar burials). Ukrainian (cranial index 75; 22, p.123, Fig.65) and Irono-Scythian (cranial index 78; 22, p.125) strains are prominent in the skulls of Cemetery H; though some of the skulls are dolichocephalics. Hence it is absurd to think that Cemetery R-37 people was other than the New-comers.

In North Kurgan (at Anau) and South Kurgan, Damghan people settled temporarily (II, p.99, p.101) and the same people inhabited at the third city of Hisserlik (II, p.162) Alishan IV, (II, p.106) Nanai Tepe B1 (II, p.104) and they are closely related with the Neolithic long heads of Central Europe (II, p.98) and also to some modern peoples e.g., the Baltis (II, p.114) the Dardous (II, p.114) the Punjabi (II, p.99, p.115) and the Zoroastrians (II, p.94). This people was uniquely identified by Kappers as the Caspians (Indo-Europeans; II, p.112). Thus we can conclude that the R-37 Cemetery people might be a branch of the Damghan people and the Cemetery H people might be considered as mixed Damghan people containing strains of local people on their later movements towards India.

3. Evidence that the Cemetery R-37 people was the Caspian and the Cemetery H peoples were mixed Caspian.
A lot has been said concerning the racial affinities of the peoples of different chalcolithic Indian sites by Sewell and Guba who have much used the then terms like 'Mediterranean', 'Proto Australoid', etc. which seem after Kappers to be not so useful for the racial analyses of the peoples of Harappa. Most interesting and trustworthy method of representing a people known only by their skulls is simply to represent them by their cranial indices and it is highly probable that the cranial index 70-71.9 (for the male) though not in itself sufficient for the diagnosis of a race, may have a great typognostic value to indicate a race (11, p. 36) particularly for the ancient peoples of Near East. Frequency distribution curves for the comparisons of the cranial indices as has been frequently used by Kappers can not be successfully applied for the cranial indices of Harappa, Mohenjodaro, or other Indian Chalcolithic sites, as the data are scantly.

Kappers first identified a close relationship among the peoples of Mal (11, pp. 117-118) Mohenjodaro (11, pp. 117-118) Tepe Hissar, Alishar IV, Hissarlik III, Anau, the present Punjabis, the Dardins, the Baltis and the Zoroastrians and declared that they might have come from the same ethnic stock, the Caspians. Mr. S. S. Sarkar has done his best to show that the skulls of Harappan Cemetery R-37 might have a close ethnic relationship with the Caspians. His study on Racial affinities (55, pp. 72-94) of Harappan peoples is of exceptional importance and I shall advise the reader to consult it.

From the table of cranial indices of Cemetery R-37, Cemetery H I and Cemetery H II, Chenhudaro, Mal, and Shahi Tump it will be clear at once that the cranial indices of Cemetery R-37, Chenhudaro, Mal and Shahi Tump might be compared successfully with the cranial indices of the modern Punjabis, the Dardins, the Baltis, the Zoroastrians and with the cranial indices of the old peoples of Tepe Hissar (Damghan peoples), Anau (Barzan people), Troy II, Alishar IV, Hano, Tepe B I and with the neolithic long heads of Europe which are thought by Kappers as contained in the same ethnic stock, the Caspians*.

*Avery prominent peak (Cephalic index) at 72 is also obvious in the UP Brahman. The Mathili Brahmanas also show a peak at 72, while the Ksanjia Brahmanes of Bihar at 73° (53, p. 29).
On the other hand, Cemetery H and II peoples and the Nevasa people have two different peaks; one at 71, and the other at 75. Hence it can be assumed that these peoples are latter branches of the Caspians (mixed) containing Ukrainian element which they might have received from local peoples of Iran. Thus Childe's hypothesis that the Cemetery H people was the Vedic Aryans and Wheeler's hypothesis that the Cemetery H was the cemetery of the Harappans do not seem to carry any momentum. It is rather more correct to say that the people of Cemetery R-37 was the Caspians (whether the Indo-Caspians, or the Iran-Caspians, we shall decide in the latter part of the paper) whereas Cemetery H peoples were the branches of the mixed Caspians containing a prominent Ukrainian strain.

4. The Cemetery R-37 people represents the 2nd wave of the Caspians or the Irano-Caspians, but not the first wave of the Caspians or the Indo-Caspians (Vedic Aryans).

(i) Time of arrival

(a) Piggott tried to uphold Wheeler's hypothesis of Aryan invasion on Harappa culture assigning Hieser IIIa to 2000 B.C. (33, p.63) and the disappearance of Harappan culture and the appearance of the Indo-Caspians in the Indus Valley to after 2000 B.C. (33, p.940). But later on, the disappearance of Harappan culture has been pushed to ca 1800 B.C. and the appearance of the Indo-Caspians has been dragged down to ca 1800 B.C. (57, p.233). But both these assignment are antagonistic as there is no such hiatus between the Harappan level and the level of the New-comers arrived at Shahi Tump, Jhukar and Chandharden which could make us suppose such interval from archaeological standpoint. Hence it is either the dating of the final phase of Harappa by carbon-14 method (50, pp.235-236) is faulty or the time of the artifices associated with the final phase of Harappan culture and the first phase of the New-comers as dated convincingly by Prof. A. Heine-Geldern (40, pp.185-188) is of no value. But we are here more intentional to depend upon the archaeological system of dating as has been done by Mr. Heine-Geldern and hence wish to dismiss the radio carbon dating as worthless for dating chalcolithic Indian sites.
(b) H. D. Sankalia has brought to our notice strong Sialk necropolis B and Tapa Missar strains in the pottery of NWT III (Navadatoli), Nagda, Sahala and Prakash (43 Preface xii-xiii). Really a considerable no of pottery published by him makes us suggest that a people who came into close contact with Iranian civilization were inhabiting in Malwa. The date of top layers of chalcolithic habitation of NWT III has been assigned to 1000 B.C. by Miss. E. K. Ralph with C-14 method and this date is hardly to be substantiated.

NWT III stratigraphically underlies the debris of the early historic period (IV) characterised by NBP ware. From Navas N.B.P. ware is dated to 2nd - 1st century B.C. (46,p.63); and there is no gaps identified between these two periods. Hence the date of the top layers of NWT III will be assigned to the end of the first half of the first millennium B.C. (or even much later). So from the archaeological excavation at NWT and Navas (not paying any heed to C-14 method of dating which has assigned the topmost layer of chalcolithic culture at Navas to 984 B.C.-1238 B.C.; 46,p.65), we can conclude that the chalcolithic cultures of Malwa with prominent Iranian elements existed most probably, at least up to 500 B.C. (or even later). Thus we see that the time of arrival of these branches of the Caspians and the mixed Caspians is circa 1000 B.C. or later but never ce 1500 B.C. which is the supposititious time of arrival of the Indo-Caspians (Vedic Aryans).

*As yet the full reports of all the excavations have not been published. But one thing is certain, viz., the relative stratigraphical position of the Chalcolithic culture. It generally lies over the black or dark brown soil and underlies the debris of the earliest historical cultures characterised by the use of iron, coins and black and red pottery associated with the N.B.P. and very often buildings of large-sized bricks! The excavations at Mehsawar and Navadatoli Sankali subareas, Dec. p.542.
(11) Disposal of the Dead

The dominant method of disposal of the dead of the Indo-Caspian (Vedic Aryans) was definitely cremation (though other forms were known and might be practised; ritual books have no rules regarding it, except in so far as the bones of the cremated might be interred). This is elaborately stated in different ritual books of the Hindoos. (1, pp. 475-479; 3, pp. 617-618, 2, p. 126).

Some of the orientalists with a view to supporting the connection of the Cemetery H people with the Indo-Caspian (Vedic Aryans) have deliberately translated slokas from the religious books of the Hindoos to prove that they would practice buryals (16, pp. 223-307; 17, pp. 1-68).

It is absurd to connect the complete burials and post-exposure pot burials of Cemetery H1 and H11 with the Indo-Caspians. Rather the complete burials of Cemetery R-37 might invoke the burial custom of the Irano-Caspian as known from their later records and from the tombs of Achaemenian (1, p. 505). Again the burial customs of Cemetery H1 might invoke Median influence which might be explained by assuming that the mixed Indo-Caspian assimilating the local people of Iran might bring this custom first to India.

Thus it is better to assume that this branch of the Caspians were the Irano-Caspian than to think them as the Indo-Caspian who would dominantly practise cremation.

(iii) Contemporaneity of the P.G. Ware people in the Gangetic plain and the New-comers.

During the arrival of the New-comers (1000 B.C.), we find the Indo-Caspians - the P.G. Ware people (1000 B.C.) in the Gangetic plain mainly. If we consider the New-comers as the Indo-Caspian, how we shall reconcile the literal fact that the Punjab (not the Gangetic plain) was the region where the Vedic Aryans first inhabited.

It can be reconciled by thinking that the New-comers were the Irano-Caspian who entered India at a time (ca. 1000 B.C.) when the Indo-Caspian (Vedic Aryans) had just mainly migrated from the Indus Valley region to the Gangetic plain.
(iv) The route of expansion inside India

We see a strong ethnical and cultural similarity of final phases of chalcolithic cultures of Malawa with Hissar and Sialk VI Cemetery B. But no such similarity could be traced in the Gangetic plain. Again it is probable that some branches of the New-comers reached Bihar and Bengal via Madhya Pradesh. This might indicate a strong pressure from the Gangetic plain which made the New-comers to go mainly to the South. Thus the route of expansion of the New-comers inside India mainly towards the South, does not provide us with the suggestion of connecting them with the Indo-Caspians. Rather, the route of expansion of these Caspians towards South may suggest that they were the second wave of the stock.

(v) Route outside India

Again if we trace the route outside India traversed by these New-comers we shall find that the New-comers of Cemetery A-37 of Harappa came down from M.E. Iran to S.E. Iran; entered Baluchistan and touching Shahi Thump Jhukar and Chan-hudaro, they reached Harappa at a time when most of the Harappans changed their place of civilization from the Indus plain to any other unknown places.

The route through which the New-comers came, does not correspond with the route of the Indo-Caspians who possibly did not cross Iran but simply touched it to the North. So it is more probable that this branch of the Caspians was a group of the Iran-Caspians. Some archaeologists are eager now to fix the time of the arrival of the Indo-Caspians circa 1000 B.C. But it is highly improbable to fix the date much after 1500 B.C. from the evidence of literary records and causes detailed in those previous paragraphs.

Hence, considering time and other causes aforesaid, the hypothesis of the migration of the Caspians in one wave in India becomes untenable; it is highly probable that the Caspian migrations took place in two distinct waves (excepting the later migration) in Iran and in India and these New-comers of Harappa were related with the second wave of the Caspian migration i.e. the migration of the Iran-Caspians.
Ghirshman has tried to establish that Sialk VI Cemetery B people were the Irano-Caspians and M.R.Banerjee has extended this hypothesis in the case of Indian Protohistory which states that the Aryans would know the uses of iron when they entered India. For this reason only he is willing to relocate the Caspian site to Hissar but to Sialk VI Cemetery B people (67, p.127). But this hypothesis of Ghirshman can never be supported from Indian background. Culturally Sialk VI Cemetery B is related to the cairn burials of Baluchistan of comparatively recent times and ethnically the people of Sialk VI Cemetery B (brachycranials with mesocranial strain) was related with the people of the megalithic burials of Brahmagiri (47, p.33) and Jaleswaran (48, p.26, p.28).

At the present state of our knowledge, to consider these cairn burials of ca 1000 B.C. connected with the Caspian is a blunder and to hope for days when some rigid evidence will come in support of Ghirshman's hypothesis from India is simply nothing but to dream of a day-dream. As the evidence comes from Hissar, Shahi Tump, Jamkar, or Chanhangar it is by no means logical to consider that this branch of the Caspian would use iron when they inhabited at Hissar or when they came to India.

A 77-79 cranial index people whom Kappers has identified as iron-users (11, p.154) was present, at Tepe Hissar, (Table I) Harappa (Table I) and also in the megalithic burials of Brahmagiri and Jaleswaran* (Table II). Again we see that influx of this people (cranial index 77-79) took place more deliberately at Tepe Hissar than at Sialk. Hence to identify this 77-79 cranial index people as Iron-users is hardly to be substantiated in Iran. Rather Sialk VI Cemetery B people, the brachycranials might be considered at least one of the iron introducers both in Iran as evidenced from Sialk VI Cemetery B and also in India as evidenced from Brahmagiri (47, p.15, p.23) and Jaleswaran (52, p.26, p.31).

*Unfortunately, no human skulls are obtained from the cairn burials of Baluchistan so that any comparison can be done.
Thus we see that all the prehistoric chalcolithic migrations through Baluchistan to India can primarily be attributed directly or indirectly to two broad categories. The first one - the migrations connected with Hissar; Cemetery B-37, Jhakar, Ghanudaro II, Shahi Tump and Cemetery H might be included in this category.

These migrations were the migrations of mainly 71 cranial index people mixed with different amount of Ukrainian strain (75 cranial index) and Irano-Scythian strain (77-79 cranial index) at different sites.

And the second one - the migrations connected with Sialk VI Cemetery B; the cairn burials of Baluchistan and the megalithic burials of South India might be included in this category. These migrations were the migrations of the brachycranial people mixed with some mesocranial strain, who might have entered India with the knowledge of iron. This people was definitely other than our Caspians.

At Lothal it seems that both Tepe Hissar people (cranial index 71) and Sialk VI Cemetery B people (brachycranials) lived together (56, p. 204) and made a composite culture.

5. CONCLUSIONS

We can now trace two ethnic migrations of circa 1000 B.C. via Baluchistan: one - the migrations of 71 cranial index people (with a little 75 and 77-79 cranial strains) and the other; the migrations of the brachycranials (mixed with mesocranial strains). First one in the previous paragraphs has been attributed to the Irano-Caspian and the second one might be attributed to the Sialk VI Cemetery B people, the Armenoids. Groups of mixed peoples of the Irano Caspians later on, assimilating the local peoples of Iran and Baluchistan might have also constituted the later portion of the train of the migrations of the Irano-Caspian as evidenced from Cemetery H II, Cemetery H I and Navasa. Again, from Lothal it seems that the Irano-Caspian and the Armenoids made a composite culture.
Now the question arises, who then the Indo-Caspians (Vedic Aryans) were in the Indus Valley, who came at least before 500 years of the arrival of the Irano-Caspians in the region.

To solve this problem we are to judge the different aspects of Harappa culture, its disappearance from the Indus Valley ca 1000 B.C. and its different articles with strong Hindu resemblances, precisely and deeply.

Taking into account the mature civilization as evidenced from Harappa, we can conclude that the centre of civilization of the Harappans was the Punjab and from this place they moved eastwards towards the Gangetic plain and southwards towards the Deccan; whereas, the New-comers mainly went southwards most probably on account of the strong pressure from the Gangetic plain. Is not the expansion of Harappan culture from the Punjab towards east and south at a time (ca 1000 B.C.) when the Indo-Caspians (Vedic Aryans) are going from the Indus Valley to the Gangetic plain at all indicative? Are the disappearance of the Harappans from the Indus plain (ca 1000 B.C.) and the appearance of the P.C. Wares people ca 1000? (or little later) in the Gangetic plain really unconnected? Should the similarities of the Harappan objects with Hindu objects of later times be simply dismissed by the hypothesis of borrowing?

There is some vague similarities between different chalcolithic West Asian cultures and the culture of the Harappans but these are nothing but the general similarities of chalcolithic cultures of Asia as a whole; there are also some vague similarities among the culture of Harappa and the first phase and also the later phases of the civilization of the Indo-Caspians in the Gangetic Valley, which might be no more than a continuation of cultural heritage through ages. But there is at least some possibility to connect the

*Some branches of them reached Bihar and Bengal not through U.P., but most probably through M.P.*
Harappans with the Indo-Caspians and their dissimilarity might also be reconciled by assuming the culture of the latter in the Gangetic plain as the same culture being transformed from the chalcolithic age to the iron age.

At least let us speak that it will not be at least irresponsibility to search facts to defend the hypothesis that the Harappans were the Indo-Caspians (Vedic Aryans); but veteran Indologist generally dismiss such hypothesis when some Hindoo orthodoxes hit the problem by their own ways.

It should be remembered that learned Indologists have done practically nothing to unveil the mystery of Harappa (except the collecting of facts). Their age old hypothesis that the Harappans were Non-Aryans and Pre-Aryans has not solved any problem but created many. We are not intended here to support the blind orthodoxy of those irresponsible orthodox theorists but only intended to judge their hypothesis properly from archaeological standpoint but not from similar irresponsible dogmatic attitude.
<table>
<thead>
<tr>
<th>Period</th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70.97%</td>
<td>72.65%</td>
<td>72.37%</td>
</tr>
<tr>
<td></td>
<td>72.37%</td>
<td>70.97%</td>
<td>72.65%</td>
</tr>
<tr>
<td></td>
<td>72.65%</td>
<td>72.37%</td>
<td>70.97%</td>
</tr>
</tbody>
</table>

**Remarks:**
- Keep a general record of the population of the State.
- Historical records should be kept.
- This record is useful for future reference.
<table>
<thead>
<tr>
<th>Site</th>
<th>Sex</th>
<th>Period</th>
<th>Crania</th>
<th>Indices</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tephestisar</td>
<td>F</td>
<td>III</td>
<td>57.34</td>
<td>70.26</td>
<td></td>
</tr>
<tr>
<td>Nebi</td>
<td>M</td>
<td></td>
<td>69.45</td>
<td>70.08</td>
<td></td>
</tr>
<tr>
<td>Shahi Tump</td>
<td>M</td>
<td></td>
<td>71.07</td>
<td>70.09</td>
<td></td>
</tr>
<tr>
<td>Chelukdarro</td>
<td>M</td>
<td></td>
<td>69.37</td>
<td>70.26</td>
<td></td>
</tr>
<tr>
<td>Moheri Jandar</td>
<td>M</td>
<td></td>
<td>69.37</td>
<td>70.09</td>
<td></td>
</tr>
<tr>
<td>R-37</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table above shows the cranial indices for different sites and periods. The indices for each site are given in different rows, with columns for sex, period, and indices. The remarks column provides additional information about each entry. The table includes sites such as Tephestisar, Nebi, Shahi Tump, Chelukdarro, and Moheri Jandar, along with their respective sex, period, and cranial indices.
<table>
<thead>
<tr>
<th>Cemetery in the State</th>
<th>Number</th>
<th>Initials</th>
<th>Sex</th>
<th>Birth Date</th>
<th>Death Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>M</td>
<td></td>
<td>1840-01-01</td>
<td>1890-12-31</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>F</td>
<td></td>
<td>1850-02-02</td>
<td>1900-03-03</td>
</tr>
<tr>
<td>C</td>
<td>3</td>
<td>M</td>
<td></td>
<td>1860-03-03</td>
<td>1910-04-04</td>
</tr>
<tr>
<td>D</td>
<td>4</td>
<td>F</td>
<td></td>
<td>1870-04-04</td>
<td>1920-05-05</td>
</tr>
<tr>
<td>E</td>
<td>5</td>
<td>M</td>
<td></td>
<td>1880-05-05</td>
<td>1930-06-06</td>
</tr>
</tbody>
</table>

A tentative record analyzes of the populations of the States-Genealogically Related

Table 1
A Tentative Chronological Scheme

Ca 1500 B.C., or a little earlier, probably Ca 1500 B.C.: (i) Arrival of the Indo-Caspians in India; (ii) beginning of Harappan Culture.

Ca 1000 B.C.: (i) Disappearance of the Harappans from the Indus Valley; (ii) appearance of the Indo-Caspians mainly in the Gangetic plain; (iii) arrival of the Irano-Caspians (New-comers) in the Indus Valley.

Ca 800 B.C.: (i) Arrival of different branches of the mixed Irano-Caspians in India; (ii) arrival of the Armenoids (the brachycranials) in India.

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REFERENCES

2. Peton L.E. Spiritism and the Cult of the dead in antiquity - 1921.
7. Stein - Archaeological Tour in Badrosia, 1931.
8. Ancient Egypt, 1933.
    Childe V.G. - Notes on some Indian and East Iranian Pottery.
    Schmidt E.F., Tepe Hissar Excavations, 1931.
10. Childe V.G. - New light on the most ancient East, 1934.
13. Herzfeld - Archaeological history of Iran, The Schweich Lectures of the British Academy, 1934 (Published 1935).
    Cited from 32, p.27 F.M.2.
    Heine - Geldern H. - Arch. Traces of the Vedic Aryans.
    Datta B.N. - Vedic Funeral Customs and Indus Valley culture.
17. Man in India, 1937.
    Datta B.N. - Vedic Funeral Customs and Indus Valley Culture (Continuation)
18. The cultural heritage of India, No.1, First edition, 1937.
    Sarkar Sasanka - Sakhar-Bace and Race Movements in India quoted from the edition of 1938.
    Childe V.G. - India and the West before Darius.
22. Vatsa MS : Excavations at Harappa, 1940.
23. Krogham W.M. - Racial types from Tepe Hissar, Iran from the late fifth to the early second millennium B.C., 1940.
25. Antiquity Vol.16, No.64, 1942.
Childe V.G. - Ceramic Art in early Iran.

Piggott-S.-Dating the Hissar Sequence
The Indian evidence.

27. Mackay E. - Chanudaro Excavations.

Piggott-S.- The Chronology of Prehistoric North West India.

Cited from 33, p.131.


Piggott S. - Notes on certain pins and a mace head from Harappa.

33. Piggott S.-Prehistoric India, 1949.

34. JRAS (letters) Vol.16, No.1, 1950.
Lal B.B. - The painted Grey Ware of the Upper Ganges Basin.
An approach to the problem of the dark age.

35. Journal of the Royal Anthropological Institute of Great Britain &
Ireland Vol.80, Gordon D.H. The early use of metals in India and
Pakistan, 1950.

Cardi Beatrice. De - A new Prehistoric Ware from Baluchistan.
Cited from 57, p.72, P.N.118.

Lal BB - Further Copper hoard from the Ganges basin and a
review of the problem.

38. A.I. No.9, 1953.
Lal B.B. Protohistoric Investigation.


Kaima-Goldern R. - The coming of the Aryans and the end of the
Harappa civilization.

Fairbairn W.A. - The chronology of the Harappan civilization.


43. Sankalia H.D. S,B. Deo S.B.
The Excavations at Mahoswar and Navdatoli, 1958.

44. Wheeler REM - Early India and Pakistan to Ashoka, 1959.

Cardi Beatrice De - Fresh Problem from Baluchistan.

47. Bulletin of the Department of Archaeology No. 9, 1960. 
Barker S.S. Human skeletal remains from Brahmagiri 1960.


Human remains excavated from Megaliths at Yalleswaran (Indhra Pradesh).


Cited from 57, pp. 235-236, F.N. 42.


Raikes R. - The Mohenjodaro Floods.


Chakraborty Dilip K. - The Aryan hypothesis in Indian Archaeology.

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In the following paragraphs and tables I am intending to relate Harappan weights with the ancient Indian weights of Gold, Silver and Copper. According to Mr. A. S. Hemmy there were two systems of weights\(^1\) used by the people of Harappa culture.

First one (in gms.): 0.856; 1.71; 2.38; 3.42; 6.85; 13.12; 27.39; 54.78; 136.96; 171.2; 273.92; 1370.

and the second one\(^2\) described by Mr. Hemmy as exceptional weights at Mohenjodaro (in gms.): 0.98; 2.07; 3.03; 3.92; 24.5; 47.30.

From vivid observations (without making a test) of the tables of weights found from Harappa and Mohenjodaro, it will be at one obvious that the second system or the exceptional system is not exceptional at all; this system is originated, rather created with a view to showing an approximate similarity of some of the weights of Harappa Culture with Babylonian system by an "As you like" type explanation. The exceptional system can easily be reasoned with the first system i.e. the exceptional weight 0.98 gm. may be taken as one defective specimen of the normal system of the weight-standard of 0.850 gm.

Similarly,

2.07 gms. may be taken for one defective specimen of 2.15 gms.

3.03 gms. and 3.92 gms. may be taken for two defective specimens of 3.44 gms.

24.50 gms. may be taken for one defective specimen of 27.53 gms.

And 47.30 gms. may be taken for one defective specimen of 56.07 gms.
It is more logical to assume that the last two weights, i.e., 24.50 gms. and 47.30 gms., are the defective specimens of the normal weights 27.36 gms. and 52.8 gms. respectively than to think that those above mentioned weights are different system of weights used in HM* and they possess approximate resemblance with light Babylonian system. The exceptional system of Mr. Kemmy is a wishful selection of few defective weights among large number of Harappan weights placing one eye to the table of light Babylonian system. Still in the table "Approximation of the Indus valley weights to Babylonian system" Mr. A. S. Kemmy will certainly deliver you some fun to find out the approximate similarity and make you think what Marshallians did to point out the imaginary resemblance of Harappa Culture with the civilization of Sumer and Assyria. This type of dogmatic attitude of explaining Harappa materials either to be Assyrian or to be sumerian by hook or by crook is a well known tradition of the Marshallians.

To prepare the tables "Excavations at Harappa" by M. S. Vats (Vol.II pp.366-368) and "Mohenjo-daro and the Indus civilization" by Marshall (Vol.II Marshall pp.589-598). Appendix II - List of Weights from Harappa) are consulted. When the same specimen of weights are tabulated in the reports with different weights, I have taken the results of the former. For the weights of Mohenjo-daro, the same process described above is adopted. The description of weights are taken from "Mohenjo-daro and the Indus civilization". Only perfect and slightly chipped weights of both the sites are taken into considerations. The weights which lack the descriptions of their condition are treated as perfect.

*HM: HM means Harappa and Mohenjodaro together.
According to Manu Indian system of weighing silver, gold and copper are given below.

**Silver**

2 Raktikās = 1 Māsha = 21.510 gms.
16 Māshas = 1 Purīga = 34.417 gms.
10 Purīgas = 1 Satamāga = 34.417 gms.

**Gold and Copper**

5 Raktikās = 1 Māsha = 33.775 gms.
16 Māshas = 1 Suvarṇa; Karshāpana (only for Copper) = 8.604 gms.
4 Suvarṇas = 1 Pala = 34.417 gms.
10 Palas = 1 Dharaṇa = 344.17 gms.

We see here that the Satamāga (320 raktikās) in the Silver system has the same weight as the Pala (320 raktikās) in the Gold system. In the Gold and Copper systems, there is a higher unit, gold Dharaṇa which is 10 times of a Pala and this unit is absent in the Silver system. From the tables I and II we may consider that for weightment of common articles, Harappan people would use Silver system. The general system of weightment of common articles of Harappan people, may be thought to have been based on the following system.

2 Raktikās = 1 Raupa Māsha = 21.510 gms.
16 Raupyas Māshakas = Purīga (Silver) = 34.417 gms.
10 Purīgas (Silver) = 1 Satamāga (Silver) = 34.417 gms.
10 Satamāgas (Silver) = 1 Suvarṇa Dharaṇa = 344.17 gms.

Harappan weights can easily be explained in terms of above unit weights of ancient India and the explanation is so clear that one is forced to infer that the weighing units of Harappa Culture were exactly the same as the prescribed weighing units of Manu (See Table I and II).

*For various reasons I have taken 1 raktikā = 0.10758 gms.*
Mr. H. D. Sankalia\(^6\) thinks that the weight system of Navas\(^a\), especially with regard to the ratios possessed, closer resemblance with light Babylonian system than with the Harappan system.

But I think that the people of Navas\(^a\) used the same system of weightment (See Table III) as the people of Harappa, Mohenjodaro and Chanhu\(\text{dai}\) did.

From the following table, it will be apparent that Navas\(^a\) people used cruder weights and so we may infer that Navas\(^a\) people were less advanced than the Harappans people in connection with the uses of weights.

The weight obtained from Chanhu\(\text{dai}\)\(^7\) (See Table II) and the Batha site Taxila\(^8\) (See Table IV) also show unmistakable resemblance with the weights of Harappa and Mohenjodaro.

**MEASUREMENT**

Relation between the Harappan scale and the system of measurement of ancient India may be traced, by observation and comparison. But this method of observation and comparison of the Indus scales with ancient Indian scales will give us no conclusive result. The weight system of ancient Hindoo India was unique, and as far as we know no peoples other than the Harappans used such system of weightment; and so definite conclusion can be drawn from the analysis.

But for measurement, the cubit system, was customary in many parts of ancient world e.g., Egypt, Asia Minor, Greece, Lachish, Syria etc.\(^9\) It can be shown that like the people of ancient Hindoo India (also like other ancient peoples) the Harappan people used cubit system of measurement.

Indian systems of measurement are given below as known from ancient literatures\(^10\). (Vrd\(\text{dha Manu}).

<table>
<thead>
<tr>
<th>8 Yaves</th>
<th>= 1 Āṅgula</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Āṅgulas</td>
<td>= 1 Vitasti</td>
</tr>
<tr>
<td>2 Vitasti</td>
<td>= 1 Hasta or cubit</td>
</tr>
</tbody>
</table>
and

• 6 Yavas\(^\text{11}\) = 1 Ángula

24 Ángulas = 1 Hasta.

Whatever be the measure of 1 Yava, it is obvious that the length of 1 Ángula was fixed. 1 Hasta of Indian scale varies from 18" - 19". So the length of 1 Ángula will vary from .75" to .79125". One Yava, then, (if 6 Yavas = 1 Ángula be customary one) will vary from .125" to .13125" and 2 Yavas will vary from .250" to .26250".

One of the two scales of Harappan culture (found at Mohenjodaro) could easily be explained in the light of ancient Hindu - scale. (See Table V).

Again the second scale\(^\text{12}\) found at Harappa tallies well with the Indian system - (See Table VI).

8 Yavas = 1 Ángula

24 Ángulas = 1 Hasta (18"

Hence 1 Yava = .06375 inch.

\(\frac{1}{2}\) Ángula = 4 Yavas = .37500 inch.

From the nature of the weights and measurement of Harappan culture and ancient Indian coins and scales, i.e. their basic unit the system of change of basic unit to higher units, I can not but think that the system of weights and measurement of BM and ancient Hindu India was the one and the same (especially with regard to weights) and the conclusion which comes from the picture is rather shocking and I am afraid of stating that such strong similarity can hardly be explained by the borrowing theory. One reasonable explanation which can never be excluded is that, both the people were the one and the same and hence, the weights of Harappan Culture were not so old as the Marshallians think.
<table>
<thead>
<tr>
<th>Group</th>
<th>Size of Specimen</th>
<th>Range</th>
<th>Ave.</th>
<th>660</th>
<th>880</th>
<th>1015</th>
<th>1170</th>
<th>1475</th>
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A Survey of the Weights From Herapeo and Mononodoro

Table 1

This table is a means of least bone of the specimen of the group are described. In all, the means of mean herapeo and mononodoro, if derrane and herapeo together, come in the following:

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</tbody>
</table>

In all, the means of mean herapeo and mononodoro, if derrane and herapeo together, come in the following:
<table>
<thead>
<tr>
<th>Group</th>
<th>Theoretical</th>
<th>Vertex</th>
<th>Mean</th>
<th>Standard Error</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.090 ± 2.960</td>
<td>(in frame)</td>
<td>(mean)</td>
<td>vertex of the triangle formed by the vertices</td>
<td>3.090 ± 2.960</td>
</tr>
<tr>
<td>B</td>
<td>3.450</td>
<td>(in frame)</td>
<td>(mean)</td>
<td>vertex of the triangle formed by the vertices</td>
<td>3.450</td>
</tr>
<tr>
<td>C</td>
<td>6.80</td>
<td>(in frame)</td>
<td>(mean)</td>
<td>vertex of the triangle formed by the vertices</td>
<td>6.80</td>
</tr>
<tr>
<td>D</td>
<td>12.360±12.600</td>
<td>(in frame)</td>
<td>(mean)</td>
<td>vertex of the triangle formed by the vertices</td>
<td>12.360±12.600</td>
</tr>
<tr>
<td>E</td>
<td>26.70±3.70</td>
<td>(in frame)</td>
<td>(mean)</td>
<td>vertex of the triangle formed by the vertices</td>
<td>26.70±3.70</td>
</tr>
<tr>
<td>F</td>
<td>60.00±20.00</td>
<td>(in frame)</td>
<td>(mean)</td>
<td>vertex of the triangle formed by the vertices</td>
<td>60.00±20.00</td>
</tr>
</tbody>
</table>
A survey of the weights of larvae and pupae of Aedes aegypti (concluded)

<table>
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<td>6</td>
<td>11</td>
<td></td>
<td>7</td>
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<td>6</td>
</tr>
</tbody>
</table>

Note: Group 1: Hawaiian 5g, Indian 6g; Group 2: Hawaiian 5g, Indian 6g; Group 3: Hawaiian 5g, Indian 6g.
<table>
<thead>
<tr>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
<th>Std Dev</th>
<th>Variance</th>
<th>Range</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>Shapiro-Wilk</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.624</td>
<td>0.772</td>
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<td>0.676</td>
<td>0.0454</td>
<td>0.00204</td>
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<td>2.358</td>
<td>0.925</td>
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A Survey of the Weights from Chasing...
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Date</th>
<th>Age</th>
<th>Years</th>
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<tbody>
<tr>
<td>74.96</td>
<td>Mr. A. Johnson</td>
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<td>32.27</td>
<td>Mrs. B. Smith</td>
<td>10/1/1970</td>
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<td>28.88</td>
<td>Mr. C. Williams</td>
<td>8/1/1980</td>
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<td>Ms. D. Brown</td>
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</table>

A summary of the weights from cholesterol

(cont'd)
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<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
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<tbody>
<tr>
<td>Value 1</td>
<td>Value 2</td>
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<td>Value 4</td>
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<tr>
<td>Value 5</td>
<td>Value 6</td>
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<td>Value 8</td>
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<td>Value 9</td>
<td>Value 10</td>
<td>Value 11</td>
<td>Value 12</td>
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</table>

A survey of the weights from Chairmend (cond.)

*TABLE II*
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<tr>
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<td>54.77</td>
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**Table I**

<table>
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**Table II**

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</table>

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**Survey of the Experiments from Chemotherapy**

<table>
<thead>
<tr>
<th>Group</th>
<th>Relevant Variable</th>
<th>Weight of the Mixture</th>
<th>Weight of the Mixture (in g)</th>
<th>Amount of the Mixture (in g)</th>
<th>Occurrence</th>
<th>Relevant Variable (in g)</th>
<th>Weight of the Mixture</th>
<th>Weight of the Mixture (in g)</th>
<th>Amount of the Mixture (in g)</th>
<th>Occurrence</th>
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</table>

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The table contains data from chemotherapy experiments, including relevant variables, weights, and amounts of mixtures, as well as occurrences.
<table>
<thead>
<tr>
<th>L (in ft)</th>
<th>C (in ft)</th>
<th>H (in ft)</th>
<th>2.74443 ft x 2</th>
<th>2.84481 ft x 16</th>
<th>TD PHRAGM (STAIR)</th>
<th>1 TD PHRAGM (STAIR)</th>
<th>3 61.82</th>
<th>4 5.49</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>L = 66.69</td>
<td>C = 23.45</td>
<td>H = 35.66</td>
<td>2.74443 ft x 2</td>
<td>2.84481 ft x 16</td>
<td>TD PHRAGM (STAIR)</td>
<td>1 TD PHRAGM (STAIR)</td>
<td>3 61.82</td>
<td>4 5.49</td>
<td>TO</td>
</tr>
<tr>
<td>L = 66.69</td>
<td>C = 23.45</td>
<td>H = 35.66</td>
<td>2.74443 ft x 2</td>
<td>2.84481 ft x 16</td>
<td>TD PHRAGM (STAIR)</td>
<td>1 TD PHRAGM (STAIR)</td>
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<td>4 5.49</td>
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<td>0 - 86° 06'</td>
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<td>N - 6° 54'</td>
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</tbody>
</table>

By scrutinizing the weight from Yeuse

*Table III (cont'd)*
<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Group of specimens</th>
<th>No. of specimens</th>
<th>Average weight</th>
<th>Relevant weight of the relevant metal (in grains)</th>
<th>Theoretical weight</th>
<th>Relevant average weight from other Indian sites (in grains)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>20 Dantas (Silver)</td>
<td>20 Dantas (Silver)</td>
<td>31.417 gms x 20</td>
<td>628.34 gms</td>
<td>31.417 gms x 20</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>14 Dhantapas (Silver)</td>
<td>14 Dhantapas (Silver)</td>
<td>20.85 gms x 14</td>
<td>292.05 gms</td>
<td>20.85 gms x 14</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>10 Dnetangas (Gold)</td>
<td>10 Dnetangas (Gold)</td>
<td>65.17 gms x 10</td>
<td>651.7 gms</td>
<td>65.17 gms x 10</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>9 Dnetanemas (Silver)</td>
<td>9 Dnetanemas (Silver)</td>
<td>34.417 gms x 9</td>
<td>309.753 gms</td>
<td>34.417 gms x 9</td>
</tr>
</tbody>
</table>

A survey of the weights from Nevada.
# TABLE IV

Survey of the Weights from Tenali

<table>
<thead>
<tr>
<th>Group of Specimens</th>
<th>Range (in Gram)</th>
<th>Theoretical Weight</th>
<th>Relevant Weight of the Relevent Weight from Other (in Gram)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Weight (in Gram)</th>
<th>Through Averages</th>
<th>C</th>
<th>Fm (gm x 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part A</td>
<td>3.82</td>
<td>3.82</td>
<td></td>
<td>H = 11.42</td>
</tr>
<tr>
<td>Part B</td>
<td>2.96</td>
<td>3.48</td>
<td></td>
<td>M = 13.76</td>
</tr>
<tr>
<td>Part C</td>
<td>2.00</td>
<td>2.56</td>
<td></td>
<td>F = 10.76</td>
</tr>
<tr>
<td>Part D</td>
<td>1.00</td>
<td>1.28</td>
<td></td>
<td>Fm = 6.78</td>
</tr>
</tbody>
</table>

Note: The table shows a survey of weights from Tenali, categorizing the weights into different groups. The weights are expressed in grams and through averages.
<table>
<thead>
<tr>
<th>Site (in mm)</th>
<th>Initial Weight (in grams)</th>
<th>Relevance Weight</th>
<th>Relevant</th>
<th>Value</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>0.491.375</td>
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</tr>
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<td>0.49.44</td>
<td>-</td>
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</tr>
<tr>
<td>0.64.68</td>
<td>-</td>
<td>-</td>
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</tr>
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<td>0.64.48</td>
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<tr>
<td>0.59.50</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>0.49.58</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>0.59.66</td>
<td>-</td>
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</tbody>
</table>

Survey of the Weights From Extent I.

(Cont) + 1 = 1
<table>
<thead>
<tr>
<th></th>
<th>1.256</th>
<th>1.177</th>
<th>1.106</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.106 = 2 X 1.106 = 8.792</td>
<td>8.792</td>
<td>8.792</td>
<td></td>
</tr>
<tr>
<td>1.177 = 4 X 1.177 = 5.068</td>
<td>5.068</td>
<td>5.068</td>
<td></td>
</tr>
<tr>
<td>1.256 = 8 X 1.256 = 10.048</td>
<td>10.048</td>
<td>10.048</td>
<td></td>
</tr>
<tr>
<td>1.106 = 2 X 1.106 = 2.212</td>
<td>2.212</td>
<td>2.212</td>
<td></td>
</tr>
<tr>
<td>1.177 = 4 X 1.177 = 4.692</td>
<td>4.692</td>
<td>4.692</td>
<td></td>
</tr>
<tr>
<td>1.256 = 8 X 1.256 = 8.048</td>
<td>8.048</td>
<td>8.048</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- 1.106 X 2 = 2.212
- 1.177 X 4 = 4.692
- 1.256 X 8 = 8.048

**Comparison of a Homodactylus scale with another Indian scale**

| TABLE | V
|-------|---
<table>
<thead>
<tr>
<th>Remarks</th>
<th>Second Scale</th>
<th>Comparison of a Hieratic scale with ancient Indian scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Yaves</td>
<td>1.4705</td>
<td>Length from the origin (in inch.)</td>
</tr>
<tr>
<td>3 Angulas</td>
<td>1.1063</td>
<td></td>
</tr>
<tr>
<td>2 Yaves</td>
<td>0.725</td>
<td></td>
</tr>
<tr>
<td>1 Angula</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>No. of markings</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Base length</td>
<td>0.75</td>
<td></td>
</tr>
</tbody>
</table>

We have 4 Yaves and 3 Angulas as 1.4705. Considering 8 Yaves = 1 Angula and 3 Angulas = 0.75 inch, we get 4 Angulas = 0.75 inch.
REFERENCE

3. Ibid, p.594
4. 1) Graves C.H. Hanva-Dharma-Sastra
Vol.I (for Sanskrit Text) Chapter Eighth-8lohas
- 134 - 137.

श्यामा: नांकिला: स्वप्नसुविकारकुपन्त्यम्।
पंस-कुक-लक्ष्मीभाषा ते सुरवणकुसुम्बीदयनं॥
पलेशुद्वमीन्हामी: पनानन्धालमाः।
दैौस्यंश्चाक्ष्मादव्यवस्थिते तिर्नेौधिपामाथवः॥
नदेश्वरस्त्रयालेङ्कुमुक्तिमय्येववरोधं।
कात्यायणमष्टु विहंगवसामाङ्गं कालिकन्म:माती॥
धातुः दौः चोषः शास्त्रान्नसुरार्जनं।
चतुः स्तीविदिती निम्नो विहेौशुप्रभाणसन॥
ii) Asiatic Researches Vol.V

"On Indian Weights and Measures"

iii) Varisrata Orientalis - E. Thomas

p.13, Table III


5. This is taken from the Gold Standard to explain the heavy weights of Mohenjodaro and Harappa. If the modification be avoided, these heavy weights can also be explained in terms of Satamāras.

6. From history to pre-history at Vesuva Sankalia H.D.


10. i) Asiatic Researches, Vol. V.

On Indian weights and Measures. Colebrooke, p.103.
11) अंतः - "संस्कृत के अवलोकन से यह निर्देश: "कुलकार्योऽनवस्तमात्रा च च, यथा हृदये।"

12) अंतः - "यह कुलकार्योऽनवस्तमात्रा च"।""

iv) Yava - "A measure of length equal to 1/6 or 1/8 of an angula" The Student's Sanskrit Eng. Dictionary, V.S. Apte p.455.

11. Excepting the reference of Apte I have been unable to find out this relation in any standard literature. Yet I have considered this equivalence on account of the fact that one Indus Scale fits well with this description.

A Jain Ganita refers - 4 Yavas = 1 angula; 4 Angulas = 1 Mushti; 4 mushtis = 1 hasta.
(Antiquities of India - Barnett p.218)

Excavations at Harappa - Vats MS, Vol.I, p.365;

TENTATIVE DECIPHERMENT OF THE INSCRIPTIONS OF THE SEALS OF HARAPPA AND MOHENJODARO

(Abbreviations used in the decipherment tables. A, B, C and D:

Mc = E. Mackey - Further excavations at Mohenjodaro Vol.II.
ML = Sir John Marshall - Mohenjodaro and the Indus civilisation Vol.III.

The inscriptions marked with numbers alone indicate the museum numbers of the seals, as tabulated by Mr. M.S. Vats in the report 'Excavations at Harappa' Vol.II).

The language of the inscriptions of the seals of Harappa and Mohenjodaro is Sanskrit. Generally Aryan personal names (and place names) are inscribed on the seals. Combinations of two names and more than two names are also found to a lesser extent.

Just like the ancient coins on which ग़रजास्य (Maharajasya), भिष्मदेवस्य (Bischnudevasya) etc. are written, these seals are also embodied with धरमस्य (Dharmasya) धर्मस्य (Dharmas) i.e., this is possessed by Dharmas, this is possessed by Dhara etc.

The most important code for the decipherment of the Indus seals is the unnecessary repetition of the same alphabet twice, thrice or more times, most probably for decorative purpose: e.g.

\[\begin{align*}
\text{Mc 327} & \quad \text{Mc 381} & \quad \text{Mc 88} \\
\text{Mc 551} & \quad \text{Mc 523} & \quad \text{Mc 132} \\
\text{Mc 131} & \quad \text{Mc 315} & \quad \text{Mc 309} & \quad \text{Mc 137} \\
\text{Mc 132} & \quad \text{Mc 322} & \quad \text{Mc 138} & \quad \text{Mc 148} \\
\end{align*}\]
<table>
<thead>
<tr>
<th>No.</th>
<th>Compound Alphabet</th>
<th>Constituent</th>
<th>Constituent</th>
<th>Constituent</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>图</td>
<td>田</td>
<td>木</td>
<td>木</td>
</tr>
<tr>
<td>2</td>
<td>甲</td>
<td>乙</td>
<td>丙</td>
<td>丁</td>
</tr>
<tr>
<td>3</td>
<td>人</td>
<td>丸</td>
<td>丸</td>
<td>壬</td>
</tr>
<tr>
<td>4</td>
<td>小</td>
<td>長</td>
<td>丸</td>
<td>壬</td>
</tr>
<tr>
<td>5</td>
<td>丸</td>
<td>丸</td>
<td>丸</td>
<td>壬</td>
</tr>
<tr>
<td>6</td>
<td>丸</td>
<td>丸</td>
<td>丸</td>
<td>壬</td>
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<tr>
<td>7</td>
<td>丸</td>
<td>丸</td>
<td>丸</td>
<td>壬</td>
</tr>
<tr>
<td>8</td>
<td>丸</td>
<td>丸</td>
<td>丸</td>
<td>壬</td>
</tr>
<tr>
<td>9</td>
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<td>壬</td>
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<td>13</td>
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<td>壬</td>
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<td>丸</td>
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<td>丸</td>
<td>壬</td>
</tr>
<tr>
<td>No</td>
<td>Variants</td>
<td>Phone Value</td>
<td>Remarks</td>
<td></td>
</tr>
<tr>
<td>----</td>
<td>----------</td>
<td>-------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>- (Gibit)</td>
<td>A (3F)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- (3F)</td>
<td>A (3F)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>J (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>G.A (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>J.A (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>NA (7)</td>
<td>These symbols have seldom been used for NA (7)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>NA (7)</td>
<td>These symbols have also the sense of NA (7)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>TA (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>DA (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>D.HA (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>BA (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>VA (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>MA (5)</td>
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2. Proposed phonetic values for some inscriptions

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicia</th>
<th>Variants</th>
<th>Phonic Value</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>13</td>
<td></td>
<td></td>
<td>YA (Y)</td>
<td>Sometimes, the symbol has been used for A, (3T).</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td>RA (J)</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td>LA (A)</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td>SA (E)</td>
<td></td>
</tr>
</tbody>
</table>

3. A tentative resemblance with Brahmi script

<table>
<thead>
<tr>
<th>Alphabet of Homelike and Mixtilinear</th>
<th>Developmental Stage</th>
<th>Relevant Brahmi Alphabet</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Е</td>
<td>У, У', А, А</td>
</tr>
<tr>
<td>К</td>
<td>(imaginary)</td>
<td>В, В'</td>
</tr>
<tr>
<td>О</td>
<td>(imaginary)</td>
<td>Е</td>
</tr>
<tr>
<td>ОГ</td>
<td>ОГ</td>
<td>Г, Г'</td>
</tr>
<tr>
<td>ЕГ</td>
<td>ЕГ</td>
<td>Е</td>
</tr>
<tr>
<td>ЕГ</td>
<td>ЕГ</td>
<td>Е</td>
</tr>
<tr>
<td>ЕГ</td>
<td>ЕГ</td>
<td>Е</td>
</tr>
</tbody>
</table>

*На основании представленного материала можно сделать вывод о возможном родстве сcripta, используемого в древних индийских памятниках, с брахми."
DHA-SA NA - NAGA NA - NAGEŚAJA SSA-GRA-PI DHA-WA 291

DHA-RKMA-NA

DHA-YA DHA-SA-SA DHA-SA-NA-NY-DHA-NAYA293

A-GA

274 AGA

275 GODHANENA A-GA-NA SA

276 GANDHAKA -STYA

281 BHAYA DHA-NASYA DHA-SA-DHA-NACA

282 DHARANA -NAYAD

283 DASA GA-SA

286 VAHA-DHVAYA DHA-NA-JA

288 DHVAJANA -SYA

289 AGASYA

291 DHARANA -NARAYA

291 DHARANA

292 DHVANA NA DHA-YA

293 VASRA

294 DASA YA

295 JANANSHA NA

297 AGA-NASYA

298 NARADA

300 DASA DHA -NAYAD

302 DHANAYA

303 GAÑA

305 DHVANA - DHVAJA

307 ADHYAGA -SYA

308 NARAYA

311 DHA-SA NA-DHA-MA-PHA -DHANAMA NA-A-MA-DHA-YA SSA DHVASYA
NARAKA
NAYA
BADAYASA
BRAHMAN
NAXASACYA
2718
3125
10831
2254
VANA.
AJENA
10242
ADHYENA
11390
ADHYENA
10830
4765
NARA
4432
SANA
7098
DHYANA
10108
5630
GUJğerI
8650
NA DHANA
NA ASA
4015
NARASYA
1. त्रिदा - त्रिदत्रि विश्वि विश्वेन ब्रह्मेन मुद्रको

2. त्रि (त्रिम) - त्रिदा दृष्टि I. गिर्नर (हिंदू अवस्थ) - Line 6.

3. त्रि (त्रिम) - "3. No. of a king of the solar race - 4 M. of a country or its inhabitants, or its king. (It was also called sauristra and may be identified with the modern Harishwar.) Dwārakā was its capital, which is called द्वारकागृह. There was also an important town called Valabhi - which afterwards became its capital. The celebrated Firtha called फिर्ती also stood in the same peninsula."


5. त्रि (त्रिम) - "Anatta is the least of the 'three characteristics' (त्रि - लक्षण) or the general characteristics (त्रि - लक्षण) of the universe and everything in it ... Stenologically, अनत्ता consists of the negative prefix a plus त्ता (cf. Vedic Sanskrit tām). The truth of अनत्ता by Dr. G. F. Meekes (Prefatory Note).

6. त्रि (त्रिम) - "त्रि (or द्विति)?: mystical N. of the letter न.

7. त्रि (त्रिम) - "संस्कृत विकियो नारीला विलो. द्वरति - 'व्रिद्धि form of द्विति', in etc. Ibid. p. 516.

8. त्रि (त्रिम) - "त्रि - 'N. of a war-like tribe; sg. - prince of this tribe', Ibid. p. 516.


10. त्रि (त्रिम) - "त्रि - 'N. of a देविया (bestowing wealth and presiding over love and marriage), brother of the Dawn, regent of the Mohāpur Phalguni; Vaisya venerates him among the divinities of the highest sphere; according to a later legend his eyes were destroyed by Mṛdrā.) ib. v & c. the देविया भूमि, प. Ph., Mohāvi, 81; the sun, ib. 111, 146; the moon, 11; N. of Mṛdrā, Mohā", Monier Williams, a Sans.Eng.Dict. p. 743.

11. त्रि (त्रिम) - "They are the seven sons of the Viscati, the lord of creation. They are symbolized in the seven देवियाः (sons of देविया), Mitrā, Varyama, त्रि, Varuna, Da, Ašvā and Vivasvān (Rgveda, X, 72, 9) and the seven priests, Hotr, Pātri, Sūstr, Agni, Pasa-str, Ahyā and Brahman". Rgveda and the Indus Valley civilization - Dr. Buddh Prakash p. 35.
Bhaga - "A Vedic god and Aditya, regarded chiefly as dispensing fortune; brother of Ushas" Antiquities of India, p.19.


7b. 8. 8a. 10: Caddha, Gandhara, Gandhara, Gandhara, Caddha, Caddha: An interesting thing is to be stated here that in the inscriptions of Ḫā, there are words like Caddha, Caddha, Caddhasya, etc. These words I think most probably mean Gandhara. There are five columns at Behistan containing the inscriptions of the Achaemenid King Darius, the great.

In column I Darius gives a list of 25 countries "then came to" him. In this list we find two names that are Indian viz., Ga (h) dāra or Gandhara and Qatagās or Sattagyās. The Achaemenids in India by Suchakar Cattopadyāya, p.6. "The South Sea at Parsgulis is usually assigned to Artaxareses in II (404-395 B.C.) on artistic grounds. Here is/inscription" - a portion of which reads - "such (satagyāa) (this is in a Sattgyadian); iyan ga (n) duriya (this is a Gandharian); iyan ki (h) duriya (this is i li (n) du" Ibid. p.14. This word "Cadaraya" means Gandharian. So Caddha in the Indus inscription has strong similarity with the Indo-Iranian word Cadaraya which means an inhabitant of Gandhara.

97.


10. Tod says that Mihñihati was a king of central India 'whose capitals were Dhār and Ujain'. (R.I.S. I. 1871-73, p.163.

9a. Gagñasya = One seal with the inscription Gagñas was obtained from Shita Excavation. 'Excavation at Shita' (R. I.S. I., 1911-12, p.57.


11. Datta = 'The word for a ruined city or settlement was āra or ṛmaṇa.


12. Dhan = One seal with the inscription Dhanasya was obtained from Bostān Excavation. 'Excavation at Bostān' (R.S.I. 1913-14, p.145.


14. Dharm = One inscription inscribed with Ārya- Dharmadevyasa (Ārya Dharmadevyasa) was obtained from Shita excavation. (R.I.S. I. 1911-12. Excavation at Shita, p.63. Dharm = 'm. (only L.) the moon; M. of Brahman; of Yama; of fish'. (M. Monier-Williams - Šings. Eng. Dict. p.509.