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Robert L. Raikes

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The End of the Ancient Cities of the Indus

ROBERT L. RAIKES

*Raikes & Socio, Consulting Engineers
Rome*

AMONG those who are interested in the prehistory of the Indian sub-continent there is probably no subject that has given rise to more speculation than that of how the Indus Civilization came into being, unless it be that of how and when it met its end. This article attempts a new look at the latter problem from outside the discipline of archeology.

When work on this article was started in 1961, discussions with a number of archeologists interested in the whole problem of the Indus Civilization led the author to believe that his views were entirely original if not positively unorthodox. Recent access to several reports in the fields of geology, paleontology and geomorphology has revealed that this is not the case. In 1956 M. R. Sahnî drew attention to the evidence for changes of level in the Indus Valley (Sahnî 1956:102-107) and suggested that these may have been a contributory cause of the end of certain of the Indus Civilization cities. More detailed references will be made to his opinion later.

In a recent article in this Journal (Raikes and Dyson 1961:270-278) some anticipatory doubt was expressed regarding the dating of both the Baluchistan peasant cultures and the Indus Civilization.

The Indus Civilization is generally referred to by archeologists as the Harappa Culture or civilization and its people as Harappans. These latter terms will be used throughout this article.

I. BRIEF SUMMARY OF PRESENT KNOWLEDGE

The origins of the culture are not known, nor what became of its people after the destruction or abandonment of its cities. It is believed by many that it was imported from outside the Indus Valley, perhaps from outside the sub-continent, but there is insufficient evidence to say whether it started as a result of a mass immigration of new people or of ideas brought in by a few and imposed upon an autochthonous population. It is even possible that it developed as a local culture without significant outside influence.

It is deduced that the Harappa culture was already flourishing at the time of Sargon of Akkad (Wheeler 1953) from the discovery in Sumerian levels of that time of steatite seals showing evidence of Harappan contacts or influence and from the discovery at Moenjo Daro of Sumerian-type cylinder seals. The date of this contact would be about 2350 B.C. and it is generally considered that the Harappa culture started in about 2500 B.C. (Wheeler 1961).

It is relevant to note that E. J. H. Mackay quotes recent (1938:7; 1948:147) discoveries by Dr. Frankfort at Tell Asmar in Iraq as indicating that the

upper Harappan levels of Moenjo Daro were probably contemporaneous with the Dynasty of Akkad, i.e. 2500 B.C. The depth at Moenjo Daro down to which cylinder seals of Sumerian origin or influence were found seems to correspond with the phase known as Intermediate II (Piggott 1948:28).

There is a mass of physical remains of the Harappa culture in Pakistan (including Baluchistan) and in India, but despite this very little is known about it. The script carved on the many stone seals has not been deciphered; there is little evidence regarding the ethnology of the population; and the religion of the people can only be guessed at.

We know that at one time or another the Harappa culture covered a vast area of the countries that are now Pakistan and India—an area bounded in the northeast by the Himalayas, in the southwest by the Arabian Sea, in the west by Baluchistan, extending in the east to as far as the Ganges-Jumna Doab, and in the southeast to Saurashtra in India. Most of the remains known at present are concentrated in the Indus Valley. While we know the approximate geographical extent of the culture, we are not necessarily entitled to assume that the whole of this area was occupied simultaneously. Indeed it is recognized that the southeastward extension into Saurashtra may have represented a later phase (Wheeler 1961:250) and other parts may have been occupied successively rather than simultaneously.

Excavations at Moenjo Daro, Harappa, Kot Diji and Chanhu Daro have revealed a very high level of material civilization, and the artifacts of all kinds—pottery, ornaments, bricks, weapons and implements of bronze and flint, seals, etc.—found in these excavations or on the surface at many other sites, show an extraordinary degree of uniformity. This uniformity extends both in time and space as evidenced by stratigraphy and geographical distribution. Taken in conjunction with the presently accepted estimates of the duration of the civilization, it suggests a high degree of authoritarianism, coupled with a degree of stagnation for which parallels would be hard to find (Piggott 1950:138–139).

The opinion has been expressed that the end of the civilization, or at least that of its principal cities, was due to invasion, perhaps by barbarians from the mountains of Baluchistan (Piggott 1950:214–242). At one time there was a general tendency to equate these invaders with the first raiding bands of Aryans whose exploits are sung in the Rigveda (Piggott 1950:244–248). There is still support for this view (Wheeler 1961:249). Recently some support has developed for the view that some time may have elapsed between the end of the Harappa culture and the coming of the Aryans. But whatever the cause, the date of the end of the Harappan occupation of the principal cities has been put at about 1500 B.C. (Wheeler 1953:89; 1961:243). Although identification of Moenjo Daro and Harappa (particularly the latter) with the fortified cities referred to in the Rigveda is no longer generally accepted, the effect of such earlier identification seems to have persisted and may have influenced more recent thinking in the direction of accepting a long duration for the cities.

II. EXISTING OPINION OPEN TO DOUBT

That Moenjo Daro and Harappa ceased to be occupied by Harappans is certain and that the end was comparatively sudden seems well established. The inference, however, drawn from a comparatively small number of skeletons of men who appear to have died violently, that the end of the civilization was due to invasion is surely too sweeping. The men whose skeletons have been found undoubtedly died violent deaths and their deaths occurred at about the end of the Harappan occupation, but it does not follow that they were killed by invaders who overthrew the whole civilization. The small number of skeletons would be equally explicable in terms of rioting or civil commotion of the kind that has characterized social revolution throughout history. There are no doubt other possible explanations such as minor fights between factions or a minor and localized raid by barbarians from the mountains or elsewhere. In fact, we do not know the cause of these deaths, whether they were connected with the end of the city, or, if they were so connected, whether they are direct evidence of the end itself or merely secondary symptoms of some other and quite different reason for its downfall. For some reason or reasons a civilization that had endured apparently for centuries disintegrated at Moenjo Daro. If it was overthrown by invaders, by civil dissension, by marauding attacks from the hills, it still remains to explain why it should have been unable to resist attack or to police itself.

Before considering possible reasons for the end of the Harappa culture or what may have contributed to it other than those already advanced by archeologists, it is worth considering more fully the stagnation referred to earlier. This stagnation, for which the case rests on an attested uniformity of material coupled with an unproved duration, is hard to believe. It is as if the material culture of France had remained unchanged in its minutiae from the time of Charlemagne to the French Revolution; or that of England from before the Norman Conquest until the Industrial Revolution. Its acceptance really depends on acceptance of the estimates of duration. If the evidence on which the latter have been based can be interpreted in terms of a shorter duration, we would no longer have to believe simultaneously in a stagnation of ideas and in creative vigor: for creative vigor there must have been, to account for the founding of an enormous empire and its several reconstructions from nothing. The whole picture of Moenjo Daro would become more credible if it could be shown that occupation of the site was for a much shorter period.

That the possibility exists of a shorter occupation of Moenjo Daro by the Harappans is implicit in the fact already noted that Harappan-Sumerian contacts were assigned by Mackay to the upper and, therefore, later Harappan levels at Moenjo Daro (Mackay 1938:7). With this evidence there seems to be a *prima facie* case on archeological grounds alone for a very much earlier final date of Harappan occupation at Moenjo Daro.

Whatever the length of occupation and whether there was stagnation or not, it remains to be explained, as noted earlier, why the city should have

become fairly rapidly weakened to the point when it was unable to resist attack or to police itself. There are many possible reasons. There may conceivably have been a succession of years during which the annual Indus flood did not suffice for the food-growing needs of the people, but, the Indus flood being largely snow-fed from the Himalayas, this is unlikely; there may have been an epidemic, though in this case we would expect to find evidence of it in the form of hurried mass burials; there may have been social and moral degeneration, though if there were, the practically unchanging styles of building, art, utensils and the like existing until close to the end would indicate that it occurred with an extraordinary and unlikely rapidity which would itself require explaining; the "empire," like others since its time, may have become unwieldy and splintered; there may have been difficulty in obtaining the equivalents of modern strategic raw materials, particularly copper and tin.

None of these reasons has, as far as is known, the support of archeologists and none except the first two would be a sufficient explanation by itself; and there is no evidence for them. In regard to the others, one asks: Why did degeneration occur? Why would the unwieldiness of the empire of itself hasten the end? Why should raw materials have become difficult to obtain?

Before considering the answers to these questions and the explanation put forward for the sudden weakening of a powerful and well-organized civilization, let us reconsider the evidence for a long duration.

III. REVIEW OF PRESENT EVIDENCE FOR DATING OF HARAPPAN CULTURE

Archeological evidence in the form of accurate stratigraphy is lacking as regards the end of the culture. Nothing comparable with the Harappa-Sumeria link in about 2350 B.C. exists to date the more recent Harappa levels at Moenjo Daro (unless indeed that link relates, as Mackay has suggested, rather to the end of the Harappan occupation of Moenjo Daro than to the beginning).

The evidence, such as it is, is mainly indirect. It can be summed up briefly as follows: Excavation at Moenjo Daro showed as many as seven Harappan occupation levels, some of them separated by layers of flood silt. Consideration of the infrequency of catastrophic floods that could bury a whole city under as much as six feet of silt and over-liberal estimates of the time required to rebuild, when taken in conjunction with the original tendency to think of the end of the culture as coinciding with the arrival of the Aryans, has supported the belief in a long occupation of the site. It has been recognized from the outset that accumulation of silt was not confined to the four periods revealed by the only recorded stratigraphy (Piggott 1948:28) and marked on the published section as "flood silt." Sir John Marshall, who carried out the original excavations at Moenjo Daro wrote: "the way in which the river has spread its alluvium over the whole expanse of plain is well demonstrated by the discovery of ancient brick remains nearly 30 feet below the present surface . . ." (Marshall 1931, vol. 1:7).

The basic assumption has been, in effect, that this silt was deposited by floods; that 30 feet of silt and seven rebuildings, which corresponded with

seven inundations by floods, must have required the agency of very exceptional and, therefore, very infrequent floods; and that all this required a very long time.

The estimate of a long duration for the Harappa Culture as a whole has been lent support by the discovery of settlements of the culture in Saurashtra where, as Wheeler remarks (Wheeler 1961), the typical Harappan ware is found sometimes mixed with the black-and-red ware typical of the latter period in Indian prehistory.

IV. CRITICAL EXAMINATION OF THE PRESENT EVIDENCE

Before examining the basic assumption just referred to, we should consider in passing the evidence from Saurashtra. The mixture of wares may be an indication of the coexistence of the final phase of the Harappa Culture and of the initial phase of the black-and-red ware, but it is not absolutely conclusive, nor, for that matter, is the date of the initial phase of the black-and-red ware. The existence of a sterile layer in a mound or buried settlement separating two distinct cultures is positive evidence of an interval of time between the end of one and the beginning of the other. No accident of nature could cause the existence of a sterile layer separating two distinct cultures that were, in fact, coexistent. An apparent mixture of cultures, however, can be explained in several ways and need not be positive evidence that the cultures coexisted. For instance, the use by a succeeding culture of collapsed mud-brick material mixed with potsherds of an earlier culture may, when the buildings erected by the latter collapse in their turn, result in an apparent mixture of the two types of pottery etc., even though there may have been some centuries during which the site was abandoned.

Returning to the basic assumption referred to above, it is necessary first to define the terms used. A *flood* in this context is taken to mean abnormal river flow at such a rate of discharge that the capacity of the river bed is exceeded so that excess flow has to be accommodated by the flood plain. *Silt* is solid matter carried in suspension by the river and comprises particles of clay, true silt, and even fine sand when the velocity of flow is high enough. Generally speaking, the excess flow would, except locally, move very slowly in the general direction of flow of the river. Only in the original channel would consistently high velocities be experienced. Over the flood plain the velocity would be low and would depend on the gradient, the depth, and the roughness. Of these factors the depth would be most subject to variation. In a river such as the Indus, variations in gradient and roughness would be marginal. Even at a depth of only one foot of flood plain flow, and even at the remarkably flat gradient of the Indus Valley, there would be an appreciable velocity, though it might be low enough to ensure that some of the suspended silt would be dropped.

It is just conceivable that a combination of high discharge, exceptionally long duration, and little variation of the high discharge rate might deposit silt uniformly and to a depth even as great as two or three feet, but it is un-

likely. For such an exceptional concatenation of conditions to occur seven times is even more unlikely.

Obviously, a long investigation into the prehistoric silting regime would be an unrewarding occupation; it would have to depend on so many assumptions, all incapable of verification, that the results of the investigation could hardly fail to be misleading. Fortunately we do not need to go to so much trouble in order to cast doubt on whether floods, in the sense defined earlier, caused the inundations of Moenjo Daro.

These inundations have caused a general rise in the level of the Indus flood plain that has buried the earlier Harappan levels under at least 30 feet of silt. The lowest level explored so far does not necessarily go back to the earliest occupations of Moenjo Daro, but it does not make much difference to the present argument whether this level is dated to 2500 B.C. or somewhat later. The topmost Harappan occupation level coincides approximately with the flood plain level so far as the "lower and outlying parts of the city" (Marshall 1931, vol. 1:1) are concerned; this is of course the most recent Harappan level, that which corresponds most closely with the end of the culture. Taking the archeologists' estimate of approximately 1000 years duration, a very strange fact emerges: during 1000 years of occupation of the city, 30 feet of silt were deposited; during the subsequent nearly 3500 years, no further silt has been deposited. It is even possible that there has been some lowering, by erosion, of the flood plain during this second much longer period. Clearly there is an anomaly here that cannot be simply explained in terms of abnormal floods, however irregular their occurrence.

For flooding to continue to be tenable as a cause of the inundations of Moenjo Daro, it would be necessary to suppose that the flood regime of the Indus underwent an enormous and extremely sudden change at the end of the Harappan occupation of the site. The flood regime of the Indus, being dependent largely on snowfall and snowmelt in the Himalayas, is for that very reason independent of local climatic variations in the plains; for the snowmelt pattern of the Himalayas to change, it would be necessary to postulate a major and sudden climatic change which could hardly have been confined merely to the Indian sub-continent and of which there is no conclusive evidence from other parts of the world. In any case there is no reason to suppose that a sudden change in the flow regime did occur, for, despite man's control of the Indus by barrages and in other ways in recent years, the river is still every so often liable to large floods. It is relevant to note that these floods, in spite of much evidence of greatly increased soil erosion in the headwaters (and therefore of a probably higher silt load), do not cause sudden significant changes in the flood plain level.

One of the premises, on which has been based the estimate of a long occupation of Moenjo Daro, may therefore be entirely false, and it follows that the estimate itself may be wrong. The city may have been occupied for 1000 years; it may, on the other hand, have been occupied for as little as a century or two. In the latter case, the question of stagnation would not arise.

V. NEED FOR RECONSIDERATION OF DATING

Unless, therefore, convincing archeological evidence can be adduced in favor of a very long occupation, the question of Harappan dating will require careful reconsideration. Since much of the very tentative dating of southern Baluchistan cultures is dependent on contacts with the Harappa culture, this will also require re-examination.

It is suggested that there does not exist an imperative need to account for continuous occupation of the areas of Pakistan and India in which the Harappa culture flourished. While there is evidence that Harappa immediately succeeded the Amri and Kotdiji cultures at those sites, there is as yet no conclusive evidence that the Jhukar culture immediately succeeded Harappa either at the type-site or at Chanhudaro (Piggott 1950:222); and, while there may be some evidence at Lothal and Rojdi (in the Saurashtrian area previously referred to) that the Harappa culture was immediately succeeded by the producers of black-and-red ware, at Rangpur in the same district the evidence is of a break between the cultures (Wheeler 1961:250).

VI. NEW EVIDENCE FOR THE END OF THE HARAPPA CULTURE

As has already been noted earlier (Sahni 1956:102-107), the possibility of changes of level has been put forward as a contributory cause of the end of certain cities of the Harappa culture. Sahni, in the publication referred to, drew attention to the occurrence in 1819 near Hyderabad, Sind, of a sudden local uplift of part of the flood plain of the Indus causing flooding of about 2,000 square miles which endured for about two years. This uplift of a strip of land about 50 miles long, on an average about 15 miles wide, to an average height of some 15 feet above the flood plain, occurred apparently as a result of an earthquake (or perhaps one should say its appearance was the cause of the earthquake). Such an occurrence near Moenjo Daro could very easily have accounted for the still-water flood conditions necessary to explain the great depth of silt.

Sahni refers to evidence in the Indus delta of both uplift and settlement and affirms his belief that major tectonic movements may have partially accounted for the end of some of the Harappan cities. He prefers, however, to ascribe the flooding of Moenjo Daro to the bursting of temporary natural dams in the Indus headwaters, even though such flooding would probably not have accounted for the silt deposits at Moenjo Daro without local uplift to cause ponding; and if there were uplift it would not need exceptional river flow to cause ponding. Collateral evidence comes from Baluchistan and is both geological and archeological.

During the winter of 1960/61 an expedition from the University of Pennsylvania discovered a site of the Harappa culture at Sotka Koh near Pasni on the Mekran coast (Dales¹ 1962:86). Almost simultaneously, and quite independently, the author discovered another site of the Harappa culture at Bala Kot near Sonmiani about 50 miles from Karachi on the way to Bela. One other

coastal site, that known as Suktagen Dor (Stein 1931:60), had already been known as a site of the Harappa culture. It is situated at the extreme southwest corner of Baluchistan practically at the Iranian frontier, and has always been something of a mystery because of its great distance from most of the other known sites of the culture. These three sites, all of which are now at some distance from the sea both vertically and horizontally, suggested the idea of a chain of coastal sites westward from Karachi where, in the hinterland a few miles to the north of the city, another site, said to have Harappan affinities, exists at Mango Pir.

Study of the available records shows that the southern part of the Indus Valley flood plain, roughly that part from Amri and Chanhu Daro to the mouth, contains no identified Harappan sites despite very extensive search (Majumdar 1934). The same absence of recorded Harappan sites marks the whole of the Las Bela plain from near the little town of Bela to the sea. The known sites of the Harappa culture from Amri to Karachi follow the extreme edge of the foothills of the Kirthar range, comprising such sites as Tharro hill, or are situated at short distances from the plain along one or the other of the small rivers draining that range.

Examination of the aerial photographs of the Mekran coast shows raised prehistoric beaches at various points running approximately parallel with the present beach line. These beaches are particularly visible in the neighborhood of Gwadar and Ormara, and it is possible to distinguish about ten of them. These prehistoric beach lines are evidence that at some period in the past the level of the sea was higher in relation to the land, or that since that time the level of the land has risen relative to that of the sea. This upward movement of the coast relative to the sea may have occurred hundreds of thousands of years ago or merely a few thousand years, and it must be admitted that some of the geologists consulted on the subject tend to think in terms of hundreds of thousands of years. This may be due to what appears to be a certain reluctance on the part of some geologists to consider anything more recent than about 20,000 years old as geology. Evidence will be quoted later in support of recent uplift.

The map reproduced as Fig. 1 shows the distribution of known Harappa sites. The area shaded with diagonal lines on the map represents those parts of the coastal strip and of the Indus and Bela plains that could have been under the sea at the time of the Harappa culture, if the changes in coastal level took place after that time.

There is nothing particularly original about the idea that the Harappa culture made use of waterways such as the Indus as main highways for commerce, and the possibility of coastwise trade has long been recognised. The map, however, gives it a new emphasis because, assuming a coastline approximating that shown, practically all of the sites of the Harappa culture would have been on a sea or river. An exception might have been Judeir jo Daro, north of the modern Jacobabad, but there is at least a possibility that changes of ground level and a higher water table might have caused the reappearance of

the combined perennial flows of the many small rivers draining through the Kacchi plain at the south end of that plain. Today the waters of the Nari, Bolan, Mula etc. disappear underground soon after reaching the plain, but they contribute to a water table which is even today only 40 feet or so below the surface at Judeir jo Daro. The coastal sites in Baluchistan are all situated on what are still important caravan routes into the interior.

The foregoing may be considered as constituting an archeological case for changes in the coastline due to changes of level (in this case uplift) along the coast and in the lower Indus Valley. The evidence may not be entirely convincing, but an expanse of sea where there is now dry land, in the areas shown in Fig. 1, would immediately explain the otherwise rather strange distribution of Harappa sites.

As regards geological evidence, it has been suggested that some at least of the prehistoric beaches are the result of recent coastal uplift (Asrar Ullah 1953:4-5; Moh'd Ismail Siddiqi 1953:2, 3, 5; 1956:5, 31, 32; Sahni 1956:101-107; Harrison 1941:12; Pendse 1946:144; Snead:²). Asrar Ullah in particular equates some of the raised beaches with gravel terraces found in the inland valleys. He refers to five terraces in one particular valley which he interprets as marking intervals of rest between periods of movement affecting land and sea levels, the whole process of movement having occupied a comparatively short time. He bases his opinion of a short duration for this period of movement on the fact that none of the terraces show any signs of having completed an erosion cycle.

In the intermontane valley of Ornach, there is possibly corroborative evidence of a recent date for the movements that resulted in the formation of these terraces. The site of Nindowari, having Harappan affinities (de Cardi 1959:24), is now situated, together with what appear to be ancient terraced fields that may have been associated with it, some 25 to 30 feet above the level of the perennial Kud river. Similar conditions apply to at least two other sites of the chalcolithic period or earlier. The site, however, of the Londo culture (de Cardi 1951) at Shori Damb is situated only just above the bed level of the Turkbar Nala and the same applies to at least one other site of the Londo culture in the Ornach valley. It appears possible that the site at Nindowari was isolated from its former water supply by down-cutting whereas some sites of the Londo culture do not appear to have suffered in the same way. The little mound of Kulli (Londo culture), a mile or so upstream of Nindowari, appears at first sight to contradict this statement, as it is situated on the gravel terrace at much the same height above the river as in the case of Nindowari. However, there are no ancient terraced fields around Kulli, and it is probable that its inhabitants cultivated the existing alluvial flat, below the gravel terrace, which is at present river level. Down-cutting is a phenomenon for which several explanations can be offered, but in view of Asrar Ullah's opinion, it seems most probable that at Ornach it was due to local uplift near the outlet of the valley. The Londo culture has been tentatively dated to 1200 B.C. (de Cardi 1951)

MAP SHOWING PRINCIPAL SITES OF INDUS CIVILISATION AND OF CULTURES HAVING INDUS CONTACTS

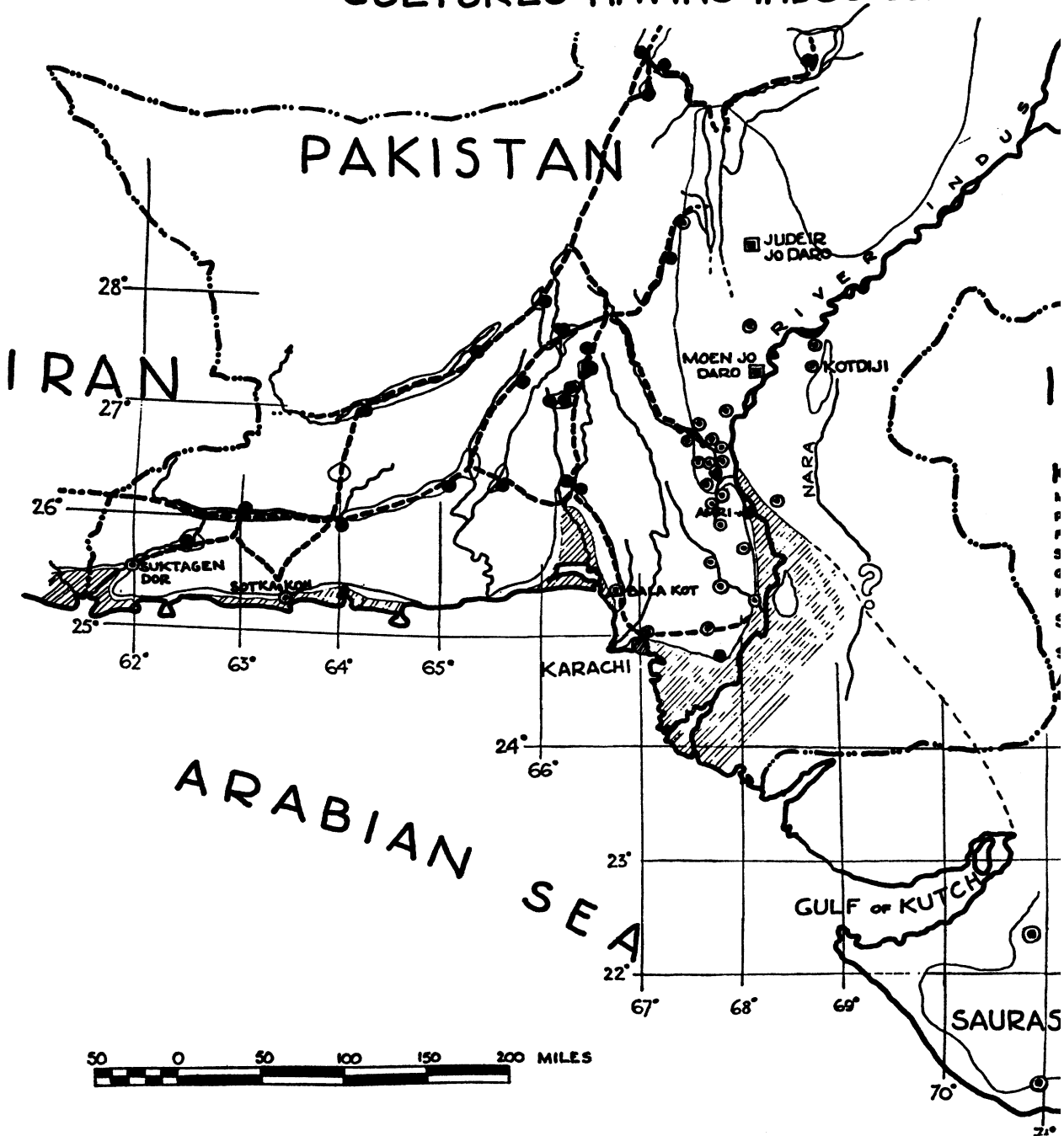


Fig. 1

SATION

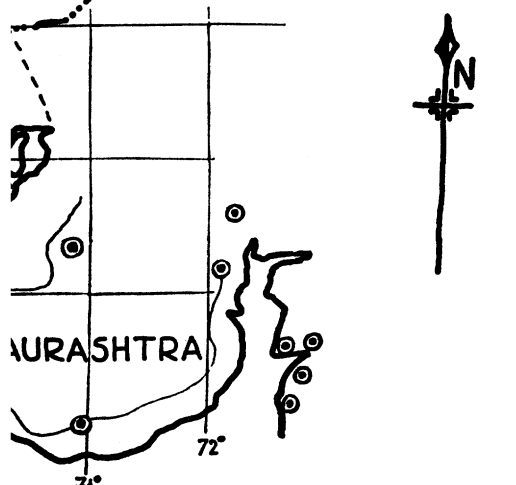
ACTS



INDIA

KEY

- MODERN INTERNATIONAL BOUNDARY ————
- PRINCIPAL TRADITIONAL CARAVAN ROUTES - - - - -
- PERENNIAL RIVERS ~~~~~
- SEASONAL TORRENTS ~~~~~
- GROUND ABOVE ABOUT 300' A.M.S.L. ~~~~~
- INTERMONTANE AREAS OF CULTIVATION ~~~~~
- SITES OF INDUS CIVILISATION
 - MAJOR (square with circle)
 - MINOR (circle)
- SITES HAVING INDUS CONTACTS (circle with dot)
- AREAS POSSIBLY UNDER THE SEA IN 3RD & 2ND MILLENNIA B.C. (hatched area)



while Nindowari must have been occupied during at least some part of the Harappan occupation in the plains and probably during an early phase (de Cardi 1959:24). It seems reasonable, therefore, to infer that uplift occurred sometime during the occupation of Nindowari by Harappans or by people who were in contact with Harappa and before the arrival of the people responsible for the Londo culture; it is tempting to infer that the uplift and consequent isolation of Nindowari from its source of water was the principle cause for the abandonment of that site. It is also probable that uplift of this magnitude would have been accompanied by earthquake shocks that would in any case have destroyed Nindowari.

Apart from a few Carbon-14 datings of material from sites near Quetta further to the North (to the early part of the third millennium B.C.) the dating of the peasant chalcolithic cultures of Baluchistan depends partly on Harappan contacts and partly on typological similarities with peasant cultures in Iran. The question of relative dating of such Baluchistan cultures as Nal, Kulli, Togau, etc. is still an open one, but, for Baluchistan in general, there has been a tendency (Piggott 1950) to consider that the end of these cultures, or, at any rate, of the later ones, coincided with a "time of troubles" that occurred at about the time of the end of the Harappa civilization. They are, therefore, believed to have survived until perhaps as late as 1500 B.C. As their affinities with Iran in some cases go back well into the third millennium B.C. or even earlier, their ending in about 1500 B.C. argues a very long occupation or sequence of occupations in the mountains. This is difficult to accept (for the same reasons as stated before for Moenjo Daro) when one considers the excellence of the fabric and decoration of, for instance, Nal pottery. It is almost impossible to believe that this very beautiful pottery was produced with little significant change for generation after generation, in virtual isolation in the mountains.

On the whole it seems to fit in much better with archeological evidence and with that of geology to hypothesize that these peasant cultures in the hills came to a fairly sudden end due to the same causes that destroyed Moenjo Daro, and that a fairly early date, perhaps even as early as 2300 B.C., should be considered for this period of tectonic activity. The evidence cited (Piggott 1950) of layers of burning at many chalcolithic sites in Baluchistan and tentatively explained as being due to the arrival of invaders possibly from the West is equally explicable in terms of earthquake damage. Much of the loss of life in the earthquake that devastated Quetta and some of its neighboring villages in 1935 was due to fire. Inflammable roofing material fell onto the fires that, in winter, are kept burning, all the time and, at other seasons, most of the time. There does not seem to be any convincing reason why between say 2300 B.C. and 1100 B.C. the whole of Baluchistan should not have been virtually abandoned, the peasant populations having reverted to nomadic life as a result of natural disasters. In support of this could be cited the present semi-nomadic population of the area who use little in the way of materials that will survive to interest the archeologist of the future.

VII. CONCLUSIONS

It would be impertinent for a layman to assert that the archeologists who have studied this problem are mistaken in their deductions. The substitution of one explanation for the inundation of Moenjo Daro by another does not of itself invalidate presently accepted estimates of the duration of the Harappa culture. The uplift and associated earth movements to which the destruction of the culture, and of the Baluchistan peasant cultures, may be attributable may as well have occurred in about 1500 B.C. as at a much earlier date.

It is, however, suggested that the archeologists *may* be wrong and that the whole subject merits fresh study and a new approach. Whatever may be the verdict on purely archeological grounds, it must be accepted that the hitherto accepted interpretation of the geo-morphological evidence is open, at the very least, to grave doubts.

Any new approach, therefore, should not be hampered by the present belief that geomorphological evidence requires a long duration of the culture.

Work currently being carried out in Baluchistan and recently completed in Sind⁸ is expected to throw light on the beginnings of the Harappa culture, its relationship to the Baluchistan Peasant Cultures, and on the sequence of the latter. A fairly precise relative chronology, therefore, for Harappa beginnings may soon be available. The question of how and when it ended is still unresolved.

If the views put forward in this paper are accepted, we have immediately a logical and easily understood explanation of how at least part of the Harappa culture met its end: the part represented by the sites of the culture in Sind and Baluchistan. Uplift, almost certainly accompanied by more or less violent earthquake shocks, would not only have caused destruction of cities and settlements but would have disrupted the system of river and coastwise communications on which the commercial life of the culture must have largely depended. Damage to the cities and settlements in the Indus Valley would have been due rather to flooding than to the shocks.

Instead of the apparent stagnation of the culture, we would have to accept rather a dogged determination and a creative energy sufficient to account for seven rebuildings of Moenjo Daro. A stage would have been reached when the people, deprived of their sea communications with the outside world and with Baluchistan, would have had to resort to the difficult caravan routes through the hills of Baluchistan. Finally, a point would have been reached when it would no longer have been considered worth the trouble and expense of rebuilding in Sind. The possibility is at least worth consideration that, towards the end of the occupation of Moenjo Daro, it was decided to move the capital to Harappa. For the idea of successive capitals is surely more acceptable than that of twin capitals. At the same time a part of the culture may well have migrated to Saurashtra.

As the successive destructions of Moenjo Daro may have all occurred within a short span of years, as the evidence of Asrar Ullah seems to suggest,

the difference in time between the occupation of Moenjo Daro and Harappa may well be too short to be detectable by Carbon 14 tests: and the same may apply in the case of Saurashtra settlements. One must also bear in mind the possibility that Harappa was occupied before Moenjo Daro.

At a later stage (and no one, on the basis of present evidence, could guess how much later) the group of settlements centered on Harappa itself, most of which are in the flood plain of the now dry Ghaggar River, may have been evacuated in favor of new settlements such as Rupar towards the Ganges-Jumna Doab, due, perhaps, to the drying up of the Ghaggar.

In the mountains of Baluchistan, much the same sequence of events may have occurred except that in the rigorous living conditions there, with the much greater difficulty of mass migration through waterless, inhospitable, mountain desert, the disasters may have led to the extinction of the cultures. This could have been due in part to exhaustion of their own resources and in part to the sudden removal of the "colonial" cultural influence of the Harappans. In isolation, and weakened by natural disasters, the population may have decreased fairly rapidly, leaving Baluchistan peopled, if at all, by semi-nomads eking out a precarious existence around the ruins of their former civilization.

All such ideas must remain, for the present, pure speculation; they represent, in any case, only some of many possible explanations.

It may be considered an impertinence for someone who is not an archaeologist to suggest specific points towards which research might be directed, and such suggestions are put forward, therefore, with diffidence. For what they are worth they are: precise dating of the earliest black-and-red ware levels in Saurashtra sites; the enormous time gap at present accepted between Iranian chalcolithic prototypes and their typological descendents in Baluchistan; the possibility of successive occupation of the various groups of Harappan sites, (Sind and Baluchistan, Punjab, Ganges-Jumna Doab, Saurashtra); and new excavations at Moenjo Daro and one of the Mekran coastal sites directed at finding dating evidence for the later levels.

At the same time, study of certain hitherto neglected sites in Baluchistan might be profitable. In the tracts of Wadh and Ornach there are at least three sites,⁴ characterised by a prolific microlithic flint industry; a stone hut was found at one and (on the surface at least) a very few potsherds of an indeterminate nature. It is just possible that these may represent settlements of the degenerate chalcolithic peasant cultures during the "dark ages" that may have preceded the arrival of the Londo culture. It is perhaps more likely that these settlements antedated the chalcolithic settlements⁵; either way they are of interest.

An attempt has been made to show that the evidence of geomorphology and hydrological engineering supports the claim of a short duration of the Harappa culture whose end was encompassed in a way different from that hitherto accepted. So far as is known, the purely archeological evidence is not inconsistent with this view. It is hoped that the possibility of a short duration will be

treated with at least as much respect as has been accorded so far to the evidence of a long duration, bearing in mind that the non-archeological evidence for the latter must now be treated as, at best, suspect.

NOTES

¹ This article owes its existence to the encouragement given to the author by Professor Dales and its present form to the generous and friendly advice of the editorial staff.

² For much extremely valuable information in these fields the author is indebted to Mr. Rodman B. Snead, now Assistant Professor of Geography at Clark University, Worcester, Mass. who carried out in 1960-1961 a study of the Physical Geography of the Las Bela coastal plan for the Institute of Coastal Studies of the University of Louisiana. He has very kindly made available for study the relevant parts of his forthcoming publication on the subject.

³ Excavations were carried out from 1959-1963 at Amri in Sind under Prof. J.-M. Casal by "La Mission Archéologique Française de l'Indus" with the object of establishing, among other things, relationship of the Amri Culture to Harappa. During the past season (1962-1963) Prof. Casal has been excavating at Nindowari in the Ornach Valley with the object of establishing the relationship between Baluchistan Chalcolithic Cultures and Harappa.

⁴ Karez dam first reported by the author in 1956 and Hurro dam found by him in 1961 are both in Ornach Valley. Bandu dam in the Wadh tract is the site referred to by Sir Aurel Stein as Abdul-But (Stein 1931:174).

⁵ Miss de Cardi, writing of Nindowari and Kinneru Mounds in Ornach, mentioned the lack of the usual Harappa shell or clay bangles. The author, in 1961, picked up on Karez dam near Kinneru part of a shell bangle. If, as is possible, Karez dam was already an antiquity when Kinneru was occupied by Harappans or by people with Harappan affinities, it is tempting to surmise that perhaps Miss de Cardi was not the first lady archeologist to be interested in Karez dam.

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