

A SURVEY OF ANCIENT SITES ALONG THE "LOST" SARASVATI RIVER

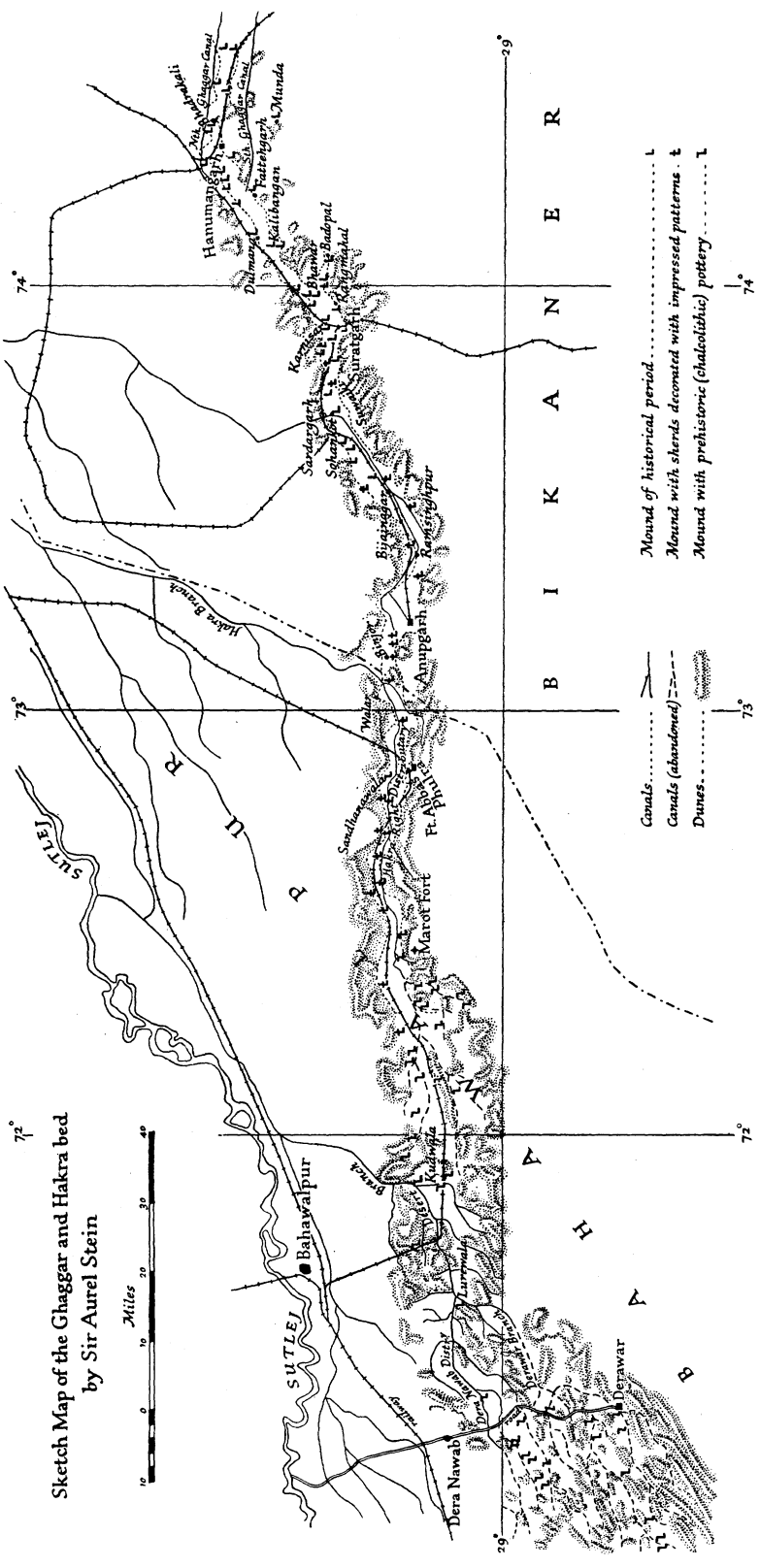
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ON my return to India from the explorations of 1938-39 along the Roman frontier defences of 'Iraq and Transjordan, a survey of any remains of ancient occupation along the dry river-bed of the Ghaggar or Hakra, which passes from the easternmost Panjab through the States of Bikaner and Bahawalpur down to Sind, seemed attractive. Traditional Indian belief recognizes in this well-marked bed the course of the sacred Sarasvati, once carrying its abundant waters down to the ocean and since antiquity "lost" in desert sands. There is no history of this great physical change. My Central Asian expeditions had shown me that where rivers have long ago ceased to carry their life-giving water, the chronology of important physical changes, as marked by remains of human occupation since prehistoric times, can be traced more easily than is possible elsewhere.

The climate of the Indian Desert, dry enough nowadays, is far removed from that extreme aridity of that true desert which in Chinese Turkistan has allowed relics of ancient life to survive in such remarkable preservation. But observation of topographical features along extensive stretches of that dry river bed, locally still well known, and the study of old sites on its banks, might throw some light on the period when water permitted there continuous agriculture and thus, perhaps, on the chronology of the process which led to water ceasing to flow in the bed. Any such indications would bear on the much discussed question of desiccation in Asia. Indirectly they might also be helpful to the student of early Indian history, still so much obscured by the want of reliable records and the inadequacy of archaeological evidence.

A tour in Kashmir in the autumn of 1940 did not allow me to start field work in Bikaner until the middle of December. The Political Department of the Indian Government helped to secure very generous arrangements for the survey from Maharaja Ganga Singhji, that remarkable ruler of the Bikaner State. Field work promptly started enabled me within less than six weeks to examine the large series of ancient mounds along the Ghaggar within Bikaner territory over a total distance of some 110 miles and to test two interesting sites by trial excavation. Proceeding thence through Jodhpur and Jaisalmer in Western Rajputana, the State of Bahawalpur in the Panjab was reached at its southern extremity. Thanks to the support kindly accorded by the Hon. C. P. Skrine, O.B.E., Resident for the Panjab States, very effective help was received here also from the State authorities, in particular from Mr. E. Anderson, C.I.E., Minister of Public Works and Irrigation, and Mr. H. Trevelyan, I.C.S., Deputy Commissioner. Within Bahawalpur territory still more numerous ancient sites, mainly prehistoric, were traced and surveyed for some 150 miles along the dry bed of the Hakra, as the continuation of the Ghaggar is known here, from the Bikaner border down to its deltaic portion below Derawar. Heat stopped field work by the middle of March.

Throughout the tour I was assisted on the topographical side by Surveyor Muhammad Ayub Khan, late of the Survey of India, my old travel com-



72°
 Sketch Map of the Ghaggar and Hakra bed
 by Sir Aurel Stein



- Canals.....
- Canals (abandoned).....
- Dunes.....
- Mound of historical period.....
- Mound with sherds decorated with impressed patterns. t
- Mound with prehistoric (chalcolithic) pottery.....

B I K A N E R

72° 73° 74°

29° 39°

panion on successive journeys in Iran. After leaving Bikaner willing help was afforded also on the archaeological side by Mr. Krishna Deva, a young scholar attached to the Archaeological Survey of India. Rao Bahadur K. N. Dikshit, its present Director-General, had before shown a very helpful interest in the object of the tour by a spontaneous offer of a grant of the Department towards its expenses. A detailed report has been prepared and will be published among the *Memoirs of the Archaeological Survey of India*.

The Ghaggar and its several affluents rise as torrent beds in the Siwaliks that fringe the outermost of the Himalayan ranges. After passing down to the Ambala district, they soon cease to be perennial streams. The easternmost, still known as the Sarsuti (the Hindi derivative of Sarasvati), passes the sacred sites of Kurukshetra near Thanesar, a place of Hindu pilgrimage; it is for the most part of the year only a modest rivulet. Farther down, some 50 miles below the town of Ambala, when the Ghaggar has gathered all its tributaries and has entered Patiala territory, it flows in its wide sandy bed for only some months. Where it approaches the Bikaner border, after passing through Patiala territory and the western portion of the Hissar district, the reservoir of Otu was constructed some forty years ago, with a weir to hold up flood water for feeding two small canals in Bikaner territory. But these suffice to irrigate only very narrow belts of land on either side of the Ghaggar for some 30 miles westwards, the available water each year varying greatly with the monsoon rainfall. The area thus irrigated down to near the small town of Hanumangarh forms even in good years but a small portion of the land shown by revenue records as cultivable within the *Tahsil*; what little water is left in the Ghaggar itself suffices only for a still smaller portion of ground in its bed. Its flow has stopped in most years above Hanumangarh; rarely is it known to have extended so far as 16 miles below.

The sketch-map based on the latest survey shows how great is the contrast between the very scanty volume of water brought down by the Ghaggar and the width of its dry bed within Bikaner territory; over more than 100 miles it is nowhere less than 2 miles and in places 4 miles or more. This bed is lined on both sides by dunes varying in height but gathered into continuous bands or ridges. Seen from a distance these might suggest river banks, but they show no marks of erosion.

Their interpretation was taught me in the Taklamakan and Lop deserts of the Tarim basin, where the river beds, whether still receiving some water or dead for ages, are always flanked by continuous ridges of high dunes. The wind-borne sand from adjacent deserts is stopped by the vegetation growing in riverine belts once reached by seasonal inundation. The gradually rising accumulation of drift-sand, usually protected by some growth of scrub, has prevented the onward move of fresh dunes and thus preserved the dry beds from being smothered. Exactly the same was often seen in the Tarim basin along the edges of cultivated ground, whether still tilled or abandoned for ages.

Within the riverine belt clearly marked by these high marginal ridges of sand the Ghaggar once carried its shifting course; but there is no reason to assume that it ever filled it completely. The bed shows a firm loamy soil, easily distinguished from the light sand on either side. Whenever it receives

adequate moisture it proves very fertile. The striking appearance of the marginal ridges, helped by this difference of the soil, accounts for the popular belief that the bed of the Ghaggar was once the course of a mighty river filling it completely. Both on the Ghaggar and its continuation the Hakra, I found this notion reflected in popular legends.

The scanty and very irregular rainfall lower down the Ghaggar is determined almost solely by the monsoon and subject to extreme variations. At the Bikaner Observatory for the thirty-five years 1879-1913 the annual average was 10.93 inches, yet that period included years as low as 5.80, 3.40, and 1.14 inches. Where irrigation by canals is not available the uncertainty of crops makes the rural population dependent largely upon a pastoral livelihood, and even this is precarious in years when wells and tanks dry up.

The special interest of the Ghaggar or Hakra arises from the fact that traditional belief recognizes in that dry bed the terminal course of the Sarasvati river mentioned in many hymns of the "Rigveda," the oldest surviving record in any Indo-European language. In later Vedic texts it certainly bears the character of a sacred river which attaches to the present *Sarasvati* in the classical Sanskrit literature and religious tradition of India. In at least three passages of the Rigveda mentioning the Sarasvati, a river corresponding to the present Sarsuti and Ghaggar is meant. For this we have conclusive evidence in the famous hymn, the "Praise of the rivers" (*Nadistuti*) which, with a precision unfortunately quite exceptional in Vedic texts, enumerates the *Sarasvati* correctly between the *Yamuna* (Jumna) in the east and the *Sutudri* or *Sutlej* in the west.¹ In a much larger number of passages of the Rigveda the Sarasvati is referred to as "the foremost of rivers," as flowing into the ocean, and otherwise extolled for its greatness in a way which seems difficult to reconcile with the Sarsuti and Ghaggar of the present day.² This difficulty induced Professor R. von Roth to recognize the Sindhu or Indus in the great river of these passages, and in this he has been followed by other scholars. The survey briefly described below may, perhaps, help to remove some of the doubts raised by that apparent discrepancy.

Taking first the Ghaggar bed above Hanumangarh, one notes that the number of mounds marking ancient sites long abandoned is here distinctly smaller than farther down the old river bed. Such mounds, known locally by the terms *ther* or *theri* (in the case of the smaller ones) are bare of all vegetation and covered with pieces of broken pottery; these mark prolonged occupation before the sites were abandoned. The long erosion by wind and rain has gradually brought to the surface sherds dropped at different times and embedded in varying levels. This thick cover of sherds makes these ancient mounds easily recognizable from a distance and well known to the people. It is not found where occupation has continued down to recent times or has been resumed later.

¹ For the list of rivers between the Ganges and the Indus, given in due geographical order, see my paper "On some river names in the Rigveda," *Journal of the Royal Asiatic Society*, 1917, 91-99.

² A careful synopsis of all Vedic passages which mention the Sarasvati and of the different views held by Indologists on their interpretation, is presented by Professors Macdonell and Keith, 'Vedic index of names and subjects,' ii. pp. 434 ff.

Such mounds are more numerous lower down the Ghaggar than near and above Hanumangarh, and also, I have reason to believe, farther up within the Hissar district; this is readily explained. Within the Hanumangarh Tahsil, cultivation is still facilitated by such irrigation as the two branches of the Ghaggar Canal and the periodical descent of flood water in the *Nali* within the Ghaggar afford. Hence there are here also more settlements still in being. Small as they are they are apt to cover up the traces of former occupation. The imposing ruined fort at Bhatner close to Hanumangarh, which figures in recorded history during medieval times and later, stands on a big mound, rising to some 100 feet, and is very early, probably prehistoric. But owing to later debris and refuse deposited on the slopes below the walls of the fort during continuous occupation, no specimens of those characteristic types of ceramic ware, common on all others, were here on the surface.

At almost all the mounds which the map marks within the Hanumangarh Tahsil, fragments of that painted or relief-decorated pottery could be found which can be definitely assigned to early historical times down to the Kushan period or the first two centuries of our era. Some 4 miles to the east of Hanumangarh lies the mound of Bhadrakali, called after a Hindu shrine standing at its eastern end and attesting here as usual "continuity of local worship." The mound measures fully 300 yards long and rises to some 43 feet above the surrounding ground which, owing to occasional flooding from the Nali and thanks to intelligent protection, still bears thin tree growth. Here painted sherds of the early historical type could be picked up in plenty on the surface. At Fattehgarh to the south-east the mound which, though extensively dug into for manuring earth and for saltpetre, still rises on its crest to 47 feet, displays the same early painted ware both on its surface and deep down in layers exposed by these diggings. The great difference in levels affords proof of the prolonged period during which that ceramic type prevailed.

Clear chronological evidence regarding the time down to which this type remained in use was afforded by a short but profitable trial excavation at the small village of Munda, not on the Ghaggar but about 10 miles to the south-east of Hanumangarh in dune-covered ground known throughout Bikaner as *Dora*. Its people, mainly pastoral, carry on some precarious cultivation with the help of tanks and deep wells. A sandy spur, rising some 50 feet near the hamlet, carries on its top a small modern shrine of Hanuman, the monkey god. Remains of terracotta sculpture from a badly destroyed Hindu temple were found close by almost on the surface. Their style showing Graeco-Buddhist influence pointed to the Kushan period, and this was confirmed by the discovery of a *cache* of Kushan copper coins comprising several issues, lower down on the slope. A trial trench cut down from the level of the ruined shrine disclosed painted pottery of the above type for some 10 feet lower. The same date was subsequently derived from the Rangmahal site.

The definite dating of this painted ware with well-executed geometrical and floral designs has its special interest. It marks the period of occupation also for the sites surveyed above and below Suratgarh, the small town lower down on the Ghaggar bed. It is plentiful on all the numerous and mostly large others traced along and within this stretch of the Ghaggar for more

than 30 miles. The large number of these ancient sites contrasts strikingly with the very few small villages still on the same ground. Apart from Suratgarh, which owes its size to being the trade and administrative centre for the whole district, the dwellers in these hamlets live far more on their flocks, cattle, and camels than on their small plots of precarious cultivation wholly dependent on the spasmodic rainfall. How limited the number of people living in these villages is can be realized from the statistical record of 1901, the latest accessible to me in the *Bikaner Gazetteer*. For the Suratgarh Tahsil, comprising an extensive desert area of Dora, the record of 1901 showed a total of eighteen thousand souls (including the town of Suratgarh) living in one hundred and twenty-six villages.

How much larger the agricultural population must have been in early historical times is shown by the number and size of the mounds proved more or less contemporary. Irrigation from the summer floods in the Ghaggar bed permitted agriculture to an extent quite impossible at present.

Among the twenty-four main sites which the sketch-map shows between Dulmana and Sohankot, Rangmahal is of particular interest. It is about 3 miles to the east of Suratgarh, where the Ghaggar bed makes a marked bend at the foot of a projecting high sandy spur on the south. The name Rangmahal, "the notable mansion," suggests the importance of the site. Several mounds along the foot of the spur and some structures on the northern slope of the latter have been repeatedly quarried for their burnt bricks, first about the year 1800 to build the fort of Suratgarh, and much later for metalling the permanent way of the railway. From numerous terracotta sculptures of the late Kushan period which have found their way into the walls of the fort and thence partly into the Bikaner Museum, it is certain that these structures comprised at least one Hindu temple. A small modern shrine on the slope of the sand spur indicates here also the continuity of local worship. The spur rising to fully 150 feet is connected with a chain of high sand ridges stretching east and west of Suratgarh. This shows how far back reaches the accumulation of dunes which accompany the bed of the Ghaggar and are now taken for its "banks."

The principal mound of Rangmahal is about 300 yards in diameter and rises to 35 feet, thickly covered with sherds. The plentiful painted fragments among them can be definitely assigned to early historical times ending with the Kushan period, and the numerous terracotta figurines on the surface and down to 15 feet below, all clearly show the influence of the Graeco-Buddhist art of Gandhara. The absence of glazed pottery here and along this portion of the Ghaggar points to abandonment long before Iranian influence was established through Muhammadan domination in the north-west of India. The large ancient tank lined with massive walls of burnt bricks near the principal mound suggests occasional failure of water supply even when the site was still occupied.

Among other sites along the Suratgarh stretch of the Ghaggar a few only need be noted. The Thers of Karnisar and Bhawar, both within 4 miles of Rangmahal, have a circumference of fully half a mile, the second one rising to some 40 feet. At both painted sherds of the same type as at Rangmahal, including also animal figures, could be picked up on the surface in abundance,

at Karnisar also a few Kushan coins. From the mound at Badopal, 7 miles east of Rangmahal, and fully a quarter mile long, terracotta reliefs from a Hindu temple, somewhat later than the one at Rangmahal, had been previously removed to Bikaner. Two large mounds close together some 14 miles to the north-east of Rangmahal and not far from the abandoned hamlet of Kalibangan offer interest as marking an extensive site used mainly for burning bricks and for pottery. They measure together some 600 yards in length and 450 yards across, with a maximum height of 30 feet. They are composed almost entirely of kiln remains. The painted sherds found among them leave no doubt about the kilns having been worked down to the Kushan period, and the size of the area shows the demand for their produce. A large tank-like depression near the mounds marks the place where the clay had been dug and water kept.

To the west of Suratgarh down the Ghaggar the number of mounds diminishes. The one close to the small village of Sardargarh, with a diameter of nearly 500 yards, still shows plenty of painted pottery, but this comes to an end at the mound of Sohankot, about 3 miles farther to the south-west and now much reduced by recent digging for manuring earth. The Ganganagar canal brought in recent years from a great weir constructed on the Sutlej below Firozpur has brought new settled life to the dry river bed.

South-east of Sardargarh at the two smaller sites of Suwaiki and Bhaironpur, close together, flat patches of ground show, among debris of plain pottery, decorated sherds of a quite distinct type, unpainted and bearing coarsely impressed geometrical patterns with hachured or herring-bone designs. This type of ware, found also at certain sites lower down, unmistakably marks a different period of occupation.

The Anupgarh Tahsil begins where the new canal enters the bed; it takes its name from the only old village in it. Within this area no painted potsherds of the Rangmahal type could be found. The very few mounds of any height had indeterminate plain ware and scarce fragments decorated with simple black bands or coarsely impressed patterns. But a single small worked flint blade, the first prehistoric relic picked up along the Ghaggar, contrasted with the abundance of stone implements within Bahawalpur territory.

From the border of the Bikaner and Bahawalpur States the dry riverine belt is known as the Hakra. It becomes wider and near Walar, above the new colony of Fort Abbas, a distinct gap in the northern sand ridges brings the Hakra Branch of the great new canal system. This canal has brought water and cultivation along a portion of the Hakra bed which had long known no settled agricultural life, and also into the Cholistan, the wide desert belt north of the Hakra.¹

Careful study of the large-scale levelling charts prepared by the Survey of India for the Sutlej Project when this important canal scheme was being planned by the Panjab Irrigation Department, has shown me that the Hakra Branch canal passes for some 104 miles across levels between the sand ridges

¹ It is of interest to find the term *chol* or *chöl*, meaning "desert," which is of Turki origin and common in Eastern Turkistan, localized as it were with the added Persian ending in this part of the Panjab. It was brought there, no doubt, by invaders from south-eastern Iran, the latest of whom are the Baluch, found also in Bahawalpur.

of the Cholistan which unmistakably represent an ancient winding bed of the Sutlej, that once joined the Hakra between Walar and Binjor.

The junction of the Hakra with a branch of the Sutlej must have meant a great increase in the volume of water, and accounts for the Hakra bed widening below the junction about Walar.

Archaeological facts prove cultivation, and with it settled occupation, to have been abandoned much earlier on the Hakra than on the Ghaggar. Pre-historic mounds with pottery of the chalcolithic period appear first near Fort Abbas. Thence they were traced right down the Hakra as far as my survey extended west of Derawar.

A trial excavation at Sandhanawala Ther, 3 miles to the north-west of Fort Abbas and rising to some 28 feet above the now irrigated ground at its foot, showed that remains of chalcolithic times are contained in its layers right through to the virgin soil of river silt. Here, as at other high mounds farther down, painted pottery closely resembled that of numerous chalcolithic sites explored by me in British Baluchistan and Makran,¹ and also that of the now well-known great Indus Valley sites. Fabric and designs clearly distinguish this ceramic ware from the painted pottery of early historical times found at the mounds up the Ghaggar. Some sherds with incised characters which appear on many inscribed seals from Mohenjodaro and Harappa, chief sites of the Indus Valley culture, assign the Sandhanawala deposits to early in the third millennium B.C. Worked flints are associated with the chalcolithic pottery at this and the very numerous prehistoric mounds traced farther down the Hakra, and there is close similarity in the shapes of vessels, terracotta, and shell ornaments.

For some 30 miles up to the Sandhanawala mound these sites of prehistoric occupation are interspersed with other mounds generally smaller and much lower, showing no painted sherds or worked flints, but with the same coarse ceramic ware with impressed or incised patterns, seen at some sites below Suratgarh. Now from varied evidence we may conclude that this unpainted type is later than the chalcolithic painted, but preceded the other painted type at most of the sites along the Ghaggar. I suggest that prehistoric occupation along the Hakra had stopped lower down after the branch of the Sutlej had ceased to join it, but for a time the floods of the Ghaggar may still have sufficed for cultivation in a stretch of the bed, until later settled agriculture became restricted to the Ghaggar higher up in Bikaner territory.

This must for the present remain conjectural. But it may be considered as certain that the riverine belt along the Hakra from about the assumed confluence with an old bed of the Sutlej down to Derawar knew no settled agricultural life during historical times. What small settlements existed near the Hakra before the modern canal system reached it were those of a very scanty pastoral population, maintaining itself partly by the supply of camel transport for caravan traffic following an old route much used until the advent of railways. It led from Multan and Sind towards Delhi and other main centres of northern India. A series of forts more or less aligned on the Hakra

¹ See descriptions and illustrations in my contributions to *Memoirs of the Archaeological Survey of India*. No. 37, "An Archaeological Tour in Waziristan and Northern Baluchistan," and No. 43, "An Archaeological Tour in Gedrosia."

from Derawar to Phulra served as stages on this route and for protection against raids.

Very numerous mounds are found all the way down from where the Hakra Branch enters the dry riverine belt to where the Desert Branch canal fed by the same main head on the Sutlej joins in from the north-west after crossing the Cholistan. On the sketch-map the prehistoric mounds with chalcolithic painted pottery are distinguished from those with plain ware and sherds decorated with coarse patterns. While these sites of presumably later occupation were traced only within the main Hakra bed, the prehistoric ones are both there and on branching side beds, now known as Dahars.

Into these have been conducted smaller channels, designated Minors by the Irrigation Department. But it was sad to note that all these as well as the terminal portion of the Hakra Distributary have had to be abandoned below Marot since their construction. The water in the Sutlej at the canal head had against expectation proved inadequate to irrigate so far down, and the sand was reclaiming ground recently tilled. The same applies also to most of the Minors which the Derawar Distributary of the Desert Branch was intended to feed.

It is probable that the Desert Branch canal follows an ancient bed of the Sutlej, which might explain two notable facts. From Kudwala onwards all the mounds to the west and south-west display both painted pottery of chalcolithic type and unpainted pottery with relief patterns of a very characteristic kind. And these sites, prehistoric, as proved by abundant finds of worked stone implements, become particularly numerous to the north of Derawar.

Some eighteen mounds were examined over an area close on 100 square miles. This is to a great extent overrun by dunes between which long stretches of flat ground are recognizable as branching dry river beds. The whole looks deltaic. Floods descending the Hakra could not have made such a network of terminal channels. But if a branch of the Sutlej also flooded this flat ground beyond the great fringing sand ridges on the south, and thus made extensive irrigation here possible, its close occupation by prehistoric settlements is intelligible.

The great height and size of several of these indicate prolonged settlement. Thus the conspicuous mound of Kudwala rises to more than 50 feet and has a length of close on three-quarters of a mile. The mound of Lurewala, some 9 miles farther west, though somewhat lower, is larger. Only excavation could estimate the time of accumulation, or the chronological relation between them and the prehistoric settlements farther up the Hakra. But at only one site in this area has occupation continued beyond prehistoric times.

That is the great mound close to the much-restored fort of Derawar which from medieval down to modern times was a stronghold of those who ruled the desert now divided between Bahawalpur, Bikaner, and Jaisalmer. It was one of the border posts of the old caravan route along the Hakra. The ground was as barren then as it is now since the new canal failed.

The mound rises to more than 50 feet and measures about 1300 by 900 yards at its foot. Debris on the surface includes sherds from later times, but large cuttings made recently on the slopes under official orders in search of

"treasure" have disclosed prehistoric pottery in successive layers. We were fortunate to discover an ancient burial ground at the foot of the mound with remains, almost on the surface, which cannot be later than chalcolithic.

With this my work along the Hakra closed for the present. It would be hazardous to correlate the archaeologically attested changes of conditions along the Ghaggar-Hakra bed with the reference found in Vedic texts to the Sarasvati river; but the evidence shows that down to historical times the Ghaggar carried water for irrigation under existing climatic conditions much farther than it does now. This makes it intelligible how the Sarasvati has come in hymns of the Rigveda to be praised as a great river. The interval between the time when that notion found expression in Vedic poetry and the time when the Ghaggar was joined by a branch of the Sutlej, may not have been so great as to efface traditional knowledge of the entire river having once been large enough to make its way as far as the Panjnad and the Indus. The width of the Ghaggar-Hakra bed is so great that even now local folklore believe in its having once been completely filled by a large river.

A great change has affected the Sarasvati river or Ghaggar since reference to it was made in Vedic texts, which can scarcely have been composed before the second millennium B.C. at the earliest. This change may be attributed to two distinct physical causes. As regards the upper portion of the ancient bed archaeological evidence attests a drying up during historical times which is likely to have been at work in prehistoric. It might have been hastened by diversion of flood water for irrigation brought about by more settled conditions and the resulting pressure of population.¹ Lower down on the Hakra the main change was due to the Sutlej having in late prehistoric times abandoned the bed which before had joined the Ghaggar: the result of a law affecting all rivers whose course lies over alluvial plains. We have clear evidence that the drying up was gradual, at least in the historical period.

¹ In my paper "Desiccation in Asia, a geographical problem in the light of history" (*Hungarian Quarterly*, Spring Number, 1939), I have indicated instances, modern or comparatively recent, where physical changes which might suggest desiccation can be proved to have directly or indirectly resulted from human activity as attested by history.