

Extracted from Marshall, *Mohenjo-daro and the Indus Civilization*, 1931, Vol. 2, pp. 266-8

then, that this inference is correct, it is evident that the heavier rainfall may have necessitated the very elaborate drainage system which will be described towards the end of this chapter.

Use of burnt brick.

Besides the types of animals that are shown on the seals and the elaborate drainage system, there are two more facts that point to a larger rainfall in ancient times. The first is that all the houses and buildings are of burnt brick. We have yet to find, even in the poorest quarters, buildings of sun-dried bricks. In Sind at the present day sun-dried bricks are used for some of the largest buildings, not solely for the reason that this material is more economical, but because experience has shown that sun-dried brick makes a considerably cooler building than burnt brick. When it is essential to build with burnt brick it is a common plan to line the walls inside with unburnt brick to keep out the heat. For this reason alone, it is permissible to argue that the climate of ancient Sind was cooler and, therefore, probably wetter than it is at the present day.¹

Thresholds.

A second point is that the thresholds of many of the houses are considerably higher than the street level; in some cases a short flight of steps and a small platform lead into the houses. From this we may infer that the streets were liable to flooding and the doorways of the houses had, therefore, to be protected.

Brick manufacture.

Bricks.—The bricks of Mohenjo-daro are all exceptionally well made, yet have no straw or other binding material. They are always rectangular in shape with the exception of those that were made for special purposes, such as the wedge-shaped bricks almost invariably employed in the construction of wells. The bricks were made in an open mould and struck along the top with a piece of wood, as proved by their striated upper surfaces. The bases of the bricks are invariably rough, showing that they were made and dried on dusty ground, which is borne out by the frequent presence of potsherds and bits of charcoal adhering to their bases. No bricks have been found that were made on matting.

Brick clay.

The clay that was used seems to have been ordinary alluvial soil, like that which is found in the vicinity of Mohenjo-daro to-day, and is used by the modern brickmaker and potter. It is only necessary to dig down a few feet below the surface soil, which is impregnated with salt, to obtain clay of the right consistency.

In one case—whether accidental or not, it is difficult to say—a brick was found which was made of a mixture of clay with a large proportion of small pieces of broken brick, which form dark red patches, the whole effect being that of breccia.

The bricks are exceptionally well baked and range from straw-colour to bright red. No attempt was made to grade them by their colour. We do not yet know the type of kiln in which these bricks were baked, but then, as now, there was evidently no difficulty about fuel. Wood must always have been far more plentiful than in Babylonia, where reeds were the only available fuel.

None of the bricks have grooves or depressions for frogging purposes. In two cases, however, bricks of usual size were found to be marked on their upper surface, one (L 374) with a cross extending from corner to corner and the other (L 373) with a longitudinal groove. In Mesopotamia it is still uncertain whether the plano-convex and other forms of brick were marked for the purpose of frogging or to identify them as the work of their maker. And here it is equally impossible to say why these two bricks were so marked without at least pulling down the walls in which they were found.

As in all brickyards of the modern East, the bricks were laid over large areas for the preliminary drying. The result is that we have found the footprints upon them of cattle,

¹ The temperature now ranges from below freezing-point in winter to 125 degrees F. in summer. A temperature of 118 degrees in July is quite common.

crows, dogs (very common), and in one case of a large cat-like animal which may have been a leopard.

The largest brick yet found at Mohenjo-daro measures 20.25 by 10.5 by 3.5 inches. It is the only one of its size and was in a wall of the Late Period in the SD Area. It was probably made originally to cover a drain and was re-utilized in the Late Period.

Another brick of large size measures 14.5 by 7.25 by 4 inches. This size of brick is fairly common, but is always found in masonry of the Late Period, never in the lower levels.

The smallest sized brick measures 9.5 by 4.35 by 2 inches, and large numbers of a slightly larger size have been found. In every case these small bricks bear evidence of having been cut down from a larger size of brick by means of a saw.¹

In the construction of bathrooms, sawn bricks were almost invariably used to ensure the evenness of floor which was considered essential. Ordinary bricks were probably not used for this purpose on account of the impossibility of making their joints sufficiently close. Many of these bricks are polished on one side by the bather's feet, as can be seen in many places where the bricks are still *in situ*. Sometimes the upper surfaces of bathroom bricks are coated with a dark red deposit resembling an enamel, the cause of which has yet to be determined.² It is certainly not a glaze, for the surface is comparatively soft.

Sawn bricks.

I give below the various sizes of bricks that have been found and the levels and areas in which they occur :—

Sizes of bricks.

	Inches.		Area.	Period.
(1)	9.5 × 4.35 × 2 ³	Sawn.	Stūpa.	Late.
(2)	10.0 × 5.00 × 2.25	„	L.	Intermediate.
(3)	10.0 × 5.00 × 2.25	„	DK.	Early.
(4)	10.25 × 5.50 × 2.25 ⁴	„	L.	Intermediate.
(5)	10.25 × 5.00 × 2.25	Moulded.	SD.	?
(6)	10.35 × 2.50 × 2.00	Sawn.	L.	Late.
(7)	11.00 × 5.25 × 2.35	Moulded.	L.	Intermediate.
(8)	11.00 × 5.50 × 2.25	„	L.	All.
(9)	11.4 × 5.75 × 2.5 ⁵	„	L.	Late.
(10)	12.00 × 6.00 × 2.25 ⁶	„	L.	Late.
(11)	13.50 × 6.25 × 3.75	„	?	?
(12)	14.00 × 6.75 × 3.75	„	L.	Late.
(13)	14.00 × 7.00 × 3.25 ⁷	„	L.	„
(14)	14.50 × 7.25 × 4.00	„	L.	„
(15)	20.25 × 10.50 × 3.50 ⁸	„	SD.	„

¹ The marks referred to, however, may be due, not to a saw, but to rubbing down the surface, the usual process followed in mediaeval and modern India.—[ED.]

² Since found to be a mixture of lime and brickdust polished with the feet. It is possible that, as now, it was customary to oil the soles of the feet.

³ Pl. CXXX, 12.

⁴ Pl. CXXX, 19.

⁵ Pl. CXXX, 20.

⁶ This size of brick was found by Major Mockler in 1876 at Suktagen-dor in Makrān. The same size of brick is known at Ur in Mesopotamia and dated to about 2000 B.C.

⁷ Pl. CXXX, 18.

⁸ This is very much the same size of brick (19 by 10 by 3 inches) found by Sir Aurel Stein on the top of the Shāhi-tump mound, near Turbat in Southern Balūchistān. From ceramic evidence these bricks, which are sun-dried, are believed to be of an earlier date than the Nāl burials.

By far the commonest size of moulded brick is 11 by 5.5 by 2.25 inches ; it occurs at all levels. The moulded brick of small size (No. 5) is very unusual ; possibly it was made for a special purpose.

The sizes of these bricks do not fit well into any known system of measurement, with the exception of those measuring 14 by 7 by 3.25 inches. On three Egyptian cubits (21.72 inches), dated to about 1000 B.C., there is a prominent mark at the 19th digit, or 14 inches, which Professor Petrie points out must indicate the existence of such a measure.¹ The commoner size of brick, 11 by 5.5 by 2.25 inches, agrees fairly closely with the Assyrian digit of 0.73 in.

Shapes of bricks.

Some of the bricks used at Mohenjo-daro are illustrated in Pl. CXXX, 12-15 and 18-20. The L-shaped brick, No. 14, was cut from a rectangular brick. The longer limb measures 9.75 inches and the shorter 4.75 inches ; the width and depth of the limbs are both 2.1 inches. A brick (HR 1126) which is similar to the above except in having limbs of equal length was found east of House VIII, Block 3, Section A, of the HR Area, at a depth of 3 feet. Both the limbs are 9.75 inches long, 4.75 inches wide, and 4.75 inches deep. This last brick cannot have been cut from one of ordinary shape. L-shaped bricks are comparatively common at Mohenjo-daro ; they were used to avoid the necessity of using two separate pieces of brick to fill up corners in the paving of bathrooms.²

An interesting brick found in the VS area and measuring 10.7 by 4.9 by 2.4 inches seems to have once formed part of a gutter. One side of the brick is lowered along its axis to a depth of 0.6 in. at one end and 1.2 inches at the other, the slope being somewhat abrupt at its lower end. This left a ridge along the longer side of the brick measuring 1.8 inches wide. By placing two bricks of this kind together a very efficient runnel would be formed.

The amount of fuel that must have been used in burning the bricks used at Mohenjo-daro and other prehistoric sites of the same period must have been enormous. It argues that in the past Sind must have been a well-wooded province. We have not yet succeeded in finding any brick-kilns, but these were probably situated well outside the city area and near an ample supply of wood. It cannot be imagined that forests were available close to the doors of the people who occupied these sites, for as time went on the supplies near at hand must have failed and the populace would have had to go further afield to procure fuel for bricks and for kitchen purposes.

Bitumen.

Cement.—When burnt bricks were used for Babylonian buildings, clay or bitumen was used as mortar, the latter material being quite frequently employed in the more important buildings. It was not until a late period that lime was used, and then only exceptionally. Bitumen has up to the present been found in only one building at Mohenjo-daro, in which it served to make a tank water-tight. It has been suggested that the use of this substance implies trade with Mesopotamia, for bitumen is rare in India and common in the former country, the best known sources of supply being the wells of Hit on the Euphrates, from which place it was brought down by river to Southern Babylonia. On the other hand, though it is not impossible that the abundant wells of Hit supplied the Indus Valley with bitumen, there are possible sources much nearer at hand ; for instance, in the neighbouring Kirthar range and in the Bolān pass.

The nearest locality to Mohenjo-daro in which bitumen is known to occur in any quantity is Khaltan, about 36 miles almost due east of Sibi. The deposits here are fairly considerable and are described in the records of the *Geological Survey of India*.³

¹ "Weights and Measures," *Ency. Brit.*, vol. xxviii, p. 483.

² Compare this shape of brick with one found at Susa which came from a wall. *Mém. Dél. en Perse*, vol. i, p. 94, fig. 139 (f.).

³ Vol. xix, pt. 4.