AXEL STEENSBERG

STONE SHARES OF PLOUGHING IMPLEMENTS

from the Bronze Age of Syria

A Contribution to the Early History of the Ard-Plough

Det Kongelige Danske Videnskabernes Selskab
Historisk-filosofiske Meddelelser **47**, 6

Kommissionær: Munksgaard
København 1977

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Synopsis

In a study from 1966 Axel Steensberg identified some triangular stone-blades from the Bronze Age of Syria as ploughing implements, pulled by *traction ropes* similar to a Neolithic tool from *Satrup* in Angel, published by the same author in 1973. Other specimens from the National Museum of Aleppo are analysed in the present paper. The *wear marks* on them shows that some of them have been *tilted* or *slanted* as mentioned in the *Agricultural Calendar of Nippur*, so that the field must have been ploughed in *Lands* or *Strips*. Two other blades of basalt are identified as *ard-shares*, one for making *water-furrows*, the other for covering the *seed*. The ploughing systems are compared with a pattern from Pre-Harappan time in India and recent *patterns of ard-ploughing* in Iran and India.

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Contents

Introduction

Ploughing has always played a dominant role in the annual farming cycle. Therefore, ploughing implements have interested ethnologists, archaeologists, geographers and historians ever since attention was first paid to the improvement of agriculture and its equipment during the 18th century. Especially during the last hundred years many theories have been propounded concerning the origin and earliest development of the plough.

The earliest ploughing implements were not proper ploughs in the modern sense. They had a symmetrical share and could not plough the soil into ridges. Using a modern term we call them *ards* or *ard-ploughs*, a derivation of the Latin *aratrum*. The oldest illustration of an ard is a pictograph from Uruk-Warka IV b, dated c. 3000 B.C. (Fig. 1). It shows a type with two handles and a beam consisting of two parts tied together.[1] From c. 2000 B.C. this type of ard was equipped with a seed funnel (Fig. 2), and it has been continuously in use in Mesopotamia and western Iran up to our own time.[2]

Fig. 1. Pictogram for Ard-Plough. Uruk-Warka IV b, c. 3000 B.C. (after Salonen Pl. III,1).

[1] A. Falkenstein: Archaische Texte aus Uruk. Berlin 1936, p. 77,12 and pl. 290,2.

[2] A. Salonen: Agricultura Mesopotamia nach Sumerisch-Akkadischen Quellen. Helsinki 1964, p. 37, Tafel V–VII. Professor Salonen makes a clear distinction between the *agadibbu*, the hand-ard, and the *epinnu*, the sowing-ard, though we have no pictures of the former.

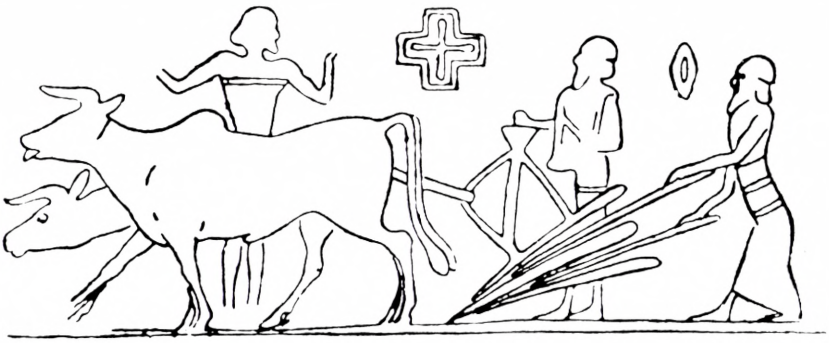


Fig. 2. Cassitic Ard with Seed Funnel, c. 2000 B.C. (after Salonen Pl. VI,1).

Another ard type with a horizontal sole, to which a beam was attached in front and a stilt handle at the rear end, is known from Cyprus c. 2200–2100 B.C. (Vounous).[1] It appears that a third type, the Døstrup type, is illustrated by a clay figurine from Byblos, north of Beirut, dated to the third or second millennium, and now in the National Museum of Lebanon in Beirut (Fig. 3). It shows a pair of oxen yoked together and a beam curving down along the left leg of the right oxe. Unfortunately, the driver has lost his right arm with which he controlled the implement, and it is therefore difficult to exactly determine the type of ard.[2]

An agricultural calendar found in Nippur and dated c. 1700 B.C. informs us how carefully the fields were prepared for sowing with weeding-hoes, pick-axes and clubs, and also that two different kinds of ard-plough were used, the *bardil*-ard for breaking the ground and the *šukin*-ard with its seed-funnel for sowing the barley. Furrows were ploughed across or diagonally to those made in the previous season, and the straight furrows made the borders of the fields into *tulu*-borders, which must mean elevated balks around the individual fields. In the same connection this calendar also mentions *parikatu*-furrows, slanted furrows. This is interesting because the wear on some of the tools discussed below shows

[1] P. Dikaios: The Excavations at Vounous-Bellapais in Cyprus. Archaeologia, t. 88, pl. XVIII, Fig. a. See also B. Brentjes: Geräte altorientalischen Bodenbaues. Wissensch. Zeitschrift der Martin-Luther Universität, Halle-Wittenberg, Gesc. Sprachw. VI/4, 1957, p. 681, and Abb. 40.

[2] M. Dunand: Fouilles de Byblos. Tome II 1933–1938 Texte. Paris 1954, p. 221, Fig. 236 and pl. CLXV in the volume of planches.

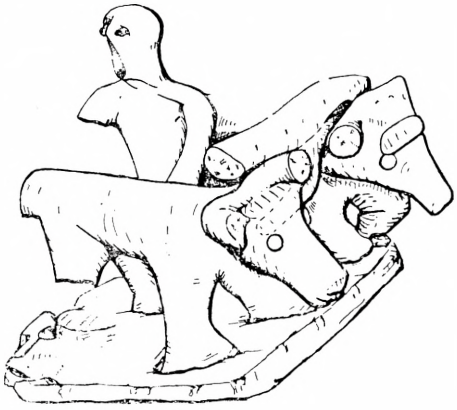


Fig. 3. Clay Figurine from Byblos
3rd–2nd millennium
(after M. Dunand, Fig. 236).

that they were held at a slant. After sowing, all clods had to be removed so that the sprouting seeds could break through the surface of the ground. Finally, the fields were irrigated up to four times.[1] However, in spite of the figures given by Herodotus and Strabon, the harvest did not exceed 10–15 fold, and sometimes less.[2]

In the Syrian Bronze Age natural conditions differed of course, from those of the Euphrates-Tigris valleys. Therefore the set of tools would also have differed to some degree. On the other hand the corn fields were probably irrigated where access to water allowed this practice. It is likely that the ard-plough of Byblos was already at that time used to cover the seed, but it may not have been universal; or rather man-pulled implements seem to have existed together with ards pulled by oxen, as I demonstrated in an article in Berytus in 1964.[3] Actually, in Early Sumerian texts

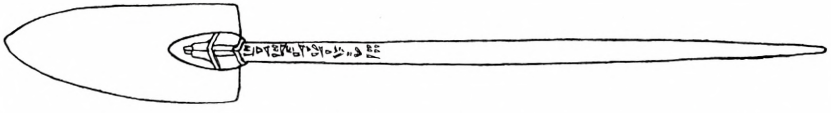


Fig. 4. Votive spade (marru) belonging to the God Nabu, Susa (after Brentjes, Fig. 7).

[1] Salonen op. cit. p. 202. S. N. Kramer: From the Tablets of Sumer, Chapter 10, Indian Hills, Colo. 1956, and: The Sumerians, their Character, History and Culture. Chicago 1963.

[2] Salonen op. cit. p. 252 and 257.

[3] Axel Steensberg: A Bronze Age Ard Type from Hama in Syria intended for Rope Traction. Berytus XV, 1964, pp. 111–139.

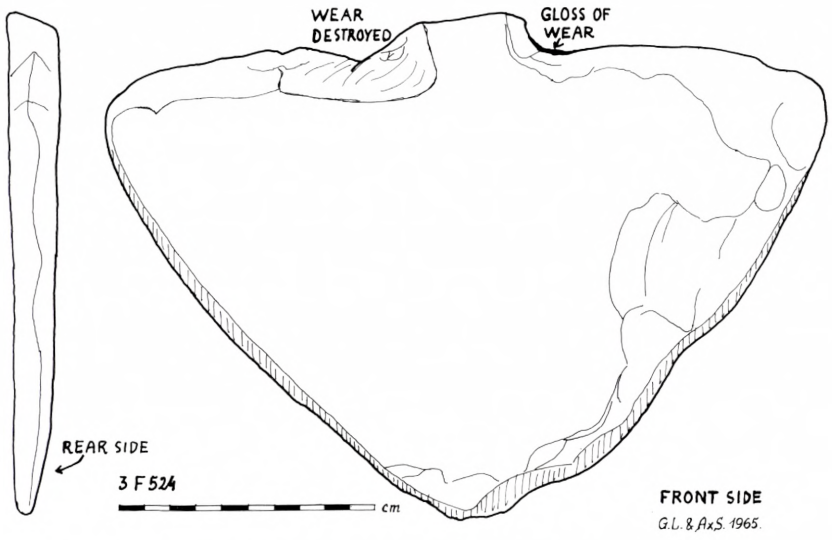


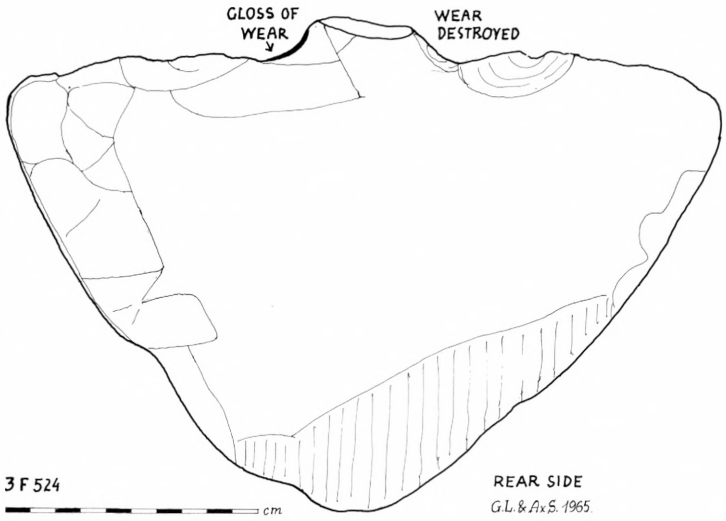
Fig. 5a–b. Triangular basalt blade. Hama No. 3 F 524. Nat. Mus. of Aleppo.

the term for spade, *mar*, is sometimes connected with the term for ard, *apin*, and at that time *mar* was included in the name of the god *Nin-mar*, the Lord of the spade. Probably the later god, Marduk, inherited his emblem, the *marru*, from the old *Nin-mar*.[1] A votive *marru* (Fig. 4) with the inscription: "Ma-(a)r-(r)u ša il na-bi-i" (Marru belonging to the God Nabu) was found in the Susa excavations.[2]

I. The Rope-Traction Ards from Hama and Mishrifé Qatna in the National Museum of Aleppo

In 1962 Professor H. Ingholt urged the present author to inspect some blades of basalt and limestone found at Hama and Mishrifé Qatna in order to determine how these stone blades had been used. Already the excavator of Mishrifé Qatna, le Comte Du Mesnil du Buisson, had mentioned that, according to René Dussaud, they would have been operated by two persons, one steering the

[1] Salonen op. cit. p. 121.
[2] Brentjes op. cit. p. 679 and Fig. 7 (from R. de Mecquenem: La marre de Nabu).



spade and the other pulling it with a rope like the traction spades of the Arab world to-day. However, the present-day implements are stuck into the soil and pulled up while the workmen move sidewards spit by spit. An inspection of the wear marks on the blades proved that they had been pulled continuously through the soil by ropes producing a very distinct gloss on the shoulders of the blades. Moreover, it could be stated experimentally that wear marks of the same kind were produced at the same places on a replica made of hard limestone; in addition, wear marks similar to those of the originals were made on other parts of the replica used for experiments.

The article in Berytus was based exclusively on an inspection of the specimens in the Department of Antiquities of the Danish National Museum, while the artifacts in the National Museum of Aleppo were only discussed on the basis of the registration file. Therefore the present author visited the latter museum, together with Mrs. Grith Lerche, in 1965 and 1968 in order to inspect the material personally. On the first occasion the museum was being reconstructed, but thanks to the director, Mr. Feisal Seirafi, and his staff we had an opportunity to see the items. On the second

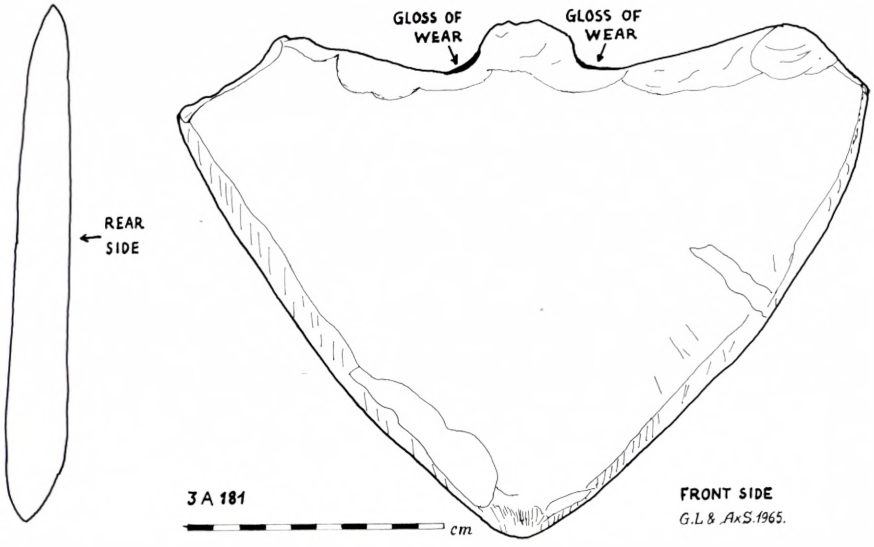


Fig. 6a–b. Triangular basalt blade. Hama No. 3 A 181. Nat. Mus. of Aleppo.

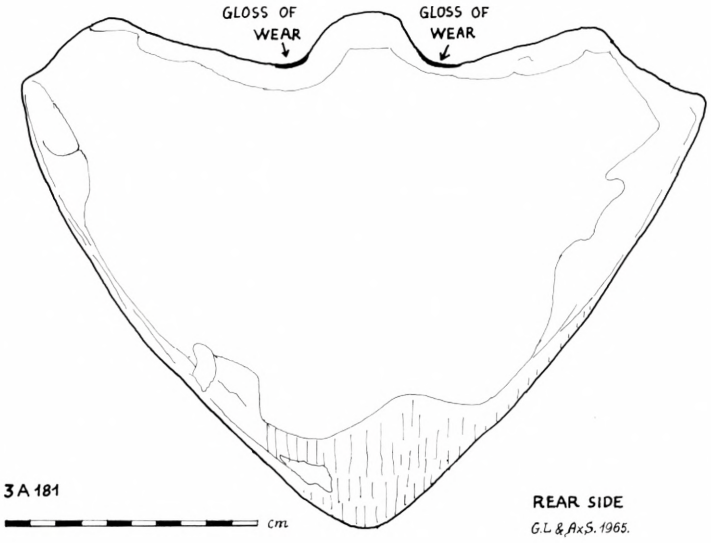
visit Mr. Seirafi provided us with a microscope for a closer observation of the wear marks on two specimens. The author is grateful to the Carlsberg Foundation, who made those journeys possible.

A. Description of Seven Stone Blades from Hama and Mishrifé Qatna

1) *Hama No. 3 F 524 (Fig. 5a–b and Plate Ia–b).*[1]

A triangular blade of basalt. Breadth: 27.8 cm, height: 19.4 cm (including hafting pivot). Length of hafting pivot: 1.5 cm, breadth at middle: 4.8 cm. Maximum thickness of blade: 2.1 cm. The *front* is covered with a weathering-crust that is damaged along the edge to the right, the facet of which is also irregular from damaging. To the left of the hafting pivot further damage has obliterated all

[1] Layer J 6-5 (Fugmann, layer J 4). Harald Ingholt: Rapport préliminaire sur sept campagnes de fouilles à Hama en Syrie, Copenhague 1940, p. 45, n. 2. E. Fugmann: Hama, Fouilles et Recherches de la Fondation Carlsberg 1931–38, II,1: L'Architecture des periodes pré-hellénistiques, Copenhague 1958, Fig. 85 on p. 69, text p. 71.



traces of wear. *Traces of wear* are pronounced on both side-edges forming bevelled facets in the weathered surface. The right side of the hafting pivot is highly polished, and the most brilliant gloss is in the angle formed by the pivot and the shoulder of the blade. The *back* of the blade is also covered by a weathering-crust, but this has been removed by retouche mostly along the edge to the left and the corresponding shoulder, less along the opposite side-edge. *Signs of wear* are distinct at c. 3 cm from the point and on an up to 4 cm broad band running from the point along the right edge of the tool, in such a way that the tool has been tilted slightly towards this side. The gloss of wear is visible only on the left shoulder, as mentioned above. *Section* from hafting pivot to point: Low on the back is a facet, a kind of "sole", at the point. The angle between this and the rear surface of the blade is about 15°. Date: c. 2250 B.C.

2) *Hama No. 3 A 181 (Fig. 6 a–b and Plate I c–d).*[1]
Triangular blade of basalt. Breadth: 27.1 cm, height: 20.5 cm

[1] Layer J 2. Ingholt op. cit. p. 45, n. 2. Fugmann op. cit. Fig. 98 on p. 77, text p. 75.

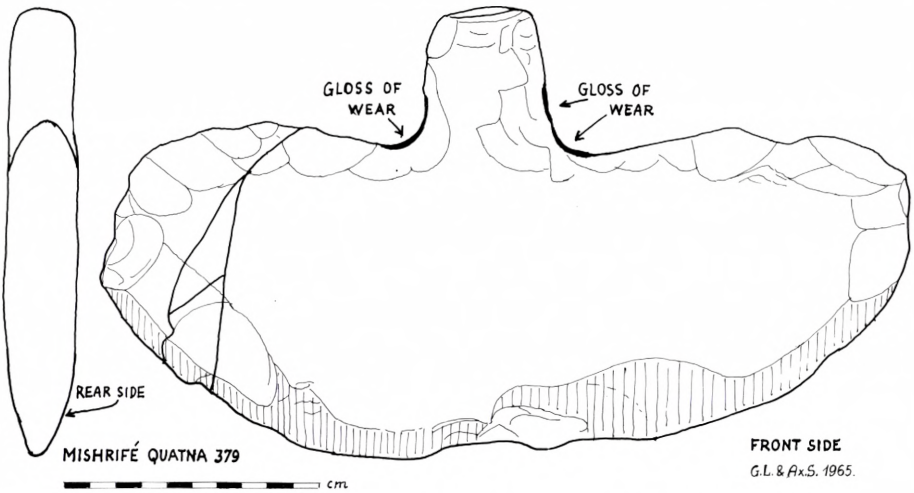
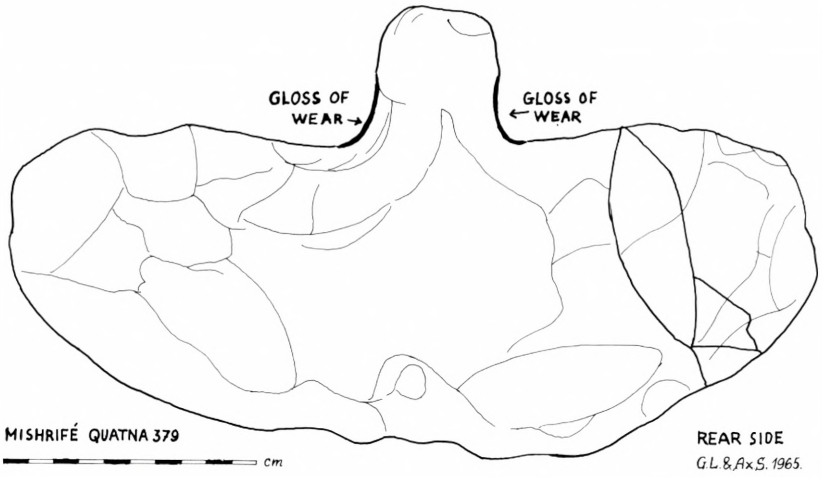


Fig. 7a–b. Triangular limestone blade. Mishrifé Qatna No. 379. Nat. Mus. of Aleppo.

(including hafting pivot). Length of hafting pivot: 2.2 cm, breadth at middle: 3.8 cm. Maximum thickness of blade: 2.4 cm. The *front* is covered with a weathering-crust and is shaped along the upper edge and on the hafting pivot. *Traces of wear*: Pronounced on both side-edges forming bevelled facets in the weathered surface. The right side of the hafting pivot (the left on Fig. 6a) is smoothly polished, regularly concave in the plane of the blade, but convex in the opposite plane. Obviously this gloss was produced by a traction-rope, while the blade moved from side to side in a more or less oblique position. Wear is less pronounced on the other side of the pivot, and the groove here is not quite as regularly curved as the other. The *back* of the blade is also covered with a weathering-crust, removed by retouche mostly along the right edge. *Signs of wear* are most distinct at c. 4 cm from the point and fade out c. 13 cm along the right edge in such a way that the tool must have been slightly tilted to this side. Gloss of wear on both sides of the hafting pivot. *Section* from hafting pivot to point: Low on the back is a facet, a kind of "sole", at the point. The angle between this and the rear surface of the blade is c. 30°. Date: c. 2000 B.C.



3) *Mishrifé Qatna No. 379 (Fig. 7a–b and Plate IIa–b).*[1]

Blade of hard, sound limestone of almost semi-crescent shape. Breadth: 31.5 cm, height: 17.0 cm (including hafting pivot). Length of hafting pivot: 6 cm, breadth at middle: 4.7 cm. Thickness of blade: 3–4 cm. The *front* is a cleavage face; it is shaped along the upper edge and two ends as well as along the hafting pivot. The lower edge is very much resharpened, originally it was probably pointed like the other specimens. Pronounced wear facet with distinct wear marks parallel to the axis of the blade. On both sides of the hafting pivot are polished concavities, worn from the traction rope. The *back* is shaped by chisel strokes, only leaving the original weathering-crust in the middle and on a small spot to the left. No wear marks preserved along the edge, but concavities produced by the traction rope on both sides of the pivot. Right end broken off (after excavation?) and glued in place again. The *section* of the blade is almost symmetrical. Because the artifact has been resharpened many times and lost its original point, it is rather difficult to determine which side is the front and which is the rear.

[1] Du Mesnil du Buisson: Le Site archéologique de Mishrifé-Qatna, Paris 1935, Fig. 46, and the same author in Syria VII, 1926, pp. 315.

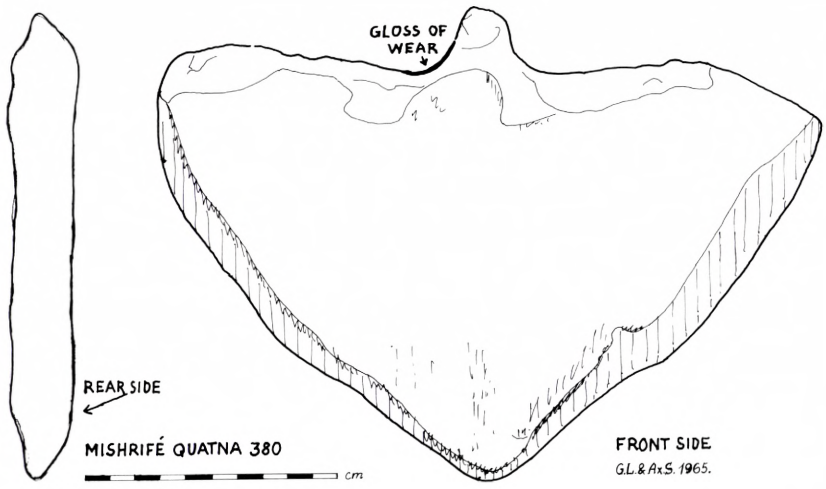
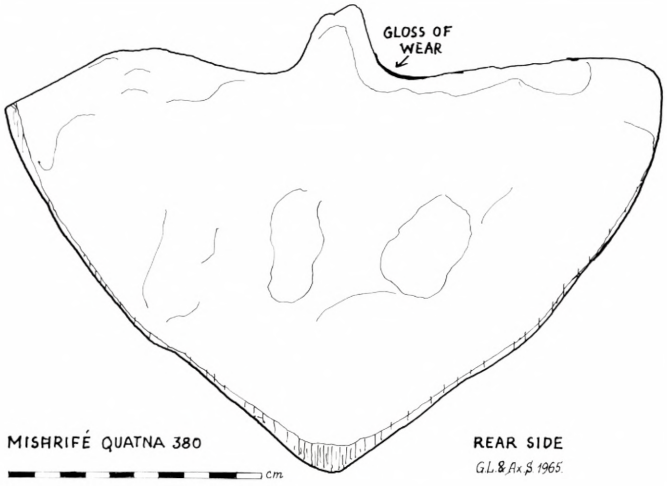


Fig. 8a–b. Triangular limestone blade. Mishrifé Qatna No. 380. Nat. Mus. of Aleppo.

4) *Mishrifé Qatna No. 380 (Fig. 8a–b and Plate IIc–d).*[1]

Triangular blade of hard, sound limestone. Breadth: 25.9 cm, height: 19.4 cm (including hafting pivot). Length of hafting pivot: 2.6 cm, breadth at middle: 2.5 cm. Maximum thickness of blade: 2.6 cm. The *front* is covered by a natural weathering-crust. Shaped along most of the top edge. Slight gloss on protruding edges, but not striated as on the edge facets below. *Traces of wear* are particularly visible on the right side of the hafting pivot (to the left on Fig. 8a), and on both side-edges of the blade forming bevelled facets, the edges of which are polished and worn with striation parallel to the middle axis of the blade. The *back* of the blade is a cleavage face. Most *signs of wear* are concentrated on the lower point, about 1 cm wide; but striation is visible at the edges parallel to the central axis of the blade. The gloss produced by the traction rope is more pronounced on the right side of the hafting pivot than on the other. The blade is straight in *section*. The angle between the "sole" of the back and the median line of the blade

[1] Du Buisson op. cit. 1926. Fig. 32x.



is c. 30°. In section, the two edges of the blade are not straight but curving.

5) *Mishrifé Qatna No. 381 (Fig. 9a–b and Plate IIIa–b).*[1]

Triangular blade of hard, sound limestone. Breadth: 26.5 cm, height: 20.0 cm (including hafting pivot). Length of hafting pivot: 3 cm, breadth at middle: 3.7 cm. Thickness of blade: c. 2.5 cm. The *front* has an oval cleavage surface at the middle and two raised surface areas, one of which, at the pivot, is worn brilliant from a hafting device; the other one, near the right edge (the left on Fig. 9a), may also be slightly polished. There is pronounced wear on the facet of the left side (the right on Fig. 9a) as if the blade had been held in a slightly tilted position. On both sides of the *hafting pivot* there are polished concavities, the left of which (the right on Fig. 9a) is damaged and broken. The *back* surface has been produced by natural cleaving, and the hafting pivot and

[1] Du Buisson op. cit. 1935. Fig. 47.

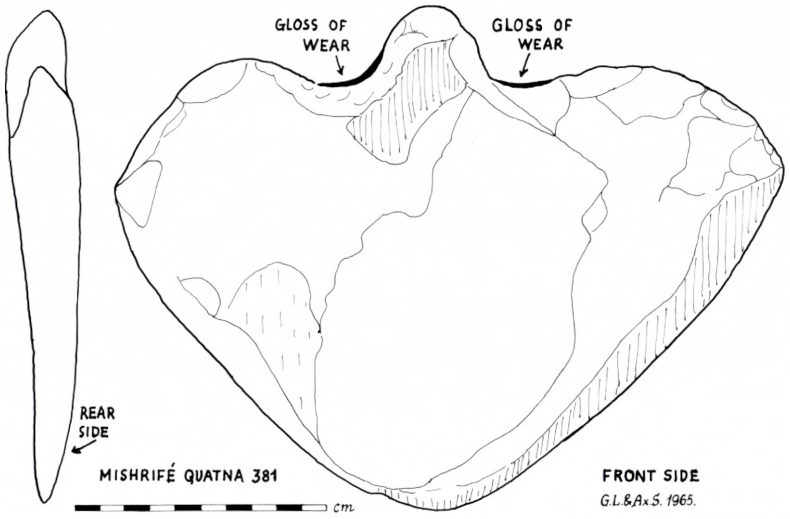


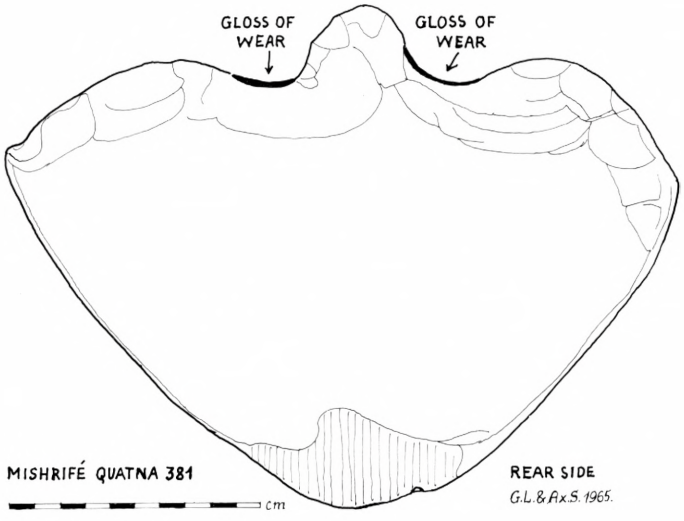
Fig. 9a–b. Triangular limestone blade. Mishrifé Qatna No. 381. Nat. Mus. of Aleppo.

both shoulders have been fashioned by chisel strokes. *Wear*, produced by pulling through the soil, is only visible up to c. 4 cm from the tip. Gloss produced by the traction rope is seen on both sides of the pivot, as mentioned above. The section is slightly curved, but almost symmetrical.

6) *Mishrifé Qatna No. 382 (Fig. 10a–b and Plate IIIc–d).*[1]

Triangular blade of basalt. Breadth: 29.4 cm, height: 20.7 cm (including hafting pivot). Length of hafting pivot: c. 4 cm, breadth at middle: c. 4.5 cm. Thickness of blade: c. 3 cm. The *front* is covered by a weathering-crust except for a triangular part from the tip along the edge to the left (the right on Fig. 10a) that has been shaped by parallel chipping. There are broad facets along both side-edges with marked parallel striation from wear in the soil. The tip is damaged. Both shoulders have been fashioned by chipping. Brilliant gloss, produced by the traction rope, is found on the left side of hafting pivot (the right on Fig. 10a). The gloss

[1] Du Buisson op. cit. 1926. Fig. 32y.



on the opposite side of the pivot is somewhat damaged. Most of the *back* is also covered by a distinct weathering-crust. Soil-wear is only visible as a parallel striation up to c. 3 cm from the tip, confined by a line running slightly obliquely upwards to the right edge, indicating that the tool was tilted towards this side. There is gloss from the traction rope on both sides of the hafting pivot, and from the hafting device on a small area below the pivot parallel to its left edge. The *section* is slightly curved at the rear, and there is a "sole" facet at an angle of c. 30° to the median line.

7) *Mishrifé Qatna No. 383 (Fig. 11a–b and Plate IVa–b).*[1]

Triangular blade of hard, sound limestone. Breadth: 25.5 cm, height: 19.5 cm (including hafting pivot). Length of hafting pivot: 2.3 cm, breadth at middle 4.5 cm. Thickness of blade: c. 2.5 cm. The *front* is a naturally cleaved surface. The shoulders and hafting pivot are shaped by chipping. On both sides of the pivot there is distinct gloss produced by the traction rope. Along both

[1] Du Buisson op. cit. 1935. No. 43.

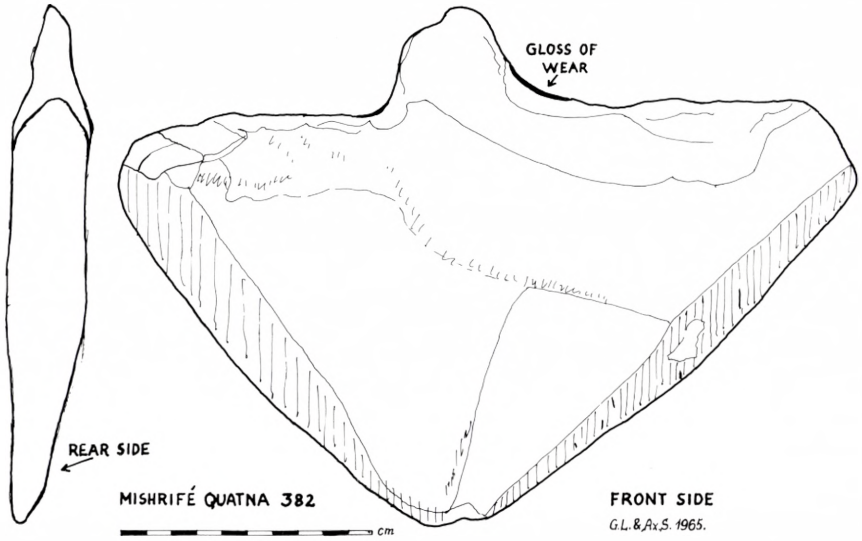
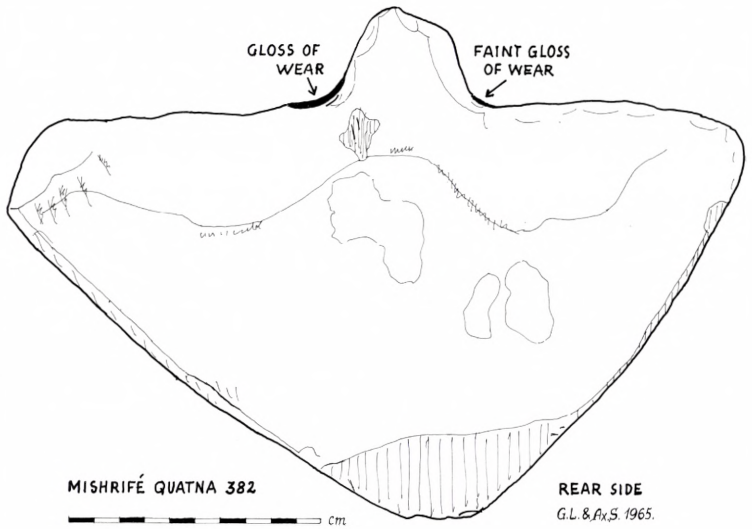


Fig. 10a–b. Triangular basalt blade. Mishrifé Qatna No. 382. Nat. Mus. of Aleppo



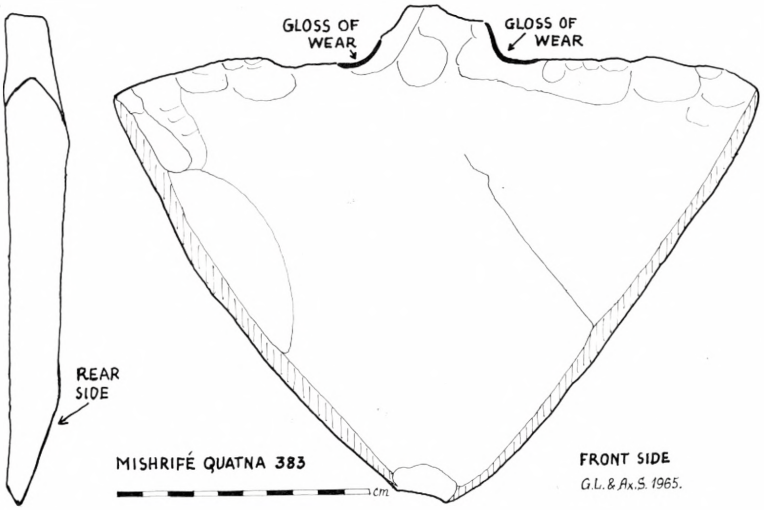
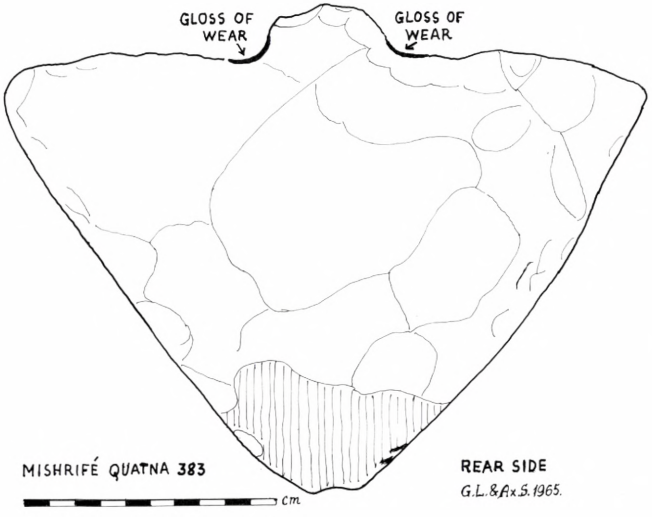


Fig. 11 a–b. Triangular limestone blade. Mishrifé Qatna No. 383. Nat. Mus. of Aleppo.



side-edges there are narrow facets striated by wear in the soil. The tip is damaged. The *back* is unevenly shaped by cleaving. The tip is worn up to c. 5 cm from the broken point. The *section* is slightly curved with a "sole" facet at c. 15° to the median line.

B. Hafting and Use of the Syrian Stone Shares

From the wear marks on the rear side of the tips of the stone blades described above, it is evident that they were pulled continuously through the soil, resting on this part of the tip as a kind of "sole". Moreover, the traction ropes have produced distinct marks of wear on both sides of the hafting pivots. Similar wear marks can also be observed on the artifacts from Hama in the National Museum of Copenhagen.

However, the blades in the National Museum of Aleppo have furnished us with new evidence in two respects: Wear marks from the hafting device on the limestone blade Mishrifé Qatna No. 381, and signs that some of the basalt blades have been tilted to the right during work in the fields.

Concerning the hafting device, the wear marks mentioned correspond well with the mounting suggested in Berytus 1964, and which proved to hold the blade firmly during ploughing experiments carried out in Denmark in 1962. This mounting consisted of two parts: One was a wooden block that grasped the shoulders of the blade enclosing it in a groove. The other was a wooden shaft with a forked lower end so that its two prongs rested in grooves in the block grasping the blade. Two notches were cut in this block to allow the traction ropes to pass around the neck of the hafting pivot. The mounting was deliberately made strongly and clumsily so that it would not break during the experiments.[1] If constructed of properly dried wood of good quality, it could be made more elegantly as indicated on Fig. 12.

The other observation made on the basalt blades in the Aleppo Museum—that these implements were tilted when ploughing the soil—corresponds with the wear marks on the rear side of the basalt blade No. 3 H 45 in the National Museum of Copenhagen.[2]

[1] Steensberg op. cit. Fig. 7 p. 127 and pl. XVI, c–d.
[2] Steensberg op. cit. Fig. 6 a–d, p. 121 and pl. XV, c–d.

This specimen is marked with an arrow-like figure, c. 12 mm long and 4.5 mm broad, carved into the basalt surface with double-line contours. Actually this arrow-like figure can be nothing but the spade of the god *Nin-mar*, mentioned in the introduction, and it is carved in the same technique as the decorations on cylinder seals.[1] Probably this excellently made specimen belonged to the temple of the god, and was consequently marked with his seal. Moreover, the figure may have been deliberately placed on the side to which the soil of the furrow was predominantly turned.

As stated above, "slanted furrows" were mentioned in the agricultural calendar of Nippur some 300–500 years after the Syrian basalt implements were used. From prehistoric finds in Europe, we know that some ards were held tilted to the right—more rarely to the left.[2] It is likely that the rope-traction ards of basalt from Syria—observed to have been tilted in the same way—were intended for raising small dividing balks in irrigated fields, making a single turn with the implement so that the soil was thrown up from both sides into a small ridge.

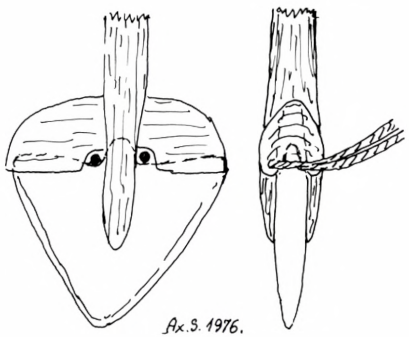


Fig. 12. Mounting device for a triangular blade of basalt or limestone used as a rope-traction ard (A. Steensberg).

[1] In H. Frankfort: Cylinder Seals, London 1939, p. 5 is explained the technique before iron came into use: "All cylinder seals were cut, drilled through and decorated by means of copper tools, which, in the case of hard stones, were probably fed with emery powder". In a private house at Tell Asmar a pot was found containing several gravers and small-edged chisels, and one piece "which is best explained as the borer belonging to a drill". In the case of the *mar* mentioned above, the copper stylus must have been furnished with a double point.

[2] See Tools and Tillage 1971: B. A. Šramko: Der Hakenpflug der Bronzezeit in der Ukraine.

The technique could have been the same as the author observed on irrigated plains in Central Iran (Fig. 19). The principal field was surrounded by permanent balks and one or two canals providing water. The farmer used the waterflow as a levelling instrument. Where it stopped, he made his secondary dividing balk. This secondary balk was made by spade, and in the following year he might change the direction of the balks in order that the plough furrows could cross those from the previous year. However, these small provisional balks could easily have been made by a traction spade, drawn sidewards, as they are actually made in Arabia. Or they could have been made by a rope-traction ard held in a slanting position like the Bronze Age ones found in Syria.

Of course, other explanations are possible. For example, when the basalt implement was used for covering the seed sown in the previous furrow, it would be an advantage if the soil mainly fell to one side. This would mean that the seed was sown in rows and the ploughing performed in "strips", because the ploughman did not alter the slant of his implement at every turn as usual, otherwise there would be no oblique wear marks on the artifacts. However, the blades without slanting wear marks—i.e. those of limestone—could well have been used in alternating positions. Or they could have been held in vertical position all the time, which was done in the experiment mentioned above. They would completely cover the seed sown in the previous furrow, and therefore the first explanation seems to be most likely.

II. A Comparison with Neolithic Rope-Traction Ards from Satrup Moor, Schleswig

In Satrup Moor in Angeln tools were excavated from a layer dated in calendar years to c. 4200 B.C. Two of them were complete "spades" made of ash wood with a triangular blade cut out of the same piece as the shaft. Because the shafts had been shaped by burning in order to produce convenient handgrips, it is possible to determine how these implements were used. One of them was a convenient shovel, 132 cm long. The other was a traction ard (Fig. 13), 185 cm long, of which the blade had been

c. 20 cm. At the top of the blade were two perforations for traction ropes, and the lower handgrip was made 65–75 cm above the blade, while the groove for the upper (right) hand was made 85–90 cm above the blade, so that the two hands were placed close to each other, the lower one in undergrip, the upper one in overgrip. The free end of the shaft must have been firmly held in the operator's armpit, so that he could steadily steer the implement that was pulled through the soil by another person.

Replicas were made of both implements, and experiments proved that the short one could be used as a shovel as well as for winnowing grain, whereas the longer one could totally cover the seed sown in one furrow by the soil thrown up from the next furrow.[1]

The rope-traction ard from Satrup Moor was less heavy than the basalt and limestone specimens from Syria, and consequently it produced a shallower furrow. However, the furrows produced by the replica of the Syrian rope-traction ard were c. 10 cm deep, which is a suitable depth for the arid climate of that country, while the furrows produced by the Satrup specimen were 5–6 cm deep, which is the optimal depth for sowing in the wet climate of countries in Northern Europe.

The ploughing implement from Satrup could not, of course, break virgin ground. Nevertheless, renewed inspection of the other tools and fragments of artifacts found in the moor showed that there had been a type of rope-traction ard made

Fig. 13. A Neolithic rope-traction ard from Satrup Moor, Angeln (after Steensberg 1973).

[1] See Tools and Tillage 1973: A. Steensberg: A 6000 Year Old Ploughing Implement. H. Schwabedissen: Die Ausgrabungen im Satruper Moor. Offa 16, 1957–58.

more in the fashion of the later ard type from Døstrup in Jutland, also used since time immemorial in Palestine.[1]

This specimen is fragmentary, only one half of the blade is preserved, 29 cm long and 4 cm thick. It seems to have been c. 12 cm broad, and it is pointed at the lowest 8 cm from both sides. An important feature, however, is that a "sole" can be observed similar to that on the stone blades from Syria. This sole is at an angle of c. 15° to the median line of the implement, similar to some of the stone blades described above. Also the heads of the ards of Døstrup type are fashioned in this way having a kind of "sole" at the point on the rear side. Perhaps this facet could have been a result of resharpening the edge and point of the blade?

The shaft of the Satrup implement is broken off 15 cm above the blade. But at the transition between blade and shaft is a narrow shoulder, c. 2 cm broad, in which there is a semicircular groove apparently made with a drill. This nearly 1 cm deep side-groove must have served as a bearing for the traction rope.

When this implement is published in the future, it is likely that more specimens of the same kind will be recognized as rope-traction ards for breaking ground, because the two types of implement from Satrup Moor just described used to supplement each other, also when the ard with a fixed beam for oxe-traction had replaced the rope-traction ard—the two types of ard known as the Døstrup and the Triptolemos type, respectively.

III. Ard Shares of Basalt from the Syrian Bronze Age

A couple of years ago when I was presented with photographs of two basalt blades with symmetrically placed holes, from the National Museum of Aleppo, I guessed that they had been used in the same way as the blades of basalt and limestone mentioned

[1] P. V. Glob: Ard og Plov i Nordens Oldtid, Aarhus 1951. A. Steensberg: Virgil's Wheel-Ard and the Two Mouldstrokers, Folk and Farm, Essays in honour of Dr. A. T. Lucas, Dublin 1976. Paul Leser: Entstehung und Verbreitung des Pfluges, photographic reprint by the International Secretariat for Research on the History of Agricultural Implements, National Museum, Brede, DK-2800 Lyngby, 1970. S. Avitsur: The Native Ard of Eretz-Israel. Tel-Aviv 1965.

above. One of them, acquired in Khanāṣer, was published in my paper in Berytus (pl. XXIX). However, not having inspected the artifact itself at that time, I could not tell if it had the same distinct signs of wear at the rear side of the lower point—which would prove that it had been pulled like an ard. Now, having examined the items twice, I can describe and interpret them as follows.

A. Description of the Blade Hama No. 3A 180 (Fig. 14 a–c and pl. V a–b)

Triangular blade of basalt. Breadth: 22.5 cm, height: 22.7 cm (including the two upright pivots). Lengtht of the pivots: 3.7 cm. Thickness of blade: 3.5 cm. The *front*: Along the two working edges is a clear, continuous band partly facetted by wear. The marks are parallel to the median line of the blade and seem most pronounced from c. 6 cm behind the point and onwards. Just below the pivot to the left along the edge a large piece has flaked off but the blade has been used subsequently. The upper edge between the pivots has no signs of wear on the front. The two perforations almost in the middle of the blade are double-conical in section. They have strong marks of wear at the facets facing each other, i.e. the inward sides. If the blade had been pulled through the soil by traction ropes, such wear marks could not have been produced. They must have been caused by a rope that tied the blade down to a support on its rear side. The *back*: The working edges of the blade have marks of wear similar to those on the front side, increasing backwards to the most prominent wings of the blade. The wear marks are shallower than on the front, but more glossy. There is no wear on the tip in front. The area between the perforations, from 4–5 cm above and down to 3–4 cm away from the tip, is rather smooth. The facets of the perforations are mostly worn in the direction towards the tip, i.e. the front of the blade. Moreover, the wear is most pronounced at the steepest part of the double-conical section of the holes, as it should be if the rope fastening the blade to the sole of an ard was pressed backwards when ploughing the soil. This would tighten the straps between the holes on the upper side and produce the wear on their inner sides, as mentioned under the

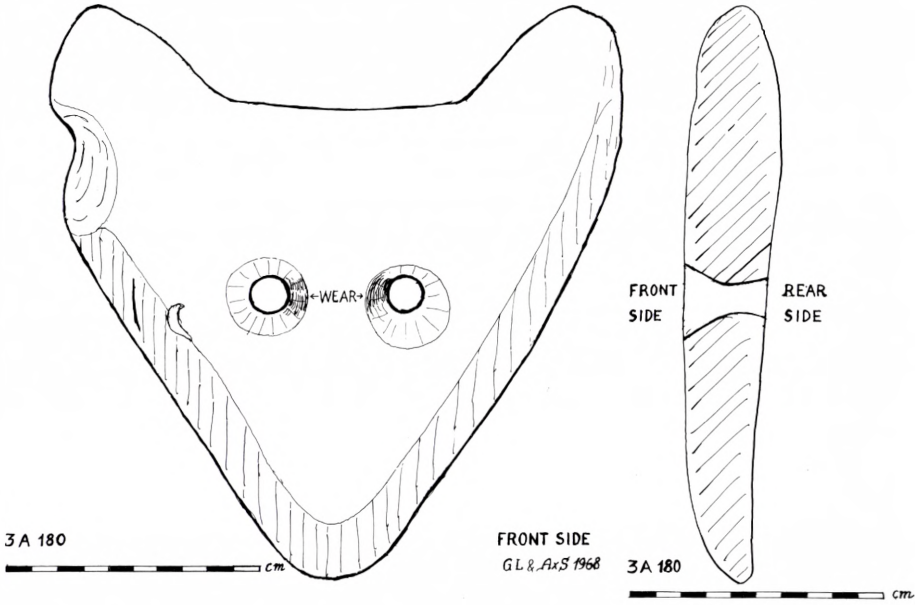
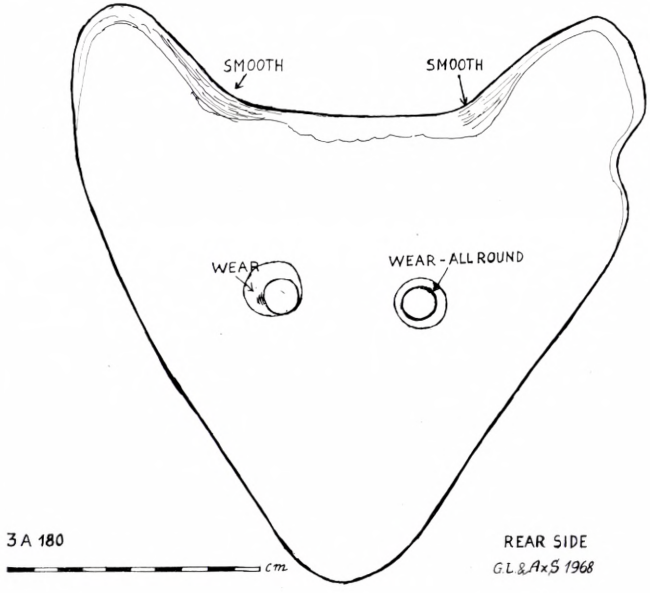


Fig. 14a–b–c. Triangular blade with two pivots. Basalt. Hama No. 3 A 180. Nat. Mus. of Aleppo.



description of the front side. Moreover, the slightly facetted upper (or more strictly speaking: backward) edge of the blade has a distinct smoothness on the inside of both pivots at the rear side. Furthermore what is very important: there is no sign of wear at the rear side of the lower point of the blade such as could be noticed on all the blades of the rope-traction ards. The rear side of the blade is somewhat hollow in order to fit the rounded upper side of the sole or head of the tilling implement to which it was tied. This can be clearly discerned on the section in Fig. 14. Date c. 1900 B.C.[1]

B. Description of the Blade from Khanāṣer in the National Museum of Aleppo (Fig. 15 a–c and Pl. VI a–d)

This basalt blade was acquired through purchase and is therefore undated. Breadth: 33.7 cm, height: 30.5 cm (including the two upright pivots). Length of the pivots: 7 cm. Thickness of blade: c. 4 cm. The *front*: Along the working edges is a facet that is c. 1.5 cm broad to the left, and 2.3 cm to the right. It is striated by wear parallel to the median line of the blade. To the left this band of wear shows distinct scratches right from the point and out to a distance of about 25 cm away from it, but from here until the outermost corner the marks become shorter and fainter, and are most visible only on the edge of the blade. To the right side, the striation of wear on the edge facet stops 17 cm away from the point, and for the next 13 cm wear marks are only observed on the edge itself. In one part of the facet, between c. 6.5 and 10 cm distance from the point, the striation of wear runs over the facet and onto the plane of the blade up to a width of c. 0.4 cm. About 15 cm from the point there are two perforations, double-conical in section, as on the last mentioned blade, c. 1.6 cm in diameter at the narrowest and c. 3–3.5 cm in diameter across the brim of facets. In front of the perforations, the blade has a protruding "nose", as if the rope which tied them to the sole of an ard was to be protected from wear. This "nose" is

[1] Layer J 1. Ingholt op. cit. p. 45, n. 3 and pl. XV, 3. Fugmann op. cit., Fig. 103 on p. 80, text p. 77.

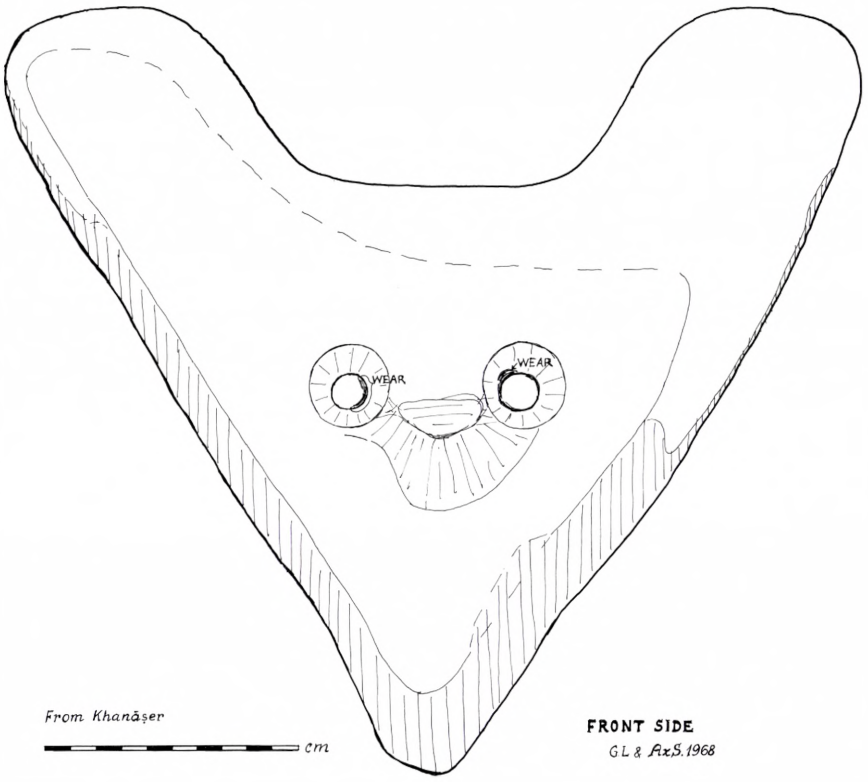
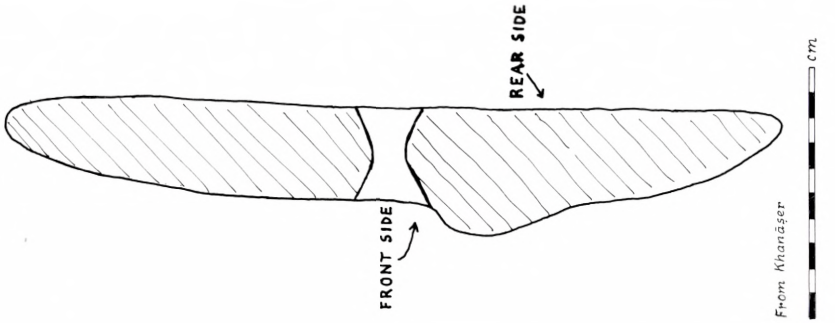
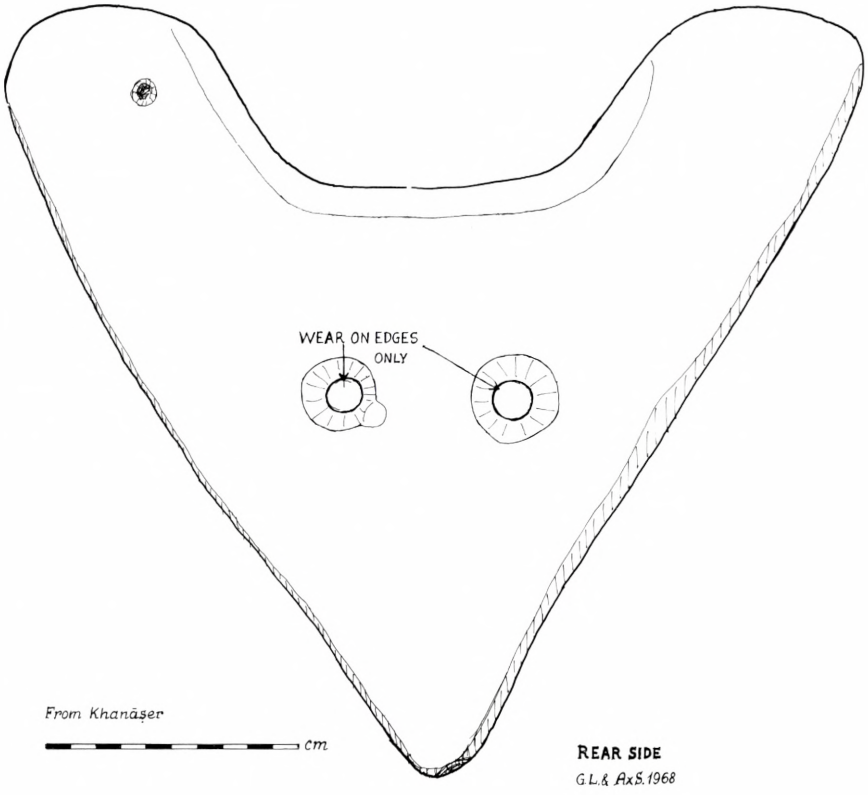


Fig. 15a–b–c. Triangular blade with two pivots. Basalt. From Khanāṣer. Nat. Mus. of Aleppo.





seen on Plate VIc. Wear is visible on the inner edges of the perforations as was the case with the other blade.

The *back*: This side is hollow, as shown on Pl. VId, so that it would fit well to the upper surface of the ard-sole or ard-head. Along the edge to the right is an up to 0.5 cm broad facet covered by wear marks. The other edge has wear marks only on the edge itself. A c. 2 cm broad piece has flaked off at the nose. Wear is visible all around inside the perforations, but it does not extend out onto the facet at the rear side of the blade. The fact that there is no facet along the upper part of the front to the right, and the fact that the surface is less raised than on the rest of the blade, suggest that this part, including the pivot to the right (actually the left one seen from the steerer of the implement), was redone

by a pick hammer. As a result of this process the original facet and its wear marks were destroyed, because they do not lack on the edge itself. The reason for the continuation of the striation onto the front side of the blade, in some areas from c. 6.5 to 10 cm from the point, must be that the facet is less marked here than along the rest of the edge.

Taking all facts into consideration, there is little doubt that this basalt blade was tied to the head or sole of an ard such as the one first mentioned. One may only wonder why the Bronze Age farmer made such a heavy share for his ard.

The furrow produced would not, of course, be 33.7 cm wide at the bottom, because the share must have stood at a certain angle to the surface of the soil in order to penetrate it to a proper depth. However, it is not likely that such a broad share was placed on a Triptolomos ard at a small angle to the soil, because it would work rather clumsily. Probably it was tied to the head of the stilt of an ard of Døstrup type as shown on Fig. 16. Even then it is difficult to believe that this ard could serve to cover the seed. The distance between the furrows would be at least about half a metre. It is more likely that it was used to make small canals or water furrows in an irrigated field.

C. Conclusion

The large basalt blade from Khanāṣer could certainly not have been pulled by a man. It must have required a pair of oxen. The smaller one from Hama is more likely to have been pulled by hand. However, both of them prove to have been mounted as ard shares; therefore, both may also have been pulled by animals.

This being assumed, we need not conclude that both fitted the same type of ard.

As stated above, the heavy specimen was probably tied to the head of an ard of the Døstrup type that, according to S. Avitsur, goes back to Talmudic times at the end of the 2nd millenium B.C. It was especially well fitted to the rough soils of Northern Palestine and Syria (Fig. 16). A rock carving from Chilwa in Trans-Jordania from c. 200 B.C. shows that a "brace rider", a crooked piece

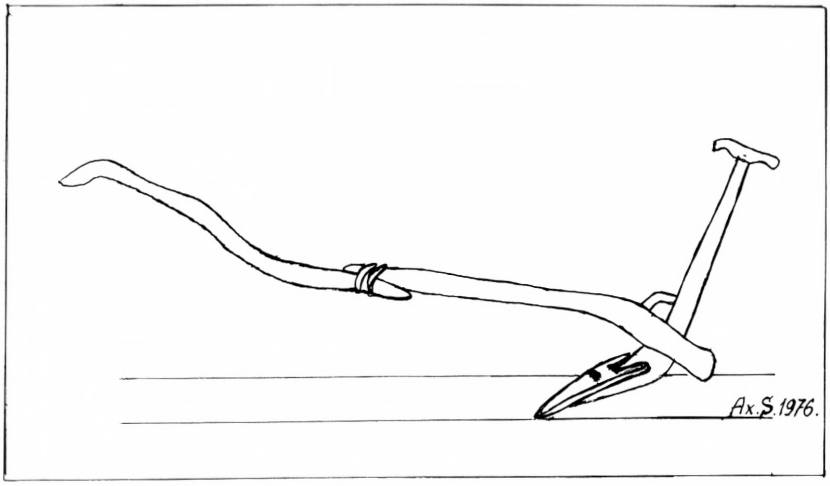


Fig. 16. Reconstruction of the basalt ard-share from Khanāṣer (A. Steensberg).

of wood, was already at that time inserted between the beam and the stilt in the upper corner of their junction.[1] In fact, the same device, which should prevent the junction from breaking, is visible on a cylinder seal from Assur, dated c. 1300 B.C.[2] Also a picture in relief on a cup from Tell Agrab, dated to the Jemdet-Nasr period c. 2800 B.C., seems to demonstrate an ard with its brace rider, not a hoe, as B. Brentjes suggested, though the top of the stilt is missing.[3]

The small basalt blade, Hama 3 A 180, could have been fitted to an ard with a horizontal sole of the Triptolemos type (Fig. 17). If this idea is accepted, it is likely to have been used for ploughing furrows with an intermediate distance of c. 30 cm and covering the seed sown in the previous furrow. It is assumed that different tilling implements were used alongside each other in Syria in the Bronze Age—some of them adapted to small fields, others to larger ones, some used in connection with irrigation, others with dry farming.

[1] S. Avitsur op. cit. Fig. 12, p. 53.

[2] A. Moortgat: Assyrische Glyptik, Fig. 67. Paul Leser op. cit. p. 247, Fig. 105. B. Brentjes: op. cit. Fig. 38. A. Salonen op. cit. pl. VIII,1.

[3] B. Brentjes: Untersuchungen zur Geschichte des Pfluges I (Bronzezeit), Wissenschaftliche Zeitschrift der Martin-Luther Universität Halle-Wittenberg, Jahrg. II, 1952/53, Heft 10, Fig. 11.

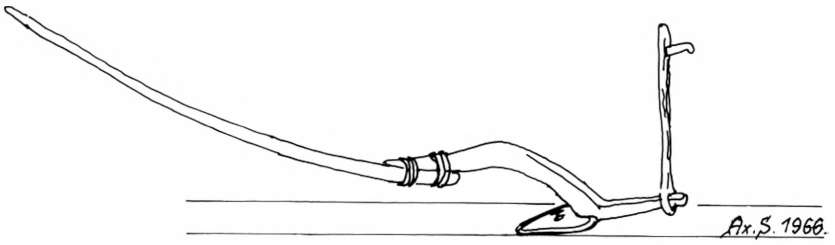


Fig. 17. Reconstruction of the ard-share Hama No. 3 A 180 (A. Steensberg).

Additional sources of knowledge about agricultural practices in ancient Syria may come to light during excavations of tells, as it was demonstrated at Kalibangan in North-West India some years ago, when archaeologists uncovered parts of a large field from Pre-Harappan time with furrows of the same character as used to-day (Fig. 18). The survival of a system throughout more than 4000 years certainly stresses the importance of making observations and maps of ploughing systems in remote areas at the present time.

Different systems of ploughing with an ard are practised in

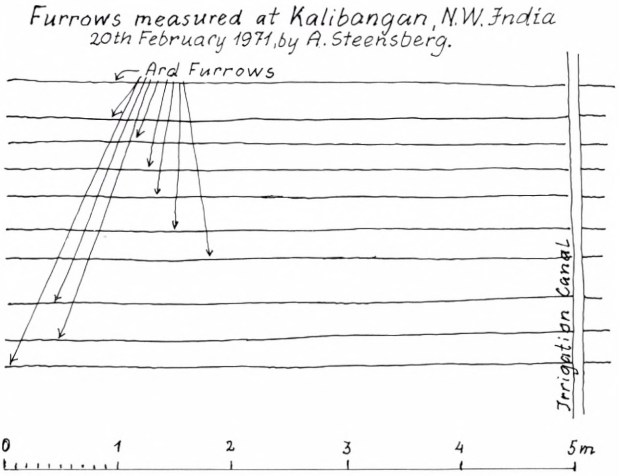


Fig. 18. Small part of ard-furrows and a crossing irrigation-ditch of Pre-Harappa time. Kalibangan, NW India (A. Steensberg).

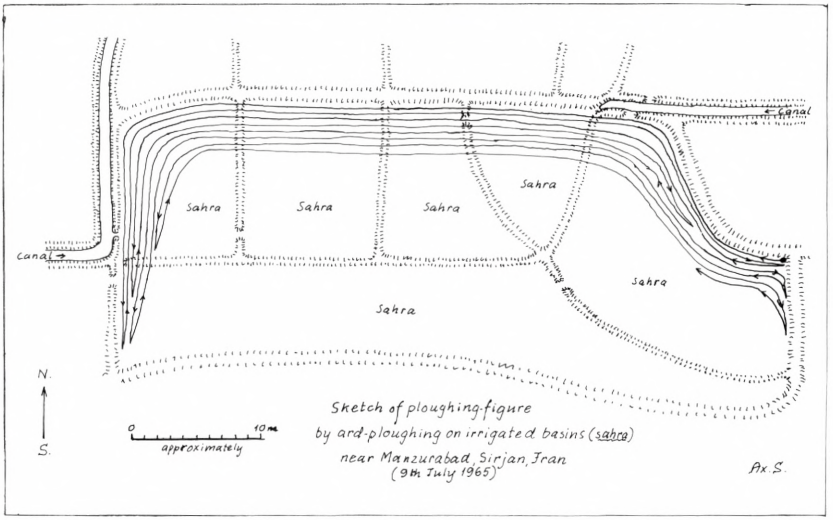


Fig. 19. Sketch-map of pattern of ploughing with an ard on irrigated land near Manzurabad, Sirjan. Iran 1965 (drawn by A. Steensberg).

Europe and in Asia. In Europe, cross-ploughing was used in Roman times, and obviously even in late Neolithic times. However, Columella described another practice, one-way ploughing between rows of trees or the like. Using a slanting ard, every second furrow was made as a shallow furrow. This meant that the following furrow could be cut deeper and very close to the first one leaving no real balks between the furrows.[1]

In Asia the present author has seen two different systems, one used on irrigated fields in Iran and the other on irrigated fields in India.

The first one is mapped on Fig. 19. The principle is always to turn inwards when adding furrow to furrow. The turnings will gradually extend along the permanent balks of the principal field so that finally the plough-team will work around an oval, ending in its centre. The animals will not need to cross the principal balks, and the secondary balks will be rebuilt when irrigation of the field commences. In Java the ploughmen use a mouldboard

[1] A. Steensberg: Parallel Ploughing with Alternatively Sloping and Upright Ard in Columella, Folk-Liv 1957/58.

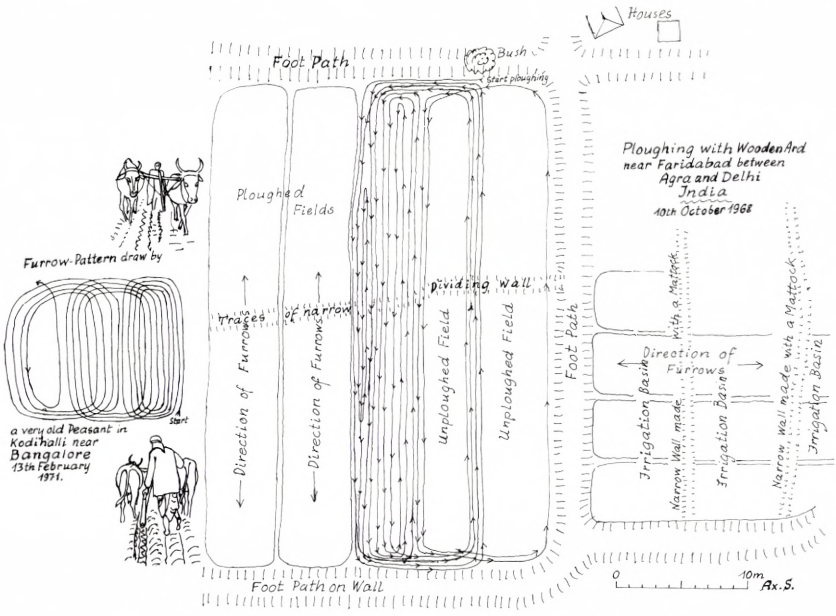


Fig. 20. Map of pattern of ard-furrows near Faridabad, India. To the left a system drawn by an old farmer from Kodihalli near Bangalore, India (drawn 1968 by A. Steensberg).

plough making ridges, and therefore they have to dig the corners with a spade.

Superficially, the Indian system appears more complicated. Figure 20 shows a furrow pattern of ploughing with an ard, such as Grith Lerche and I observed for an hour or two near Faridabad between Agra and Delhi. The ploughing turns are always made to the left and, as usual in all parts of the world, the ploughman conducting an ard walks on the fresh soil of the furrows he has just ploughed and not, as one would expect, on the firm ground. The reason seems to be that he normally tilts the stilt of the ard slightly towards himself. The field at Faridabad was surrounded by permanent walls giving access to the ploughed lands, or strips, by foot-paths on top of the walls. Three "lands", c. 40 m long and c. 5 m broad, were already ploughed before we arrived. The ploughman started near one corner of the three unploughed "lands" in the direction of the ploughed ones. When he had

made two roundabouts we noticed that he had left a narrow oval unploughed to the left near the ploughed lands, and therefore he made a special turn here before continuing. The reason seemed to be that the lands he had started to plough were slightly broader in the middle than at the ends. But after three or four turns comprising two lands, he finished ploughing the land on which he had started and then again ploughed around two lands.

To the left of the map is a sketch of a furrow pattern or system which an old farmer at Kodihalli near Bangalore in Southern India drew for me in order to explain the ideal system of ploughing. In another village, Kanamangala, a young peasant drew the system as shown in Fig. 21. None of the educated people I asked could understand the system clearly. They had seen peasants ploughing innumerable times, but none of them could draw the system correctly on paper. However, one of the farmers explained it in this way: The ploughman begins at the border of the field which is divided into parts or "lands". In order to avoid too sharp turnings, he soon makes a new addition, though returning to the first land until it is all ploughed. Then he will turn to the third land, finishing the second on his returns and so on until all is ploughed in one direction. Then he will start ploughing across the lands, following the same pattern, dividing them into lands again. Normally, the field is ploughed four times before the *ragi*

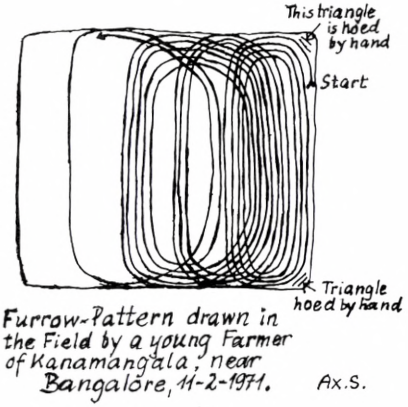


Fig. 21. Pattern of ard-furrows at Kanamangala near Bangalore (drawn by A. Steensberg).

(Finger Millet, *eleusine coracana*) can be sown with a special seven- or nine-row drill implement as described by the present author in *Tools and Tillage.*[1]

When a paddy field is tilled with an ard such as observed at Yelahanka near Bangalore, one always starts in the middle and continues ploughing outwards in a spiral in order not to end in the middle of the muddy field. The paddy field is ploughed three times before the seedlings can be transplanted from the nursery beds to the field.

From what has been demonstrated above we learn that ploughing systems differ from country to country, though all are based on rational considerations. The plough pattern will also reflect ecological conditions prevailing at the place where and when the systems were practised. This is the reason why archaeologists should be aware of the opportunity to uncover field-systems and ploughing-patterns from ancient cultures in order to gain deeper understanding of the structure of the material conditions on which the superstructures rest. The foundations of ancient cultures have been too much neglected—though the brilliant upper layers were always based on the labour of unknown *fellahins* and slaves, who produced the grain to feed the mouths of the rest of the population. The splendid results of the excavation at Kalibangan in India are a challenge which should be met by every archaeologist in the Middle East, who feels a responsibility towards the past history of the poor masses of ordinary people in his country.

[1] A. Steensberg: Drill-sowing and Threshing in Southern India Compared with Sowing Practices in Other Parts of Asia. Tools and Tillage 1971.

PLATES

Plate Ia–b. Hama No. 3 F 524. Front and back.

Plate Ic–d. Hama No. 3 A 181. Front and back.

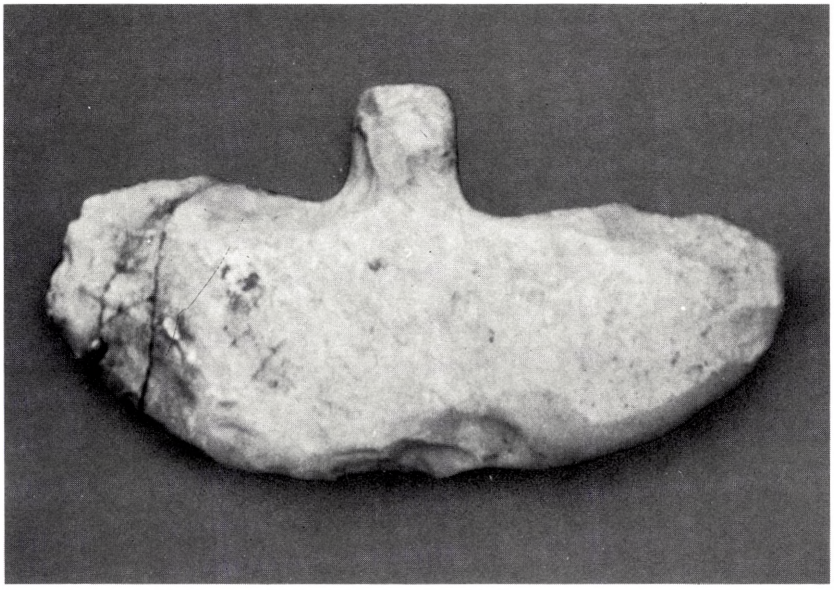


Plate IIa–b. Mishrifé Qatna No. 379. Front and back.

Plate IIc–d. Mishrifé Qatna No. 380. Front and back.

Plate IIIa–b. Mishrifé Qatna No. 381. Front and back.

Plate IIIc–d. Mishrifé Qatna No. 382. Front and back.

Plate IVa–b. Mishrifé Qatna No. 383. Front and back.

Plate Va–b. Ard-share No. 3 a 180 from Hama. Front and back.

Plate VIa–d. Ard-share from Khanāṣer. Front and back and oblique views of front and back.

Indleveret til Selskabet juli 1976.
Færdig fra trykkeriet april 1977.

Det Kongelige Danske Videnskabernes Selskab

Historisk-filologiske Meddelelser

Fra bind 37:

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