

Indo Sumerian

J.V.KINNIER WILSON

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**A NEW APPROACH TO THE
PROBLEMS OF THE INDUS SCRIPT**

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A New Approach to the
Problems of the Indus Script

BY

J. V. KINNIER WILSON

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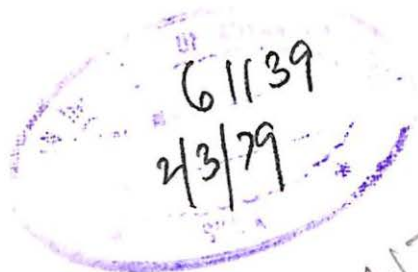
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I have finally to thank Miss Susan Mosley for her skilled and patient work in preparing for publication the texts and signs used in the book.

August, 1973

J.V. Kinnier Wilson

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I

INTRODUCTION

The starting point of the present study is a group of two or three signs which are to be found on a number of the Indus seals excavated at Harappa and Mohenjo-daro. It was some years ago that a possible reading and interpretation of these signs suggested itself to me, and the idea has successfully survived such criticism as I have since tried to raise against it. Accordingly it is time for the proposal, as indeed for the several ancillary ideas which depend upon it, to stand on trial, and it is with a great sense of personal obligation to the publishers of the present monograph that I set down below the essential arguments.

The approach to the problem is different to that recently advanced by Parpola, Koskeniemi, Parpola and Aalto, 1969, who have thought to interpret the script through the medium of 'proto-Dravidian'. The interpretation which is here proposed belongs to the field of Sumerian. In this regard it may be emphasized that no postulates of any kind are being made, and what follows should simply be regarded as a scientific experiment in which Sumerian is being tried as a possible key to the problem. Nevertheless one need not underestimate the suitability of trying it. The many cultural and trade connections which existed between the Indus civilization and Sumer in third millennium times are well known and need not be repeated here. Points of contact between the two scripts were remarked at an early period of study notably by Langdon apud Marshall, 1931 (p.453), even though with Marshall himself (p.41) and Gadd (*ibid.*, p.411) it is still proper and important to emphasize the differences. Moreover, Sumerian has this advantage for the experiment, namely, that it was spoken contemporaneously with the Indus language and its syllabary is known. This does not increase the chances of a theory of relationship being right, but at least we shall avoid arguments concerned with morphological developments and reconstructed forms which are current difficulties with the proto-Dravidian theory (cf. Burrow, 1969; Chadwick, 1969; also Zide and Zvelebil, 1970). For an opinion against the idea of Sumerian relationship, and an independent, and, indeed, more original, argument for the conclusion that 'the Proto-Indian language is close to Dravidian in grammatical structure', reference may be made to Knorozov, 1965. The latest statement on this proposal is that of Knorozov, *et al.*, 1968, shortly to be made more accessible through the work of Zide and Zvelebil, 1974. [1]

What follows has purposefully been reduced to as simple a form as possible so that even the non-specialist may have an opportunity of assessing the results. For convenience, the selected texts which have been mainly taken from Marshall, 1931, Mackay, 1938, and Vats, 1940, have each been assigned a serial number,

and the original sources may be found by consulting the Text References at the end of the paper. For the sake of the interested reader it may also be mentioned that the major collections of early Sumerian texts at the present time are those of Deimel, 1922, Langdon, 1928, Luckenbill, 1930, Burrows, 1935, Falkenstein, 1936, Jestin, 1937, and Sollberger, 1956, although collation has shown that the copying of the first two of these scholars has some imperfections. Additionally, attention may be drawn to the important collections of Abu Salabikh tablets shortly to be published by R.D. Biggs of Chicago and discussed by him in a preliminary survey, 1966. A catalogue of all the early inscriptions from Ur and el-^cObēd has been prepared by Sollberger, 1960. A number of other texts may also be traced through the Index bibliographique of Sollberger, 1971. For a study of the whole field of this early writing, together with a number of clear and representative photographs from the different sites, a standard source at the present time is that of G.R. Driver, 1948.

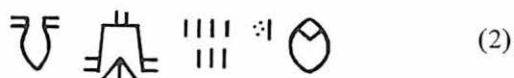
II

THE ARGUMENT

With the above introduction we may proceed by setting down for examination the following five texts:



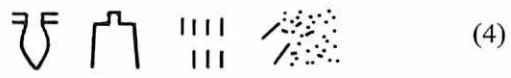
(1)



(2)



(3)



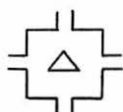
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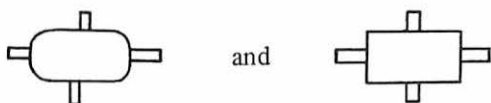
(5)

It should be made clear that these texts (as throughout the study) are taken from, and reproduce, the seal impressions, and that each is a complete unit in the sense that all the signs visible on the seals are reproduced unless otherwise stated. With a number of authorities (cf. further in Section IV) the direction of writing is considered to be generally from right to left.

With regard to these texts—more probably ‘phrases’ than complete sentences—the view is taken that each conveys the same meaning. For the moment we may concentrate on the second sign from the left, and for reasons which will gradually develop we propose to see in it a truncated form of a sign which in its earliest form at Ur appears as



In the form given this sign may be seen on seal No.431 of Legrain, 1936, and it is likely to be the same sign as that found at Uruk in the forms



and

These last examples are taken from Falkenstein, 1936, No. 631. In this connection it should perhaps be explained that in the early phase of Sumerian writing which is from the Proto-historic (or Protoliterate) period, and in part also from the following Early Dynastic period—for the tentative chronology reference is made most easily to Rowton, 1962, 56—signs are not yet in the ‘cuneiform’ (or wedge-shaped) stage of development so characteristic of the later periods.

The sign is read *ba*d or *ba*d₃—that is to say it is the third of the signs to which the reading *ba*d is assigned according to the standard lists—and like its Akkadian equivalent *dūru* it means a ‘wall’ or ‘walled city’. A few place names in ancient Sumer and later Babylonia begin with this element, as *Bad-tibira*, ‘town of the bronze smiths’, and *Dūr-Kurigalzu*, ‘city of (the king) Kurigalzu’. It is not doubtful that the sign itself represents a city wall with four gates.

As to the small triangular shape within the sign, this element is an old form of the sign *ba*d₁. For want of an agreed name it may be regarded as a ‘sign-reader’ in the sense that it confirms the reading of the sign as ‘*ba*d’; actually one may suspect that its more original function was simply to fill the space in the middle of the sign which Sumerian engravers evidently disliked in seal designs. It does, however, follow that this element is not to be regarded as an integral part of the whole and it will have been noticed that it is absent in the Uruk sign. The point is of obvious importance in interpreting the supposed equivalent sign in our texts (4) and (5).

From this position we turn to the adjacent sign on the right, composed of seven strokes, which with others we in fact take to be the numeral ‘seven’. If the text were Sumerian the sign would be read *imin*, a word compounded of *ia*, ‘five’, and *min*, ‘two’; and in this regard it is of interest to note that the combination



of which some 46 examples have been recorded (Parpola, *et al.*, 1969, 42) may possibly indicate that the numeral ‘two’ was *min* in proto-Indian also. The argument is that both by the Finnish scholars (p. 43), as also by Fr. Heras before them, the simple fish sign was read *min* on the consideration that this was the common word for ‘fish’ in Dravidian India; and although my own position is that the Dravidian connection need not have been direct, the word was certainly old in India since *mīna*, ‘fish’, occurs as a loan word in Sanskrit (for essential evidence cf. Burrow and Emeneau, 1961, under No. 3999). It may thus be that both elements of the combination unite to express the numeral *min*, ‘two’.

In any event, let it be supposed, even hypothetically, that we have initially to do with a unit of two signs in the Indus script which we may tentatively read as *ba*d-*imin* meaning ‘the seven walls’ or ‘the seven cities’. It has next to be said that this combination is no invention of the writer’s. It occurs in a Sumerian epical

story composed and edited by S.N. Kramer in 1952 and entitled by him 'Enmerkar and the Lord of Aratta'. The story and its heroes are not of present concern, although the composition has much to do with Sumer's early connections with the east and sources of lapis lazuli and carnelian. For the moment, however, attention may be directed to the three lines 287-289 which read as follows:

kur-kur-re izi-gar-ra-bi á-dam me-te-bi
bád-imin-e še-er-ka-an-dug₄-ga
nin-ur-sag mé-a-túm-ma

The lines describe the goddess Inanna (the Sumerian Ishtar) in terms of some of her epithets, and if we understand these aright she was:

" 'The torch of all the lands', 'the charm of womankind',
 'The adorned one' of Bad-imin,
 'The queen, the heroine fit for battle.' "

For Sumeriologists who may read this, it is perhaps necessary to explain that the translation of *me-te* in line 287 as 'charm' follows Finkelstein, 1968. It need otherwise only be added that Kramer's rendering of *bád-imin-e še-er-ka-an-dug₄-ga*, 'who adorns the seven walls', receives the notice in his own commentary, 'The implications of line 288 are not clear'; and obviously one has to try something else. It is significant perhaps that, in the story, the lines are spoken by the lord of Aratta. The ancient city of Aratta has not been identified, but it lay to the east of Sumer from which it was separated by 'seven (ranges of) mountains', and at the present time most scholars would locate it in western Persia. The latest statement is that of Wilcke, 1969. Thus to put the matter no higher it would certainly be permissible to seek for Bad-imin in a position further east again. The term has not been encountered in Sumerian documents relating to Sumer itself.

To believe in an ancient political or economic union of 'Seven Cities' in the Indus region would mean probably that seven major cities—such as Harappa, Mohenjo-daro, Lothal and Kalibangan—must be pictured as dominating a territory of lesser towns and villages somewhat in the manner of provincial capitals. However, a more immediate question is why such a designation should appear on the seals at all, and to answer it it will be necessary to turn again to the texts. It has not been overlooked that sign elements on either side of the supposed *bad-imin* signs have not yet been explained, but to these we will return later. What in fact we intend for the moment is to start again on the problem of the signs following a rather different line of approach.

In this approach we follow generally in the footsteps of Parpola, *et al.*, 1969, and more originally in those of Ross, 1938, who gave close attention to the vertical strokes, which he called 'numeral signs', in the Indus script and discussed their probable significance in most cases as numerals. Ross's position is in fact made quite clear from p. 13 of his study. 'It is quite possible', he argues, 'that some of the signs here called 'numeral signs' may have no connection with

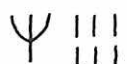
numerals . . . But taking the numeral-signs as a whole, it is quite inconceivable that there should not be represented among them signs having some connection with the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 12.' The essential argument is contained in the very next sentence. 'Had there been only a few numeral-signs the obvious similarity to numerals might have been dismissed as due to chance, but the presence of such a series [presented by Ross in his Signs-list on Plate 1 and in the following tables] cannot possibly be fortuitous.'

This position, together with the contention that 'the chief numeration-system of the base-language is decimal' (p. 17), is here accepted. Indeed, I think the situation can be presented quite simply and in a way which will lead to a further extension of the argument, by a consideration of the following texts:

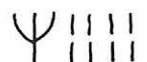
, ,  (6)

, ,  (7)

,  (8)

 (9)

 (10)

 (11)

[

 (12)

 (13)

The above examples of which two are reproduced on Plate I, *c* and *e*, and the references to them which, as before, will be found at the end of the study, are selective, but the purpose of them will be immediately clear. So far at least as our Nos. (6) to (11) are concerned, each group consists of an unidentified sign ("Q") on the left, a presumed numeral respectively 3, 4, 5, 6, 7, and 8 adjacent

to it, and in some instances the same unit of two short, raised, vertical strokes and intersected circle as the first sequence of texts provided in Nos. (1), (2) and (3). From these examples our first conclusion would be that the 'numeral signs' are indeed being used as numerals, and secondly that the sign "Q" is most likely to have been a unit of measure.

Both these themes we now attempt to develop. In the first place it would seem to be significant that early Sumerian which came to form its numerals with similar single lines presents the numeral 10 as a simple circle. Thus we extend the range of the system by supposing that the common sign found under entry No. (12) represents a combination of the numeral 10 plus the unit Q, and so '10 Q'. Similarly it may be proposed that text (13) means '20 Q', the two circles being ligatured, and even slightly elongated, to reduce the lateral width of the signs. If further encouragement may be thought required for these conclusions it may be found firstly in the text:

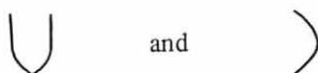


The value of this text is that no written language is likely to express meaning in terms of the fourfold repetition of a word or syllable so that the repeated signs seem likely to mean 'four times the (unit of measure) Q', or '4 Q'. Secondly, amongst the signs to which the Q-sign is commonly ligatured are the following



(for the complete set of five such signs Parpola *et al.*, p. 35, may be consulted) and it will suit our argument ideally to suppose that the left-hand sign represents another writing of '3 Q' and the right-hand sign another writing of '10 Q'. We have now to suggest why the sign in the middle should represent '5 Q'.

We return to the point that the numeral 10 in Sumerian is represented by a full circle. The position may then be taken—and it is to be noted that the idea is not found in the Sumerian writing system—that a half-circle was at some time adopted as a convenient and shortened writing of the numeral 5. This half-circle, we suggest, was presented in one or other of the two forms



depending upon whether the circle was 'cut' horizontally or vertically. Subsequently compression of the sign to reduce width has resulted on the one hand in a rather elongated U-shape, and on the other in a rather thin, crescent shape.

Some evidence in support of these contentions may now be presented. Firstly, we may consider four simple texts, namely:

ψ U || (15)

U || (16)

U ||| (17)

U |||| (18)

It will be noticed that the first text makes a point of contact with those of the (6) to (13) group in that the supposed numeral is combined with the unit of measure Q to make, suitably, '7 Q'. The remaining texts will simply represent the numerals '7', '8' and '9' respectively, the latter providing at least some compensation for the missing '9 Q' inserted in square brackets after text No. (11). Significantly, there appears to be no numeral 10 according to this system.

With regard to the crescent-shaped numeral the pattern of use appears to be less clear. However, five of the following six texts show the sign in some simple combinations:

⌘ ψ □) " ◇ (19)

ψ) |||| (20)

ψ) |||| ||| < U ⌘ > (21)

ψ) ○ /// U ⌘ (22)

ψ |||| ||| U ⌘ (23)

ψ ⌘) || ⊗ (24)

In connection with the first of these texts we are content for the moment to suggest that the third sign from the right is the numeral 'five'. In text No. (20) the numeral is likely to be '10' ($5 + 5$), and this will be the case in the following text where the angled brackets supply signs which, in the actual use of the seals, were presumably furnished by an initial seal impressed adjacently. This principle, namely, that seals in many cases were used in groups of perhaps up to three to provide a running text with several component parts, is an important one to establish and will be referred to again. In text No. (22) the crescent-sign is preceded by a small circle which is probably too small to be regarded as '10' and may rather be another writing of '5'. Its origin is perhaps to be sought in the signs

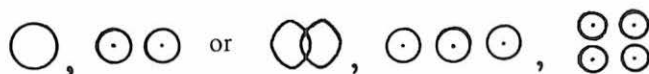


which may reasonably be thought to be writings—in whole or part—of the numeral '15' ($10 + 5$). By contrast text No. (23) (cf. Plate I, *h*) does not use the crescent-sign to express the presumed numeral '12', but since it is otherwise in exact correspondence with the two preceding texts, this difference only supports the view that the crescent-sign has to do with numbers. Finally, text No. (24) would appear to provide good confirmation of the proposal from another direction in that, if its signs are compared with those of text No. (1), it will be seen that the central element may, as before, be read *bad-imin*, only the numeral is now written as $5 + 2$ rather than 7. The further correspondence of the beginning and end signs in these two texts makes it virtually certain that they convey the same meaning.

A final consideration which may be advanced at this point with regard to numerals is that, in early Sumerian, the sequence 10, 20, 30, and 40 is represented by the signs



For the equivalent signs of the Indus script present evidence is incomplete, but on the basis of our initial findings and thereafter of form alone, one may think the corresponding scheme to have been



The authority for the presumed higher numbers in this series may be found in Vats, Nos. 572–575, 578, 580, etc., and Mackay, No. 649. It is proposed that the central point or miniature circle within many of the 10-signs, as also the small vertical stroke which takes its place if the outer circle is at all elongated, should simply be regarded as a space-filler.

Our next concern—and we shall here be entering into the very heart of the matter if the conclusions are correct—is with the specific form of a verb which, in the light of the presumed Sumerian cognate, will mean ‘to weigh out’. Furthermore, by great good fortune this verbal form contains as an element in one of its writings the same sign Q which we have proposed to see as a unit of measure, and the identity of this unit will thus also be suggested in the process of the argument.

The essential idea concerns six independent, but related, signs, namely,



The first of these signs were considered by the Parpola school (p. 23) to be a plural sign and to represent a ‘pole with ropes hung on each end, used to carry loads on the shoulder’. To see a connection between these concepts one has to believe in the homonym principle of interpretation which they consistently adopt. In the present account the sign is thought to represent a pair of scales with the central stand, arms and two pans clearly visible, although the latter appear actually to form one unit with the strings supporting them. According, therefore, to this suggestion the sign is thought to have had a meaning or meanings related to ‘weighing’.

This sign does not occur in Sumerian, and instead the verb *la*, ‘to weigh’,—it is actually always written with the *la*₂ sign—is a very simple sign, the early form being



We feel thus encouraged to suggest that the second sign of the six represents the verb to weigh plus the sign-reader *la*, in which case the sign may be closely identified with the first.

As to the third sign, it has been customary since Hunter, 1934, to interpret this and others like it as ‘men’ signs (and actually in spite of the fact that the supposed figure has no noticeable head in quite a majority of instances). [2] It is here, however, taken as a simple abbreviation of the scales-sign. The latter is a large and elaborate sign, one well able to sustain the loss of the pans which, as if to prove the point, seem then to have had an independent existence in the sign



(cf. Vats, No.55). Upon this removal the arms of the scales were evidently displaced downwards, although one could think that this was mainly brought about by the lateral pressures of adjacent signs. In any event we interpret the

fourth and fifth signs as again *la*, 'to weigh', the scales in its abbreviated form having now a ligatured *la*-sign to left or right as sign-reader. Lastly, the sixth sign may also be read as *la*, at least in so far as the angle-shaped element in the combination is concerned. But here the situation is different in that the fish-sign incorporated with it has no longer anything to do with weighing as such. It has, however, something to do with numbers as one may think from associations found both on pottery (cf., e.g., Vats, pl, CII, No. 3 and Casal, 1969, p. 171) and on such seals as the following:



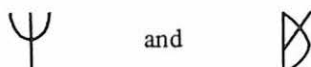
It could in fact be suggested that, in these combinations, and possibly arising out of a more original use in association with *min*, 'two', the fish-sign has the function of a determinative following numbers.

Now thus far we may think to have found the verb but not yet the form. So with regard to the form our first step will be to consider that the familiar ligature

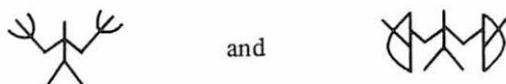


is to be read *ban-la* on the basis of the fact that *ban* is the common Sumerian word in all periods for the 'bow' which is evidently seen in the right-hand part of the sign. Analysed differently, however (actually as *ba-n-la*), the resulting meaning is 'he has weighed out'. In this analysis *n-la*, although not independently existing, provides essentially the person and tense, while *ba-* is a verbal prefix meaning 'into it' or 'out'.

From this position one may propose that the signs



may both be read as *ban*. There is, in fact, much to suggest their close association. In the first place the Parpola team (p. 24) have already drawn attention to the possible relationship of the complex signs



Secondly, in the third line of Marshall, No. 400, there occur the signs



which could reasonably be thought to convey the same meaning. Thirdly, in the text of Marshall, No. 406, there occurs the sign



of which the right half is evidently the sign *ban* ('bow') with above—or perhaps including the string of the bow as an essential part—a sign-reader which is also to be understood as *ban*.

If accordingly we may think to give this latter sign the same reading *ban* as for the bow-sign, it will follow that the unit of measure sign cited as Q must also be read *ban* for we are dealing with the same sign. And in this connection the significant fact is that there does exist a *ban* measure in Sumerian. It is a unit of volume consisting of 10 *sila* and it is common in administrative texts of all periods where quantities of grain and the like are concerned. The latest statement on measures in Sumerian is that of Salonen, 1966. In this account which follows the original lead of the French Assyriologist Thureau-Dangin, the *sila* is cited as approximately 0.842 litres in the equivalent modern scale, and the *ban* therefore as 8.42 litres. It was thus intermediary in nature, the highest unit in

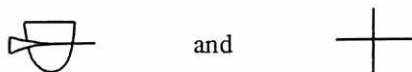
the scale being the *gur* which consisted of 300 *sila*, or 30 *ban*, and was largely used in connection with the issuing of rations to groups of persons. It was also used with numbers between 5 and 120 to indicate the capacity of boats, and in the recording of consignments of grain being transported by boat.

As a final argument for positing the existence of a *ban* measure in the Indus civilization, attention may be directed to the two following texts:

 (32)

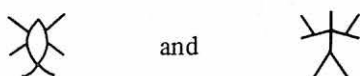
 (33)

The first of these I would understand to mean '5 *ban*', and the second would equally begin '5 (?) *ban*', the reference in each case being to the *ban* unit of measure although it is the bow-sign which is used. It may be noted that two early forms of the *ban* measure sign in Sumerian were:

 and

The signs in the two scripts thus have a certain resemblance, but it would be difficult at the present time to say that they are directly connected.

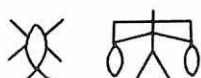
From this point we return to the theme of *ban-la*, 'he has weighed out', and firstly to suggest that, in many instances, a prefix *mun-* (analysed as *mu-n-*) was in use beside *ban-* as a prefix to the posited verb *la*, 'to weigh', which then remains unchanged. In this connection the essential signs are:

 and

The proposition now is that the first of these signs is to be read *mun* which one might interpret as a straight development from the simple fish-sign, supposedly *min* (cf. above on p. 4), and that the second is to be read as a unit *munla*, being composed of the shortened *la* (scales)-sign plus the essential distinguishing element of the *mun*-sign. Another writing of the supposed *mun-la* would be with the numeral-determinative in the common unit



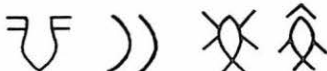
which may go some way to confirm the suggestion. Further a Harappan seal which carries a numeral, probably '7', on one side has on the other the signs

 (34)

which bring together the *mun*-sign and the large scales-sign. As before in the case of *ban-la*, *mun-la* will also mean 'he has weighed out'. There will, however, have been this difference, namely that, in accordance with at least one school of opinion regarding the Sumerian *mu*- prefix, the implied meaning of *mun-la* will have been '(as this label witnesses', or, 'as is here declared') 'he has weighed out', even as the common Sum. *mu-un-du*₃ on bricks used by royal builders appears to mean '(as this brick witnesses', or, 'as is here recorded') 'so-and-so has built'. The form *ban-la* would not have had this additional connotation, although we leave it to the summary at the end of the section to provide a reason for the existence of the two separate forms.

Our next task will be to show how the new proposals consort with the earlier suggestions, and to this end we may consider the five following texts:


(35)


(36)


(37)


(38)


(14)

In the first of these texts it will be seen that the ligature *ban + la* (in these pages read simply as *ban-la*) is associated with a group of signs which include the unit '4 *ban*'. In the second text no indication of measure is expressed, but instead the verbal element *mun-la*, provided by the initial signs in the reverse order of writing, is associated with the numeral '10' (5 + 5). Text No. (37) introduces a new sign in the fourth position. We believe that it may be compared with the Sumerian shekel-sign



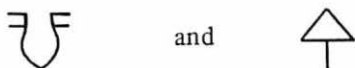
(gin₂)

as given by Falkenstein, No. 522, so that, in this instance, the object of *mun-la* would be '12 shekels'. The text following features the large scales-sign with the sign-reader '*la*'; it is found alone with the numeral '12'. However, in text No. (14) which we bring forward a second time, a ligatured form of the scales-sign is

associated with a presumed writing of '4 *ban*', thus again involving units of measure. Altogether one may think that the texts generally support the idea that numerals, units of measure and a presumed statement of weighing might often be associated in combinations sometimes requiring the addition of a second seal to complete the sense. It will be of interest to add that they come from a wide selection of sites, namely, Harappa (No. 35), Lothal (No. 36), Mohenjo-daro (Nos. 37 and 14) and Chanhudaro (No. 38).

Examples of the use of the proposed *munla*-sign will be found in text No. (49), discussed presently, and in Section V, text Nos. (81) and (84). But we turn aside from the verb at this point to discuss three other matters which may usefully claim our attention before proceeding.

The first is concerned with the meaning of the signs:



Both signs will be familiar to all who have studied the Indus script although only that on the left, which we take first, has so far appeared in this account. The sign occurs more often by far than any other in the whole corpus of the Indus seals. Because of this high frequency the sign manual given in Marshall, Vol. III, writes only the word 'passim' against the sign. However, that given in Vats, Vol. II, assigns some five columns to the entry, and the important computer research of Parpola, *et al.*, p. 19, gives the actual number of occurrences as 873. In fact this number may be even increased by 79 (Parpola) if one adds to the list the ligatured sign

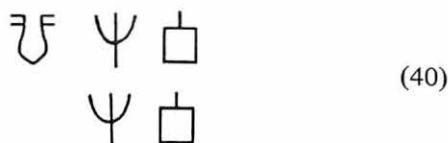


in which case the full total of occurrences is only 50 short of 1,000. Bearing this statistic in mind, I believe that the correct explanation of the sign was provided by Sidney Smith, apud Marshall, 1931, pp. 415f., who there studied what he called 'end signs' and 'beginning signs'. In general its use seems to be quite consistent with the idea that it is an 'end sign' (as Sidney Smith supposed), but there are exceptions and in any case the term one may preferably use is 'word divider' to which students of ancient scripts are already accustomed. Necessarily the concept of word dividers involves with it a belief in 'sentences' composed of several seal impressions united in series. But this supposition gets every support from sealings found at Lothal where on the one hand two seals (Rao, 1956-57, Pl. XXXII, 15) and on the other hand three (*Indian Archaeology*, 1957-58, Pl. XX, 2, reproduced in this study as Plate I, a) have been carefully impressed together to form a single text. Moreover, in the latter case each of the three lines ends with the sign which we are discussing. The same situation is reflected

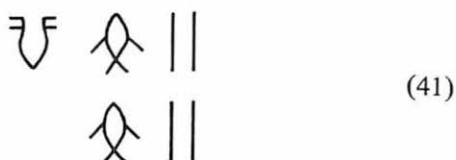
also on a sealing (Plate I, *b*) recovered from Rupar in the upper Sutlej valley, and reproduced from the Archaeological Survey of India's *Archaeological Remains, Monuments and Museums*, I (1964), Pl. II A. This shows the nearly complete impressions of again three seals in adjacent positions—interestingly the left-hand impression carries the two signs which we think to read as *bad-imin*—and this and the preceding impression both have the presumed word-divider sign in final position. Additional evidence for the significance of the sign may be sought from the following pairs of texts,



(39)



(40)



(41)

which may suggest that the use of the sign was not obligatory in writing. A further interesting text is the following:



(42)

Reading from right to left we propose that the first two signs are respectively the determinative after numerals and the word-ending sign (or word-divider), so that on both considerations it is necessary to suppose that, in the actual use of the seals, the text must have followed one or more introductory seals in a text series.

As to the second, triangle-headed, sign, a glance at the sign manuals will show that this sign also is commonly found in the left-hand position of a line of text, and it thus equally qualifies to be regarded as a 'word-divider'. Moreover, it is significant that in only a very few instances (during a transition period?) is the previous sign found in conjunction with it, so that it is reasonable to presume that the one sign replaced the other. Further help in the general analysis of the signs is provided by the text following,



which will be seen to be identical with the preceding text No. (42) only with WD_1 or 'word-divider, one', as we might call it, replaced by WD_2 . [3] Similar support is provided by the three following texts



which have been taken from Parpola, p. 20, sub-para 2).

There is, finally, one interesting dividend which results from a study of the word-dividers, particularly from that which was first discussed. It may be seen in the following texts,



which are closely parallel, and indeed may be thought to differ only in the point that the numeral in the first text is 'six', whereas that in the second is 'four'. In detail, however, the point is that, if the penultimate sign in the second text is a word-divider, one may the more easily equate the two end (scales) signs as, for other reasons, we have already proposed. The same situation obtains in the texts



where again there is good parallelism. Thus it is thought that text No. (46) reads initially *munmunla* with *mun* (first sign) acting as a sign reader, and that text No. (47) also begins with the signs *mun-la* (written with *mun* and 'la simplex' over

the numeral determinative), as in fact has been already proposed for text Nos. (36) and (37). With the word-divider common to both texts it would be natural to assume that the final signs are also identical, and we may again conclude that one is simply a shortened form of the other. A separate problem concerns the meaning and function of the reduplicated forms *munla-la* or *mun-la-la* which appears to result. A possible use for these forms is suggested at the end of the section (p. 22).

As a final observation on the word-dividers we may consider the sign complex



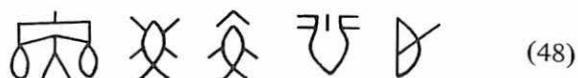
which occurs, perhaps uniquely, in Mackay, 1937, No. 662. It appears to be a triple ligature involving *ban* in the centre, the shortened *la*-sign to the right, and the *WD*₁ sign—or as much of it as the device will allow—to the left.

The next matter which we have to discuss concerns the writing of the numeral 'one' in the Indus script. It will already have been noticed that the table of numerals given by text Nos. (25) to (31) on p. 11 begins with the number 'two'. It is only, however, at this point in the argument that one may fully enter into a discussion of the different methods of writing 'one', since it was commonly ligatured with other signs. In fact the signs of our concern appear mainly to be three, namely,



The element which they have in common is a short vertical stroke which is probably to be regarded as the essential numeral 'one'; it may possibly in a few instances exist independently in this form without the assistance of another sign.

Of the signs given above, the first may be described as a ligature of 'one' and *WD*₁. A good example of it occurs in the following text:



With some adjustment in the order, and in fact separating the numeral from the word-divider, we may read: 1 *ban* *WD*₁ *mun-la-la*. In this transliteration it will be noticed that, in accordance with note [3], no attempt has been made to distinguish the two *la* signs, or, for that matter, to represent appropriately the initial *ban* ('bow')-sign, which, as was noted in the discussion of text Nos. (32) and (33), is not usually written to indicate the *ban* unit of measure. A further example of the use of the sign occurs in a text from Harappa:



(49)

Here, if we may again advance the numeral 'one' in the word-divider to the beginning of the transliteration, the text may be read: 1 + 3 + 5 + 7 WD₁ ^{mun}*munla* WD₁. In the interesting procession of numerals which results from this reading it will be noticed that '7' is essentially a combination of '5' and '2'. A further example occurs in text No. (74) cited towards the end of Section IV.

The second of the 'one' signs is patently a combination of this numeral and the numeral determinative. As an example of it a quite simple text is the following,



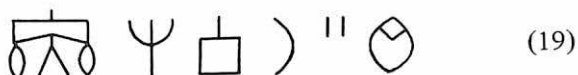
(50)

which is in line with an established pattern for the numerals of the Indus seals. The sign may also be recognised in the combination



as it is found, for example, in Marshall, 1931, III, No. 156. In this association the sign qualifies to be regarded as a combination of '5' and the determinative with numerals. It may thus help to fill the gap at this point in the table of numbers given on p. 11.

The third of the signs in question may be described as the numeral 'one' in the form of the same short vertical stroke, surmounting a small square or rectangle. The latter is perhaps to be regarded as a kind of platform for the numeral, with the possible function of giving it additional character and identity. As to its use, two examples have been already cited under text No. 40 (*q.v.*), and seem likely to mean simply '1 *ban*'. Another text which may now be reconsidered is the following,



(19)

where the sign in question unites with the numeral '5' to make '6 *ban*'. The value of this example is that the possible nature of a sign which falls between a numeral and a unit of measure is obviously much restricted, but it could certainly claim consideration as another numeral. The same situation is found in the following text,



(51)

where again the meaning conveyed appears to be '6 *ban*'. [4] This conclusion is

obtained by reading (from the right) $5 + 1$ *ban* WD_1 , the case for regarding a small circle as a writing of '5' having been already discussed under text No. 22. In a further text from Harappa,

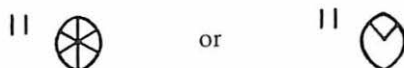


we perhaps learn that the simple fish-sign which has hitherto been described as the determinative after numbers may also be placed centrally between two numbers, so that the concern of the text will be with $3 + 1$, or 4 , *ban*. The numerical aspect of the sign is also upheld by a seal which carries one sign only, namely:



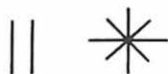
With little hesitation one may think that the sign is yet another writing of the important numeral '5'.

We leave the numerals at this point to consider our third matter for discussion, which is one that can no longer be postponed. It concerns the meaning of the unit



which is found in great frequency on the seals, and has already occurred many times in the texts cited. There can be little doubt that the form of the sign on the right of the second group is only a later development of the fuller, and more original, form found in the equivalent position on the left.

It is proposed to identify these signs with the Sumerian unit

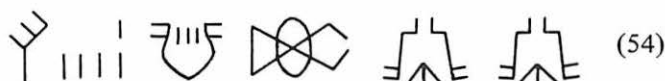


This writing consists of two signs, respectively *a* and *an*, which are together read as *am₃*. As a word this *am* is the third person singular of the verb 'to be', and so basically means 'he (she, it) is (or, was)'. Additionally, however, *am* may be used as an enclitic when it commonly emphasizes the word to which it is attached (cf. Falkenstein, 1959, § 43; Jestin, 1967). It is possibly also the historical antecedent of an element -*e*, known as the 'subject element', which in classical Sumerian was always attached to the subject of an active, transitive verb. Without making this point directly, Jestin himself accepted that '*am₃*, passé à -*a*, peut ensuite devenir -*e*'. Falkenstein discusses the point in two studies, 1950 and 1957-58.

If we may now turn to the proposed correspondence of the two pairs of signs, it may be suggested that they are close palaeographically, and it could easily be supposed that the presumed *a*-sign of the Indus script was purposefully shortened to avoid confusion with the numeral 'two'. Likewise, the presumed *an*-sign which probably in origin represents a shining point of light (*an* in Sumerian means either 'heaven' or the 'god of heaven') has a similar basic form in the two scripts.

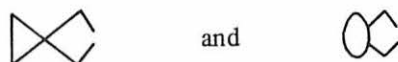
As to usage, we have two kinds of text to consider. The first is represented by such texts as our Nos. (6) to (8); and, following the idea that the initial *-am* should go with the subject, we advance the pattern of our type-sentence into *X-am . . . ban mun/ban-la*, 'X has weighed out (so many) *ban* (of grain)'. The second class of text is represented by text Nos. (1) to (5), and also No. (24), where the reading may now be proposed as *bad-imin-am*, and whence a sentence emerges of the type, 'Bad-imin has weighed out (so many) *ban* (of grain)'. It may be confessed that I was slow to accept the suitability of these results which are more fully developed in Section VI. However, the analysis of a further text is of much assistance in the matter, and may be considered at this point.

The text in question is the following:



It is seen to consist of seven signs, of which the fourth from the right is the word-divider, *WD*₁. This sign divides the whole into two groups. In line with our earlier findings, the group to the left seems probably to express the quantity of 8 *ban* (in detail 4 + 4 *ban*). As to the three signs on the right, the first two may be read as *bad-bad* in the light of our previous conclusion regarding *bad-imin*. The third sign is new.

Now, *bad-bad*, in Sumerian (if written with the *bad*₃ signs), means 'all the cities', and so it will obviously be desirable to discover as much as possible about the unidentified third sign. In fact we may suggest that it is to be read as *dam*, a conclusion which follows from the idea that it is compounded of two simple and relatively common signs, namely,



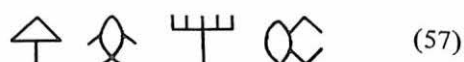
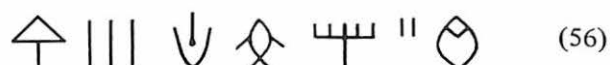
For the first of these signs reference may be made to the Sumerian sign *dim*, written



which is strikingly similar. The sign on the right has no clear origin, but it may be shown to have had a value *am* (here represented as *am*_x). A first text which demonstrates the point is the following,



where the initial signs read suggestively *bad-imin-am_x*, in contrast to the more usual writing of this complex with the *am*(A + AN) sign. A further example occurs in connection with the texts:



Here the two *am*-signs introduce sequences which, as shown later in Section III, are only to be distinguished by the additional numerical element in the longer text.

The argument is completed by supposing that the sign DIM X AM_x may be read as *dam*, producing a reading *bad-bad-dam* for the first three signs of the text of our interest. If this should be so, four important results may be thought to follow. They are:

- (1) The inferred type-sentence 'Bad-imin (or, The Seven Cities) has weighed out (so many) *ban* (of grain)', will now have the support of a variant type 'All the cities have weighed out (so many) *ban* (of grain)'.
- (2) The concept of Bad-imin as an 'alliance' of seven major cities or city-states within the Indus civilisation is itself underwritten by the new text.
- (3) The identification of the supposed A + AN, or *am*, signs as indicated above, and their identification as an enclitic on the Sumerian model, will have the support of the *dam*-sign (analysed as *-d-am*) in an entirely analogous situation.
- (4) This enclitic is seen to be attached to the subject of the sentence in both cases.

It would remain to add that the verbal form which would most suitably go with an introductory complex *bad-bad-dam* would be the reduplicated *mun-la-la* which was recovered from text Nos. (46) to (48). As far as I am aware, a subject *bad-imin-am* would require only the simple *mun-la*. On the Sumerian theory of interpretation no specific 'plural' ending is to be expected in either case, since the subject does not belong to the person-class (cf. Falkenstein, 1959, § 44).

With the above arguments we in fact return to our starting point, and find an explanation for the term *bad-imin* on the seals which is at once sensible and satisfactory within the framework of a consistent idea, that of *oeconomia*. There now follows a reconstruction of the picture, partly hypothetical but partly also factual, within which the several ideas so far presented in these pages, and some aspects of the supporting archaeology, may be accommodated.

I think two things are of fundamental concern in any correct analysis of the Indus script and its system of seals. The first is the recognition that some of the excavated sealings indicate on their reverse, by impression on the clay, the materials to which they were once attached. 'In all, eight steatite seals and three terracotta sealings were recovered', writes the report on the final season at Lothal in *Indian Archaeology*, 1958-59, 18, 'the latter bearing on the reverse impressions of cloth, reeds and cord' (cf. also Rao, 1962). Similarly Mackay, 1938 (I, 349) refers to sealings found at Mohenjo-daro 'which were certainly once affixed to matting or a rough textile'. It is thus with every justice that Bridget and F.R. Allchin write in their recent study, 1968, 'The seals were sawn from blocks of steatite . . . Their importance was doubtless linked in some way with their role in trading activities'. Indeed, as an indication of how minds were thinking even in 1931 it is revealing that the very first publication of Indus seals explained that these 'are shown as they would appear stamped on a bale of merchandise or on the sealing of a jar' (Mackay, apud Marshall, II, 370).

The second point of concern is, in a sense, almost the reversal of the first. It is the recognition that complete sealings have been found which are altogether innocent of any marks of cloth or rope attachment. For this assertion the essential reference (which I owe to Dr. Allchin) is again Mackay, 1938, I, 349, now quoted in full: 'Though sealings have been found which were certainly once affixed to matting or a rough textile, it should be understood that only seven of the objects under discussion come into this category. The rest were never attached to bales or anything else, nor did they serve to mark merchandise'.

This problem of the sealings may be solved in terms of primitive accountancy. Much is known about Sumerian accountancy from basic studies by Oppenheim, 1948, Jacobsen, 1953, Jones and Snyder, 1961, and others, and it is thus not without parallels that we bring forward into the limelight of the imagination the accountant of some responsible organisation in Harappan times. His task will have concerned the distribution of the goods belonging to that organisation, perhaps mainly in the form of rations, foodstuffs and materials for craftsmen; he will also have recorded the relevant information. To this end he will firstly have labelled those sacks or other containers going out from his stores, stamping upon them a figure whose precise nature is indicated in Section V. At the same time he will have recorded the same information on a second round of clay, keeping this in the appropriate basket in his archives until the end of an accounting period; at that time he will have added all such records together to obtain the total of his outgoings for the period. There will, however, have been this difference in his formulae as we would see the matter in the light of the previous discussion on p. 14. On the two records of the expenditure either the word *mun-la* or *ban-la* might be impressed, and, when the former, this would have been particularly appropriate to the label which 'declares' the contents to be as stated. By contrast, the *ban-la* form would have applied more easily to the accountant's records, and would have been not inappropriate on the label.

Additionally, however, there was another, and probably earlier, variant of the system. It is known only from Harappa, and consisted in the use of very small 'seals' in place of the sealings, at least for the accountant's records. On these 'seals' the writing is in all cases too thin and shallow to allow of their being used in the making of impressions (cf. Vats, 1940, I, 325), and more suitably they may be regarded as 'tallies'. They carry writing on two, or occasionally three, faces; a numeral seems invariably to be present, and so also is a statement of expenditure, commonly *mun-la*. To illustrate the type, text No. (34), already studied in part on p. 13, may be brought forward again,



the rectangles denoting the two faces of the stone. As with the sealings, it is likely that the tallies were kept in a receptacle for outgoing amounts or specific items of expenditure (cf. further in Section V). The obvious advantage of the system would be that they could be used all over again at the end of each accounting period.

It would remain to find a use for the so-called 'copper tablets' which are associated particularly with Mohenjo-daro, and have been found 'in considerable numbers in the buildings of the Late Period' (Mackay, 1938, I, 363ff.). Because of the difficulties of reading and copying only modest numbers have been published (cf. Marshall, 1931, III, pls. CXVII and CXVIII; Mackay, II, pls. XCIII and CIII),—but the sample is sufficient. The standard type carries an animal or other symbol on one side and a line of writing on the other, and the latter have many similarities, and are often identical, with groups of signs which we have already been considering in this study. Thus the *bad-imin* signs are represented, and so is the *mun-la* formula indicating expenditure. But notably absent are references to 3 *ban*, 4 *ban*, 5 *ban*, and other small denominations of this measure which so plentifully occur in the main body of the seals, whereas indications of *ban* in high, or even very high, numbers do prominently occur. This result is necessarily dependent on the study immediately following, but the conclusion which we would place upon it would seem in any case to be logically required by the argument. We propose that the copper tablets were used to preserve in permanent form (and hence the use of a metal) the periodic totals of outgoing expenditure recorded for the individual accounting periods.

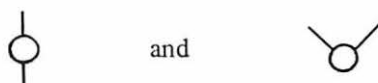
Thus may the four major components of the archaeological picture—the labels, the duplicate impressions, the 'miniature seals' and the copper tablets—be incorporated within a single scheme of solution. [5]

III

THE HIGHER NUMBERS

Our further enquiries in this investigation are cast somewhat in the nature of appendices although they are still relevant to the main theme. The first of these is concerned with the writing of some higher numbers particularly as they relate to the scale of volume.

We may begin by comparing the signs



That on the left is from the Indus script and that on the right is one of the forms of the Sumerian sign *sila*₂, the *sila* being the tenth part of a *ban*. To be sure the signs are different in shape, but they are composed of the same elements and it is no new finding of these pages that the Indus signs tend often to be long and narrow as a result of the restriction of space. Moreover, the proposal receives much support from the text following,



where the supposed *sila*-sign is associated on the one hand with a form of the *ban*-sign (cf. Note [4]), and on the other with a numeral consisting of a full-length vertical stroke. In texts from Harappa, as we have seen, such a numeral is frequently to be understood as 'one' (cf. especially text Nos. (15) to (18) on p. 8); but in the present instance a reading 1 *sila ban* would yield no sense.

Accordingly, we intend, as it were, to place the accountants of the seals (and this does not mean the whole Indus civilisation) onto the sexagesimal system and so read the signs as 60 *sila ban*. The translation would then be '6 ban'. [6]

To test the proposition further we examine two developing patterns. The first is the series



which may now be suggested as writings of the numbers 60, 120 and 180. [7]
The second is the series



Four further texts may also be profitably examined at this point, each again featuring the presumed '5 *sila*' sign and in combinations involving either '60' or '180'. They are:

 (61)

 (62)

 (63)

 (64)

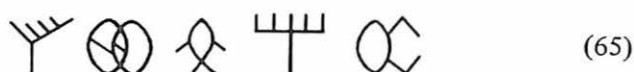
In these examples the last sign on the left is not important: in the first text it is the familiar combination of the number determinative and simple *la*, in each of the others it is WD₂. But otherwise the disposal of the signs in the different groups is interesting. Thus firstly, in text No. (61), the combination of 60 and 5 *sila* provides a total of 30 *ban*. In the text following, No. (62), the product of 5 *sila* and 180 yields 90 *ban*. And in the third example, text No. (63), the total of 60 and 5 *sila* × 180 is 150 *ban*. These three amounts have this significance, namely, that in the higher scale of *gur* to which attention was drawn on p. 13, the quantities involved are respectively 1, 3 and 5 *gur*. Thus also the less elegant writing of 120 *ban* which was discussed above under text No. (60) will fall easily into place in the position of 4 *gur*. As an independent observation it may be noted that the first sign of text No. (64) is probably not, in the present context, to be regarded as a writing of 'one'. The parallelism with text No. (63) suggests that, with the higher numbers, and following a usage common to both Sumerian and Akkadian, the 'one' signs may become expressions of 'sixty'.

We turn finally to a consideration of the signs

 and 

Both qualify to be considered as writings of the numeral '100' in the Indus script, the central stroke providing the element '60', and the four shorter strokes the additional '40'.

In support of this proposal it may be said firstly, that, in more than fifty occurrences (Parpola, *et al.*, p. 42), the signs are followed by the simple fish sign, supposedly the determinative after numbers. Secondly, in the following text,

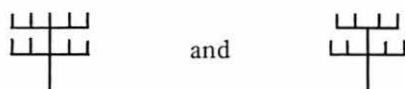


one notices that the signs precede an evident writing of 20 *ban*. The initial sign in this text is *am_x* discussed in Section II (p. 21), and we conclude that the remaining signs form another writing of '120 *ban*', or 4 *gur*. A further example of the signs occurs in the second of the two following texts where there is obviously a close relationship:

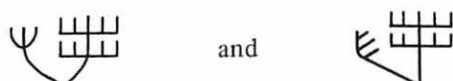


The first of these texts was discussed on p. 26 where it was regarded as a writing of 100 *ban*. The suggestion that is now made for the second text is that it is to be regarded as a writing of 200 *ban*.

Moreover, if the proposal is correct, it will be obvious that the signs



must be taken as the numeral '200'; and it will follow also, and most satisfactorily, that the complex ligatures



will then have to be taken as single expressions of the quantity '200 *ban*'. To support this finding two final texts may be considered. They are:



The first of these we may describe, from the right, as consisting of the enclitic *-am*, the sign 10 *ban*, the sign 60 and numeral determinative (thus confirming the reading of text No. (64) discussed above), and the ligature 200 *ban*, making

a total of 270 *ban*, or 9 *gur*. The second we believe to represent the enclitic *-am*, the sign 10 *ban*, the numeral determinative (although the horizontal stroke creates a slight doubt about the identification), the unit 90 *ban* and the ligature 200 *ban*, making a total of 300 *ban*, or 10 *gur*. Thus an acceptable result is obtained. [8]

It may be said that, in the above account, only selected texts have been used, and many others of a like kind are to be found in the various seal collections. They include texts whose totals do not work out exactly in terms of 100s or *gur*, but it must also be pointed out that many numbers and amounts appear to be missing altogether,—that is, if one should think that the accountants of the seals will necessarily have had a full range of figures at their command. However, it may have been that the real genius of the Indus numerical system lay not so much in the individual seal, as in the use which could be made of combinations of seals. One could ask, for example, whether the measure of 210 *ban*, or 7 *gur*, was not usually expressed by means of two seals, one for 200 *ban* and another for 10 *ban*, thus explaining why no single seal for the full amount seems yet to have been found. Indeed, such a text as the following,



may itself indicate that the amount of 10 *ban* is to be considered as additional to some previous amount, for the reason that the determinative after (or between) numerals appears as the first sign. Altogether, the need at the present time is for the discovery of ever more sealings, or even a fragment of 'book-keeping' which we feel sure must have existed in some form, which may assist towards the solution of the above problem.

IV

THE DIRECTION OF WRITING

Our next enquiry concerns the problem of the direction of writing of the Indus script. In some respects, and certainly as it appears from such new insight as we may think to have achieved, the matter is more complex than it has hitherto been thought to be, or, indeed, than even this account has so far hinted.

In great part, however, the question of the direction of writing is not problematical. An initial lead in the matter was given by C.J. Gadd, apud Marshall, 1931, pp. 409ff., who concluded that the direction of writing was ordinarily from right to left. This proposal was assisted by the analysis of an unusual seal, known as H 173 in the original account and later published by Vats, 1940, as No. 254. The seal has writing in three planes along three of its sides—top, left side and bottom—and Gadd argued that the seal could only be read by beginning at the top right-hand corner and then continuing to read towards the left. Some further arguments from early studies which are thought to favour either the same conclusion or the opposite, are ably summarized by A.H. Dani, 1963. However, three years later an important paper was published by B.B. Lal, 1966, who reproduced photographs from recent excavations at Kalibangan of two potsherds on which signs had been roughly scored with a sharp-pointed instrument. These signs cut into each other at several places, and by carefully determining which signs must have been written first, and noting also the significant detail that, by its inordinate length, the extreme left-hand stroke qualified to be regarded as a 'flourish' at the end of the line, Lal concluded that the writing was indeed from right to left.

Yet another argument for this order results from an examination of what are technically known as 'overruns'. This feature of writing concerns the carry over of signs from one line to another, and was first, I believe, examined by Ross, 1939. The matter was alluded to by Parpola, *et al.*, p. 18, but has received the fullest and best treatment at the hands of G.V. Alekseev, 1965. An example which all three of these studies have in common concerns two seals from Mohenjo-daro, published respectively as Marshall, No. 555, and *ibid.*, No. 247. It involves a run of four signs which are identical in the two texts, except that the first series is written in one line in the order 4-3-2-1, and the second in two lines in the order $\begin{smallmatrix} 2-1 \\ -3-4 \end{smallmatrix}$. It is this second text which establishes the direction of writing as being from right to left, and, as I owe to Prof. O.R. Gurney, it was precisely this kind of evidence which led the Danish scholar Carsten Niebuhr in the 1780's to identify the direction of cuneiform writing as from left to right.

A point made by Alekseev is also worth noticing, namely, that on many seals which carry a comparatively large number of signs, 'there is a tendency towards

slight compression of signs on the right side—that is, on the left side of the impression'. This I believe to be a generally correct observation.

There are thus four lines of evidence—the seal (from Harappa) with writing on three sides, the potsherds from Kalibangan with overlapping signs, the overruns and the compression of signs—which support the conclusion that the Indus writing ran normally from right to left. This conclusion we accept as the basic rule, and indeed the majority of texts already presented in this study accord well with this result. It is the opposite order to that of Sumerian, but in this connection we ought perhaps to think in terms of the seal-cutter, who will doubtless have worked for the most part in the direction of the mirror-image of the texts.

Nevertheless, the position adopted in this paper does allow for some exceptions to the general rule, for there do appear to be instances where small units of signs are not found in the expected order.

The point will need investigating carefully, and we may begin by demonstrating that variation in sign order is a feature of Sumerian also. Thus in Sumerian the writing of the name of Ur-Nanshe, an early king of Lagash, is found both in that order and in the order *Nanshe ur* (cf. Sollberger, 1956). The word *lugal*, 'king', might itself be written in the order *gal lu₂*. Jestin, 1937, draws attention to the writings—not understood—of *si nu* and *nu si* (p. 29), and of *si nu sag* for *sag si nu* (p. 27). Goetze, 1961, edits an early text from Kish where the initial line *An-lugal-kur-kur-ra*, '(to) An, king of the world', is actually written in the sequence *lugal an ra kur kur*. A few examples, such as the writing *en zu* to express the name of the moon-god, Suen, have survived even into late Babylonian times. In most, if not all, of such instances, the order of signs was determined by factors other than that of the spoken word.

If we now turn to the Indus script we find features of much the same kind. Possibly the most difficult example to understand occurs in connection with *bad-imin-am*, where the signs are as if written from left to right. It seems possible, however, that the actual order of '*am imin bad*' has been determined by the need for conformity with texts of the pattern '*am numeral ban*'; moreover, that the overall order is still to be regarded as from right to left may be seen from the fact that the word-dividers remain as usual on the left (cf., for example, in text Nos. (1) to (5)).

Another departure from the general rule of sign order concerns the position of the prefix *mun* in certain writings of *mun-la*. The reversed order of the signs



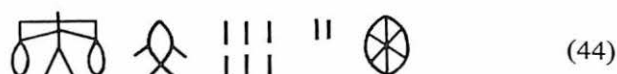
is explainable on the grounds that the first sign incorporates the determinative after numerals; such, we believe, may often have been provided by a previously impressed seal. There need also be no irregularity in the three following texts,



(14)



(38)



(44)

if, as we suggest, the old scales sign was originally used to represent *munla*, or *banla*, by itself, and without the assistance of any prefix at all. But in the following case



(34)

no suitable explanation for the sign-order is obvious, and the example may be listed as divergent.

Amongst further examples we may cite the two following texts,



(70)



(71)

which may reasonably be thought to convey the same meaning despite the different sign order. On a point of detail comparison with previous texts may suggest that the first and last signs of the two groups—the first sign in a slightly variant form—are only other ways of writing the numeral 180 (60 within a ‘frame’ of 120). [9] Similarly, by comparing a new text with an old one,



(37)



(72)

(the latter is also available for study on Plate I, g), it may be supposed that both mean ‘12 shekels he/they have weighed out’, and again despite the variant order. It is to be noticed that, in text No. (72), the right-hand of the two overlapping shekels which compose the shekel-sign appears to have been displaced downwards to make a narrower (?) sign, and that we infer also the proposition



A rather longer text is



which we may first read as . . . *silā la am mun* WD₁ *bad-imin* WD₁. However, this writing is so close to a more orthodox . . . *silā mun-la* WD₁ *bad-imin-am* WD₁, that it is difficult to believe that this is not the order intended. A final example concerns a text



where the signs are placed unusually in the lower part of the seal. It has also to be explained that a unique five-rayed symbol (cf. the reproduction of the seal on Plate I, *d*) occupies much of the field in the overall design, so that the positioning of the signs may have had something to do with their individual shapes and the space available. In any event it seems necessary to begin the inscription at the bottom right-hand corner. One then reads in a vertical direction *bad-imin*, the '7-sign' being composed of the U-shaped '5' with inserted '2' as already suggested for text No. (49). From this position it is quickly seen that the remaining signs form an anagram (if this term may be used) and read *mun-la* WD₁, as commonly, in the order 1–3–2.

Our conclusion, therefore, is that the direction of writing of the Indus script is from right to left with permitted exceptions in certain stereotyped and other phrases.

UNITS OF ACCOUNTANCY : THE SIGNS FOR "GRAIN" AND "SILVER"

As it has been so far presented, the theory which is being pursued in these pages may be thought to have two main weaknesses. The first is that nothing has been said on the subject of the commodities which one might expect to find mentioned if distribution is a major theme of the texts. Secondly, one might reasonably ask for more information concerning the administrative authority behind the expenditures.

The present section is devoted to the first of these problems,—and particularly to the search for a grain-sign whose existence has been many times inferred in this paper with its constant reference to the *ban* unit of measure. This we think to have found in a sign which is written



Of the forms given that on the left most probably represents the standard form of the sign. The two to the right are narrower and appear to have suffered compression from adjacent signs in the restricted space of the seals.

The sign has no parallel in Sumerian writing. As a result, its 'identification' is based solely on the way in which it extends, or even completes, the arguments of the previous sections. Neither the reading of the sign nor the nature of the grain (if the theory should prove correct) can be presently known. Consequently, the sign is provisionally represented as GRAIN, and is discussed as the grain-sign.

The sign is common, and our examples need only be selective. In fact ten examples have been chosen, which together show the sign in a number of different positions and combinations. They are set down below in three groups.

𐎶𐎵 𐎶𐎵 (75)

𐎶𐎵 𐎶𐎵 || '' 𐎶𐎵 (76)

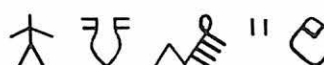
𐎶𐎵 𐎶𐎵 𐎶𐎵 [] (77)

𐎶𐎵 𐎶𐎵 𐎶𐎵 𐎶𐎵 (78)

The above group is in a sense introductory. The first text, if read simply as GRAIN WD₁ would appear to have been supplementary in nature; it could presumably have been added to any text which expressed a quantity (of grain) using either numerals or a combination of numerals and the *ban*-sign. To this idea the three following texts offer good support. In text No. (76) it is seen that the numeral '2' (or, '120') precedes the grain-sign, and in text No. (78),—the fourth of the group,—the equivalent position is taken over by 10—*ban* and the determinative after numerals. Text No. (77) is incomplete, but its importance is that the writing is scratched on a potsherd, and indeed, many will recognise it as being one of the texts from Kalibangan which Lal used in his study of the direction of writing (cf. above, in Section IV). It has been included because only one kind of restoration seems possible in the break at the beginning of the line. We think either a numeral, or such a sign as the 10—*ban* sign (as provided by the final example), can alone have preceded the determinative after numerals, whereupon the grain-sign fits into place accordingly.

The second of the three groups consists of three examples, as follows:

 (79)

 (80)

 (81).

These texts differ from those considered in Nos. (75) to (78) above in that they include, at the left-hand side, an indication of expenditure involving the *la*-sign in three of its forms. It will also be noticed that if, as seems abundantly clear, the fourth sign from the right in text No. (80) is a word-divider, the two end signs are again seen to be simple variants of each other (cf. previously in the discussion under texts (44) to (47)).

However, the most helpful of the three examples is No. (81), which may also be seen in the reproduction on Plate I, *i*. It reads beautifully from right to left: 9 *ban* GRAIN *munla* WD₁, '9 *ban* of grain (X) has weighed out', and the medial position between *ban* and *munla* is altogether satisfactory for taking the supposed grain-sign in this way. What one may particularly learn from texts (79) and (80) is a lesson in word order. These texts carry no indication of number and measure which were the 'variables' of the sentence. What, we suggest, they do provide are the unchanging 'constants' of the sentence, namely, the enclitic —*am*, the grain-sign, and an indication of expenditure, usually *munla*. Thus in this scheme of division the numerals will have been relegated to the *end* of the sentence. It is in fact in this position that they are found in texts (35) to (37) on p. 14 (cf. also, in part, in text No. (83) closely following).

The third group of examples relative to the grain-sign consists also of three texts:

 (82)

 (83)

 (84)

These texts are interesting, for, despite appearances, they have much in common. The first consists of the enclitic *-am* (partly damaged), the numeral 200, the determinative after numerals, a sign which is evidently *sila* with *la* 'simplex' as sign-reader, the supposed grain-sign, and the large scales sign. With the necessary conversion of '200 *sila*' into *ban*, the translation becomes, '20 *ban* of grain (X) has weighed out'.

As for texts (83) and (84), these are thought to convey identical meanings, namely, '100 *ban* of grain (X) has weighed out'. The details are as follows. Text No. (83) begins with the 10-*ban* sign, is followed by the unit *mun* and *la* 'simplex' over the determinative after numerals, is followed again by the unit '90 *ban*' (specifically 5 *sila* × 180), and is concluded by the supposed grain-sign and *WD*₁. In text No. (84) the sequence is the enclitic *-am*(A + AN), the grain-sign, the numeral 100, *munla*, and *WD*₁.

There is now one text which invites consideration on its own account:

 (85)

This text comes from Lothal (where the grain-sign seems not to occur) and so it may be separated from the texts cited above which derive from Harappa, Mohenjo-daro, Chanhudaro and Kalibangan. It is not easy to describe, but in accordance with the argument of p. 32 and note [9], it seems initially to begin with a numeral, probably 200 (120 + 80). In second position there stands the word-divider with inserted 60(?), and this is followed by the determinative after numerals. The unit *mun-la* seems then to follow (the *mun* being in the form determined on p. 33), and four strokes surround it. However, in the context of high numbers it is easier to think in terms of '240' (4 × 60) than simply '4', and, indeed, the newly introduced fifth sign may even have been a 'conversion-sign' with the meaning, 'short single strokes to be read as 60'.

In any event, and whether or not the appealing total of 500 (200 + 60 + 240) will eventually prove correct, the text seems certainly to be concerned with a large expenditure measured in *ban*, although this term, as commonly, must be

mentally supplied. It is accordingly of much significance to discover that the final sign of the line is altogether comparable with the Sumerian sign še , which expresses the meaning of 'grain' or 'barley'. In early texts the sign occurs with a variable number of branches, but the following forms

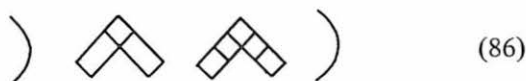


are amongst those which have been recorded from Uruk and Jemdet-nasr (cf. Falkenstein, 1936, No. 111).

Amongst other 'commodities',—and we shall shortly be forsaking this term to make way for another,— we have only been able to isolate one additional kind from the script of the Indus seals. Our progress in this direction results from a comparison of the signs



those on the right being early forms (the one in an original position, the other in a later, turned, position) of the Sumerian *kug*, 'silver'. The sign is not common, but the following text



which appears to read 5 *gin kug* 5 in the order 1—3—2—4 goes some way towards confirming the proposal. In this text the third sign will be seen to be the shekel-sign which was discussed in connection with text Nos. (37) and (72), and the whole is then thought to be a symmetrical arrangement representing '10 shekels of silver'. It does not seem convincing to suppose that additional signs are needed to turn the sense into '5 shekels of silver, 5 [shekels of . . .]'. In any event it is obviously appropriate to find shekels and silver associated together. [11]

But now there is one matter which must be squarely faced in connection with the whole purpose and meaning of the Indus seals. There are indeed many signs which lie beyond present frontiers of understanding, and it is naturally arguable that a whole range of distributed commodities may perhaps remain hidden in these signs. However, we have to state clearly that, on present evidence, such a possibility seems altogether unlikely. One argument against this conclusion is that the unknown signs appear largely in the wrong places if they are supposed to be the names of either raw materials or finished goods. Moreover, if such were indeed to be found, we might have expected to make at least some headway towards understanding them in simple terms.

I believe the key to the problem is to be found in the words 'grain' and 'silver'. As may be seen even in Hammurapi's Code, both grain and silver were anciently used as monetary standards, and certainly silver was much used as a unit of accountancy. The latter point is important. It was first shown clearly in a basic study by Paul Koschaker, 1942, and its wider relevance was examined also by M.I. Finley in a study of the Mycenaean tablets, 1957. In the briefest terms, Koschaker's main discovery was to see that references to 'silver' in second millennium documents from Babylonia had nothing to do with either buying or selling or prices or payments, or even silver itself as such. The silver simply represented a convenient standard whereby, for book-keeping purposes, all kinds of distributary operations could be recorded under a single denomination. In one text, for instance, dated to the fourth year of Samsu-iluna, Koschaker noted that a consignment of fish, dates, wool and onions had been accounted as the equivalent of $2/3$ mana and 3 shekels of silver, and registered accordingly. But no quantities were specified in connection with these items, nor were any further details given. It was the total reckoning in silver which was deemed important.

It is this picture, *mutatis mutandis*, which we may now advance to explain the main purpose and function of the Indus seals. In fact, the chief alteration which has to be made is to change the accounting standard from silver to grain, although the former may also have been used. We may then, in the mind's eye, visualize a massive distributary operation taking place between major cities or centres of the Indus world. Foodstuffs, textiles, stoneware, wood, minerals, and in fact everything which formed a part of the civilisation of the times, will have gone forth from centres of collection,—but all that we are actually permitted to see are the accountants' entries in terms of units of 'grain'. This theory will explain why it is that many large amounts of 'grain' are so often encountered in the Indus texts. It will also explain why the seals seem to deal so consistently with 'grain', to the apparent exclusion of other matters. Nevertheless, grain itself must also have been involved within the category of 'foodstuffs' mentioned above, so that it may thus have played a double rôle in the operations which we envisage.

If one should attempt to fill out the scene, it may be thought that the seals are far more likely to have been used internally than externally, and that somehow the whole procedure closely involved all the member-states contributing to the system. It will be the task of the following section to explore a little more deeply into this territory.

AUTHORITY AND THE ANIMAL SYMBOLS

If it could have been possible, this final section of the argument should logically have been written first rather than last since it concerns the subject of the much-featured sentence, '(So many) *ban* of grain (X) has weighed out'.

The true identity of this subject was a difficulty in the reconstruction for a long time, but it became finally settled with the conclusion that the enclitic *-am* must have been attached to it. Then, firstly, it followed that *bad-imin-am* represented the subject in some instances, and secondly, that the animal symbol plus *-am* must have represented it on others. Of assistance in the matter is text No. (54). This text (cf. p. 21) may begin *bad-bad-dam*; and since, in this case, the seal is of the 'rectangular' variety and there is no animal, it is obviously necessary for the subject to be written out. By contrast, text No. (81) (reproduced on Plate I, i) was considered above as virtually complete with its reading, 9 *ban* GRAIN *munla* WD₁, '9 *ban* of grain (X) has weighed out'. It is made altogether complete with the conclusion of the animal (unicorn) as subject.

It may be said that much has been written on the animal symbols of the seals, mainly from the religious point of view. In fact, we suspect that it was partly this approach which led to the prominent opinion in early studies that the seals were amulets. However, nothing that we can see prevents their being intimately connected with the subject-matter of the writing, so that if the latter proves to be generally economic in character, it would be sensible to accept them into the same or a similar field.

But the essential problem would seem to be that, if the animals are symbols, then what precisely do they symbolize? In the remainder of the section we address ourselves very largely to this question.

The argument which we attempt to develop will take us firstly to the Sumerian king list, a document which is easily accessible through a basic study by Jacobsen, 1939. Included in this list are a number of early names of pre- and post-diluvian kings which fall into a definite pattern: they are the names, partly of Sumerian and partly of Akkadian origin, of animals, and Jacobsen called them the 'animal-kings'. They include A-lulim, 'staghorn', Kalibum, 'dog', Qalūmu, 'lamb', Zuqaqīp, 'scorpion', Mashda, 'gazelle', and Arwium, also 'gazelle'.

From this somewhat tame beginning the further point may be made that many later kings and even gods were often identified in some way with animals, many being now of a more ferocious kind. Thus among kings, Enmerkar in line 182 of 'Enmerkar and the Lord of Aratta' is called *muš-sag-kal-ki-en-gi-ra*, 'the leading serpent of Sumer'. In a self-laudatory hymn, Shulgi, second king of the Third Dynasty of Ur, describes himself as *pirig-ka-duh-a-dutu*, 'the roaring lion of Utu (the sun god)' (Shulgi A, 14). Even Hammurapi of Babylon in a text

published by Sjöberg, 1961, could style himself as *ušumgal-lugal-e-ne*, 'the great dragon of the kings'. Amongst gods, an address to an unnamed god (cf. Falkenstein, 1938) begins *lugal-gud-alim-igi-gunu*₃ . . . —*mu-ur*, 'to my king, the bison with the coloured eyes (of pure birth?)', and in this connection it is worth noticing that a lexical text referred to by the Chicago Assyrian Dictionary (D. 164) even equates the Sumerian *alim*, 'bison', with Akkadian *šarru*, *kabtu*, *ditānu* and *kusarikku*. Of these words, the last two are the equivalent words for 'bison', *kabtu* means 'a person of honour or influence (at a royal court)', and *šarru* means 'king'. Kingdoms were also involved in the imagery as may be seen from such a phrase as *uri*₂^{ki} *am-gal u*₃-*na gub-ba*, 'Ur, the great aurochs, that stands ready for battle' (Second Ur lament, line 51).

These examples are selected only, and many more of a like kind will be found in the long and comprehensive survey of Heimpel, 1968. They suggest, since metaphor alone seems insufficient to explain them, that the Sumerians did actually sense some direct connection between the qualities of their leaders and those of animals. And on the basis of the seals we make bold to suggest that the same was true of the Indus peoples also.

If this was so, then our argument could mean that the animals of the seals represented the kings or rulers of the various ethnic or other units which made up the peoples of the Indus world at this time. It is proposed that, when impressed upon a label, the animal would have been both an identifying symbol and a symbol of authority, although, as we conclude below (p. 42), the 'authority' was essentially of a single kind. Of the mythological animals, none is more common than the unicorn—in Sumerian a *gud-si-dili*, or 'one-horned bull', had some existence in thought before giving its name to the battering ram—and this may reasonably be thought to have been the main symbol of Bad-imin as a whole. The possibility that the strange 'composite' animals may sometimes have represented the device of a ruling partnership or confederacy(?), may be considered.

There is, however, one further aspect of the matter which it will be convenient to discuss at this point. It is attested from all the sites that the several individual animals of the seals such as the elephant, bison, tiger and others, were not restricted to specific areas. They are found scattered throughout the sites in varying percentages. Those which have just been mentioned, for instance, are found at Harappa, Mohenjodaro and Chanhu-daro. The elephant and bison are found also at Lothal. The more elaborate device of the tiger who looks upward, as if to his source of power or authority, to a tree-deity portrayed beside him, is known from Mohenjodaro (cf. Mackay, 1937, No. 522), Chanhu-daro (cf. Mackay, 1943, Pl. LI, No. 19 and p. 147), and Kalibangan (cf. *Indian Archaeology*, 1962-63, Pl. LXII, C, top right-hand seal). One theory alone seems capable of explaining such evidence. It is that the kings or rulers of Bad-imin must have ruled 'by rotation', even as was the case among city-governors of the Ur III empire in Sumer, who had the responsibility to supply, in succession, the sacrificial needs of the country's religious centre at

Nippur (cf. Hallo, 1960). Thus when any one king was ruling, seals bearing his animal would be used all over the region, and when his *bala* (as the Sumerians called it), or 'turn of office', was over, another king and other seals would have taken their place. So we are led to believe by the archaeological evidence.

We conclude with a consideration of three points of detail which are relevant to the general theme of 'animal-kings' as proposed above.

The first is concerned with the 'humped bull' or *bos indicus*, as it occurs on the seals. According to a personal count, this animal is found forty-four times in the full collection of seals, thirty-nine times on seals from Mohenjo-daro and five times on seals from Harappa. The latter point is not of concern: it is sufficiently answered by the findings of the previous paragraph. Indeed, we believe it is only due to the accident of archaeological discovery that a much wider distribution for the animal has not so far been revealed. Nevertheless, the existence of an especially close link between the bull symbol and Mohenjo-daro is surely to be admitted on the evidence; it may accordingly suggest that the bull was the symbol of rulership at that city throughout much of its history.

We turn, secondly, to the consideration of a familiar and much-studied seal which comes also from Mohenjo-daro (cf. Marshall, 1931, 53; Mackay, 1937, 335f.; Sastri, 1957, 7ff.; Wheeler, 1968, 105). It depicts a seated deity attended by six animals,—the elephant, rhinoceros, tiger, buffalo, antelope (restored) and mountain goat. Admittedly any deity is a 'religious' figure; but such a seal need not, we think, fall outside the economic theory, for one could easily suggest that the god's place on the seal was as the supreme ruler of his city-region. Moreover, if the six animals could represent the rulers of six other regions, it would mean that all of the 'Seven Cities' were thus included on the seal, with the deity necessarily representing Mohenjo-daro where the seal was found. On this explanation it would be far less certain than previously that the deity was the Paśupati form of Śiva as 'Lord of Beasts'. The proposal had always to meet the difficulty that the animals of the seal occur often, and in the same attitudes, upon other seals and so might obviously be related to the latter group.

We turn, thirdly, to the proposal, briefly mentioned above, that the ubiquitous unicorn was the standard form of representation for Bad-imin as a whole in the iconography of the times.

There are three lines of approach. In the first place the unicorn dominates the whole scene. It occurs forty-four times in the seals from Chanhu-daro out of a total of fifty-five. It occurs two hundred and thirty-nine times in the seals from Harappa out of a total (excluding the 'tallies') of about three hundred and thirty. Some seven hundred more examples occur in the Mohenjo-daro collections (cf. Marshall, p. 68; Mackay, 1937, p. 326) where the total of seals found is in excess of 1200. These figures are impressive, and, within the terms of the present theory, may suggest that the 'unicorn' represented a territory far greater in area than that of any of the 'animals'.

For the second argument we return to the 'sentence' of expenditure. The following texts are typical of many,



(19)



(81)

and we have seen that both seem incomplete for want of a subject. However, from other texts (cf. Nos. (1) to (5) and (54)) we have recovered the words *bad-imin* and *bad-bad*, and if these are then substituted for the unicorn of the seals we may read respectively: *bad-imin*(UNICORN)—*am* 5 + 1 *ban* LA, 'Bad-imin has weighed out 6 *ban* (of grain)', and *bad-imin*(UNICORN) 9 *ban* GRAIN *munla* WD₁, 'Bad-imin has weighed out 9 *ban* of grain'. It is nevertheless to be noted that, in our opening text,



(1)

the familiar signs of *bad-imin-am* accompany a rhinoceros-symbol, so that even the animals seem to qualify for this 'reading'. The observation, in fact, is of much importance. It suggests that both unicorns and animals performed the same function on the seals of representing Bad-imin—the former perhaps permanently and the latter during specific tenures of kingship—and that otherwise there was no difference in their manner of use.

Our third approach to the identity of the unicorn is of a different kind. It concerns the curious seal reproduced on Plate I, *d*. In this seal the central feature has proved difficult to identify; it has been described as a 'skirl device' with 'five curvilinear arms' (Mackay, 1937, 648), or as a 'whorl with . . . five featureless lobes' (Wheeler, 1968, 104), or, again, as a 'starfish' (B. and F.R. Allchin, 1968, pl. 14). But an explanation on a far larger scale seems also possible. This would interpret the figure as an attempted reproduction of the Arabian Sea,—the gulfs of Cambay, Cutch, Oman and Aden(?) being represented by four of the arms, although the fifth (on the unknown southern side) would be no more than imaginary. As thus explained the poorly-drawn unicorn's head would fall easily into place as a symbol of Bad-imin,—indeed, it would seem to provide the whole reason for the Sea's presence in the design. Moreover, the signs below the unicorn provide much encouragement for the interpretation. As determined in the study of text No. (74) they are thought to read: *bad-imin mun-la* WD₁, 'Bad-imin has weighed out'.

VII

CONCLUSION

It would be appropriate to end with a short concluding statement which may, at the same time, take note of some of the wider issues involved.

Let it be said that, by all accounts and following a growing consensus of opinion, the ancient term for western India as a perhaps somewhat vague geographical area was Meluhha. Within this area we have been led to subsume the sometime existence of a consortium of city-states(?) known anciently as Badimin, or 'the Seven Cities'. This term is Sumerian, and with what success Sumerian may also be used to unlock the further secrets of the Indus script the reader may judge.

It is in any case important to stress that no claim is being made concerning the physical character of the people who lived in the Indus cities. Without other evidence one is not permitted to equate linguistic and racial criteria. What perhaps we may have discovered is that the language of the 'Dilmun route' from the Indus to Sumer was Sumerian, or a form of it, at both terminals, and this would not be greatly surprising although we are only permitted to see the eastern form of it as a language of accountancy. The evidence from statuary is that the comparatively few pieces recovered from Indus sites portray facial characteristics which are different from those seen on their counterparts from Sumer. The more strictly anthropological evidence points to mixed populations—'the skulls are, without doubt, not a homogeneous series' (Sewell and Guha, 1931; cf. Bose *et al.*, 1965).

As to the scripts, the result of our enquiry is little different from that which was admitted as a possible judgement at the beginning: the Sumerian and Indus scripts have something in common but it will always be important to stress the differences. In fact, to judge from the sample of texts and signs which we have used, the differences greatly outweigh the similarities, although the latter are fortunately sufficient for some headway to be made with regard to elementary reading. It would be compatible with this conclusion to suppose that the two scripts branched out from a single stem at some early period and that original features are preserved in both. Thereafter both advanced along their own individual lines, one of the developments of the Sumerian script being that it turned the axis of writing through an angle of 90 degrees so that tall and thin signs such as the Indus script essentially retained became long and narrow signs in the new direction.

We end with a postscript, which is concerned to make a plea for the study of proto-Elamite in connection with the above results. This is a field which the writer does not command, but progress in the comparison of proto-Elamite and Sumerian has been made by Falkenstein, 1936, and Meriggi, 1969, and the

convincing proposal that many of the proto-Elamite tablets are concerned with numerals and units of measure (cf. now Brice, 1962) is of much interest in the light of the comparable proposal which may be advanced for the Indus script. The essential material comes from three sites, namely Susa and Tepe Sialk in Western Persia and Tepe Yahyā in south-eastern Persia, and it is of interest in the present context that 'some of the tablets recovered by us at Sialk had been perforated to take a cord by which they could be tied to merchandise' (Ghirshman, 1954). The stimulating new study of Georgina Herrmann, 1968, which argues that the overland lapis lazuli route into Sumer from the east passed through such sites as Sialk and Susa, belongs indispensably to the reading list. Equally, the importance of Tepe Yahyā as the centre of an international trade in steatite (Lamberg-Karlovsky, 1970 and 1971), is another of the new and exciting ideas which may soon be fully dominating our reconstruction of the ancient economic scene. [12]

NOTES

[1] (page 1). I am grateful to Mr. K.R. Norman for drawing my attention to this publication.

[2] (page 10). The statement may be qualified by saying that, in a few instances on the Mohenjo-daro seals, some signs do appear to behave somewhat as 'men'. This is true, for instance, of the large scales sign as seen most clearly in Mackay, No. 421, and of the unidentified sign of *ibid.*, Nos. 57, 546 and 630. But the development, if such it was, was short-lived, and is best regarded as secondary.

[3] (page 17). It may be noted that, with the exception of the two word-dividers whose frequencies alone offer a sufficient basis for distinction, no attempt has been made to assign index numbers to the proposed sign values. It is considered that much further evidence should be available before work of this kind is undertaken.

[4] (page 19). It is to be noticed that text No. (51) introduces in the third position from the right a sign which is almost certainly to be regarded as a by-form of the *ban* (measure)-sign (so also Parpola, *et al.*, p. 35). It behaves in all respects like the sign of texts (6) to (13), etc., which has been made familiar in this account, and it may be seen in miniature in many examples of the presumed '10 *ban*' sign. Further examples of the sign may be seen in text No. (52) immediately following, and in text Nos. (58) and (65) in Section III.

[5] (page 24). Dr. F.R. Allchin has kindly drawn my attention to the peculiar archaeological context of the miniature seals. They have so far been found only at Harappa, and come mainly from early levels of an area in Mound F beside the old river-bed where deep digging was found to be possible (cf. in general Vats, 1940, 92 and 324f., and plan, Pl. XIX). The find spot itself is not associated with any building, but nearby were situated the granaries and some eighteen or more circular brick platforms whose centre, in each case, was evidently a wooden mortar for the pounding of grain (Wheeler, 1968, pp. 31-33). It could thus well be that the seals in question had a sometime use in grain-accounting.

[6] (page 25). It will be noticed that the two initial signs of the example seem, by themselves, to express the quantity of 6 *ban*. Consequently, the final *ban*-sign does not appear to be strictly necessary. It is in fact absent in the parallel example concerning '30 *ban*' (text No. (61)), which is discussed later in the section.

[7] (page 25). With regard to the variant form of '180' made with slanting strokes, it is worth suggesting that this form served simply as a means of avoiding possible confusion with the numeral '3'. A writing of the latter numeral by using long vertical strokes may be seen in text No. (17) on page 8. The examples derive mainly from Harappa.

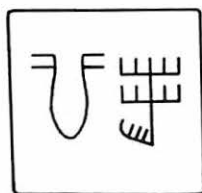
[8] (page 29). Three additional points may be made in this note with regard to the sign for '100'.

The first is that, on the authority of Falkenstein, 1936, p. 49, there is evidence that both the 60-system of counting and the 100-system were in use in early settlements of Uruk and Jemdet Nasr in Sumer. The point is of much comparative importance to our present findings.

In the second place we may add the detail that a sign which appears identical in shape to the presumed 100-sign occurs in both Sumerian and proto-Elamite. In Sumerian (which is alone the province of this paper) the sign stands for an adjective *gal* meaning 'great' or 'old'.

As a sign, however, it has not been explained, and the question arises as to whether it may not still be reflecting the original meaning since a person of 100 (years) is certainly to be regarded as old.

Finally, we take the opportunity to consider a single example from the collection of copper tablets found at Mohenjo-daro. It was published by Mackay, 1937, Pl. CIII, No. 7,



and belongs to the variety of tablet which carries a number on each face. In this instance the number is combined on the left with the *ban*-sign, and seems evidently to be 500, making '500 *ban*' (in detail $5 \times 60 + 200$ *ban* WD₁). This total with perhaps that also of text No. (85), q.v., represents the highest single amount which we may think to have discovered in the Indus writing. For the relevance of this finding to our general conclusion concerning the copper tablets, cf. above, p. 24.

[9] (page 32). In support of the proposal that numerals might sometimes be encased in a 'frame' by the addition of horizontal strokes, attention may be drawn to the parallel texts,

𐎧𐎺)) 𐎧𐎺 𐎧𐎺 (36)

𐎧𐎺 𐎧𐎺 𐎧𐎺 𐎧𐎺 𐎧𐎺 𐎧𐎺 (87)

where, in each case, the second sign from the left is suggestively the numeral '10' ($5 + 5$). The first of these texts is a repetition of that to be found on p. 14.

[10] (page 33). Two further texts which speak for the proposal are the following,

𐎧𐎺 // 𐎧𐎺 𐎧𐎺 𐎧𐎺 " 𐎧𐎺 (88)

𐎧𐎺 ||| 𐎧𐎺 𐎧𐎺 𐎧𐎺 𐎧𐎺 𐎧𐎺 (89)

in both of which the two central fish signs may be read as *mun-la* and despite the different sign order. Additionally the texts would seem clearly to establish the nature of the second sign in text No. (89); it must be a by-form of the sign 'A' which appears in its characteristic form of two short raised vertical strokes in the text above. A further variant of the sign is to be seen in text No. (87), cf. previous note.

[11] (page 37). It is worth mentioning that, in favour of the suggestion regarding a 'symmetrical arrangement', is the following text,



(90)

where the same two crescent signs encase the numeral '12'. Moreover, the example is perhaps useful in another way in that, while simple addition ($10 + 12$) would produce the somewhat unconvincing total of 22, multiplication (10×12) would yield the much more acceptable figure of 120. Accordingly it is possible that a multiplication factor was also involved in the sign arrangement of text No. (86), so that, by using only simple numbers in an adjacent position, one could continue the series to write '20, 30, 40, etc., shekels of silver', as required.

[12] (page 44). As I owe personally to Prof. Anne Kilmer of the University of California, Berkeley, a further important name in proto-Elamite studies is that of Francois Vallat. In a recent work, 1971, Vallat examines 29 new tablets and fragments discovered in the Acropolis at Susa during the three campaigns 1969-1970 and 1971. Part of his summary is worth repeating here:

'Ainsi, le sondage stratigraphique de l'Acropole nous permet tout d'abord de noter une évolution dans l'écriture proto-élamite. Au niveau 17, les documents écrits ne comportent que des chiffres. Les premiers signes apparaissent au contact 17A-16. Entre les niveaux 16 et 14B, les signes s'affinent et s'ordonnent mieux sur les documents tandis que les tablettes plus plates, plus rectangulaires, plus grandes sont moulées dans une argile travaillée avec plus grand soin.

'Ensuite, le matériel épigraphique recueilli, en démontrant la contemporanéité de Sialk IV, Tépé Yahyâ IV C et Suse 17-16, semble indiquer une vaste diffusion de la civilisation proto-élamite à cette époque.'

SOURCES OF THE ILLUSTRATIONS

Sealings

Plate I, *a*: from Lothal (*Indian Archaeology*, 1957–58, Pl. XX, 2).

Plate I, *b*: from Rupar (*Archaeological Remains, Monuments and Museums*, I (1964), Pl. II, A).

Seals

Plate I, *c* (Text (6)): from Mohenjo-daro (E.J.H. Mackay, *Further Excavations at Mohenjo-daro*, Pl. LXXXVI, No. 180).

Plate I, *d* (Text (74)): from Mohenjo-daro (E.J.H. Mackay, *ibid.*, Pl. C, "G").

Plate I, *e* (Text (11)): from Mohenjo-daro (E.J.H. Mackay, *ibid.*, Pl. LXXXV, No. 127).

Plate I, *f* (Text (60)): from Harappa (M.S. Vats, *Excavations at Harappā*, Pl. LXXXVIII, No. 81).

Plate I, *g* (Text (72)): from Mohenjo-daro (Sir John Marshall, *Mohenjo-daro and the Indus Civilization*, Pl. CXIII, No. 470).

Plate I, *h* (Text (23)): from Mohenjo-daro (Sir John Marshall, *ibid.*, Pl. CXIII, No. 414).

Plate I, *i* (Text (81)): from Harappa (M.S. Vats, *Excavations at Harappā*, Pl. LXXXVII, No. 47).

PLATE I



a



b

cm



c



d



e



f



g



h



i

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SELECTED SEALS AND SEALINGS

For explanations see opposite

TEXT REFERENCES

Note: In the following references numbers which are provided with the prefix H (= Harappa) are to be found in Marshall's Sign list under the cited classification number. They represent seals which the writer has failed to identify in the M.S. Vats volume. Unless otherwise indicated the notification 'Mackay' refers the reader to *Further Excavations at Mohenjo-daro*, Vol. 2.

- (1) Marshall, No. 344
- (2) Mackay, No. 478
- (3) Mackay, No. 214
- (4) Vats, No. 616
- (5) Mackay, No. 691
- (6) Marshall, No. 220; Vats, No. 126; Mackay, Nos. 180 (Plate I, c), 354, 572 and 642
- (7) Marshall, Nos. 133, 143, 180 and 229; cf. also 76
- (8) Mackay, No. 636; Marshall, No. 157
- (9) Mackay, No. 604b; Marshall, Nos. 243 and 249
- (10) Mackay, No. 298, preceded by three other signs
- (11) Mackay, No. 127 (Plate I, e)
- (12) Sign occurs commonly, and invariably in the company of other signs
- (13) Mackay, No. 270
- (14) Mackay, No. 322; cf. also 175
- (15) to (18) See most easily Vats, Sign manual, Pl. CIX, under No. 219, also examples found on the small seals, Pls. XCIV to CI
- (19) Mackay, No. 569
- (20) Marshall, No. 460; Mackay, No. 381
- (21) H. 125, see Marshall, Sign manual, under sign VI
- (22) Wheeler, *Illustrated London News*, June 3, 1950, p. 855
- (23) Marshall, No. 414 (Plate I, h)
- (24) Vats, No. 152
- (25) *Passim*
- (26) Marshall, No. 365; Vats, No. 264, etc.
- (27) H.250, see Marshall, Sign manual, under sign CCCXXXIV, etc.
- (28) Vats, Nos. 116, 256 and 604; also Mackay, *Chanhu-daro Excavations*, Pl. LXXIV, No. 1 (on copper plate)
- (29) Vats, No. 9

- (30) Vats, No. 448
- (31) Marshall, No. 172, and commonly
- (32) Vats, No. 231; Mackay, *Chanhu-daro Excavations*, Pl. LI, No. 9
- (33) Vats, No. 682, and see also Marshall, Sign manual, under CCCXXIV, H. 347
- (34) Vats, No. 479
- (35) Vats, No. 107
- (36) *Indian Archaeology*, 1957–58, Pl. XX, 7
- (37) Marshall, No. 404
- (38) Mackay, *Chanhu-daro Excavations*, Pl. LII, No. 25
- (39) Respectively Vats, Nos. 454 and 536
- (40) See most clearly Vats, Sign manual, under No. 126
- (41) Example taken from Parpola, *et al.*, 1969, p. 20, 2
- (42) Vats, No. 656
- (43) Vats, No. 659
- (44) Vats, No. 116
- (45) Mackay, No. 567
- (46) Mackay, *Chanhu-daro Excavations*, Pl. LII, No. 28
- (47) Vats, No. 442 (second side)
- (48) Mackay, No. 344
- (49) Vats, No. 84
- (50) Mackay, No. 132
- (51) Vats, No. 99
- (52) Vats, No. 264
- (53) Marshall, No. 292
- (54) Mackay, No. 301
- (55) Marshall, No. 435
- (56) Marshall, No. 94
- (57) Mackay, No. 183
- (58) Marshall, No. 55
- (59) Mackay, No. 589
- (60) Vats, No. 81 (Plate I, f)
- (61) Marshall, No. 202
- (62) H. 379, see Marshall, Sign manual, under No. VII
- (63) Marshall, No. 168
- (64) Marshall, No. 170 (four left-hand signs)
- (65) Marshall, No. 458

- (66) Vats, No. 15
- (67) Vats, No. 270
- (68) Marshall, No. 104
- (69) Marshall, No. 213
- (70) Marshall, No. 38
- (71) Vats, No. 291
- (72) Marshall, No. 470 (Plate I, *g*)
- (73) Marshall, No. 553
- (74) Mackay, No. 641, repeated on Pl. C, seal 'G' (Plate I, *d*)
- (75) Mackay, No. 258; Marshall, No. 279
- (76) Mackay, *Chanhu-daro Excavations*, Pl. LII, No. 24
- (77) Lal, *Antiquity*, Vol. XL, 52
- (78) Marshall, Pl. CXVIII, No. 1 (copper tablet)
- (79) Marshall, No. 557b
- (80) Mackay, No. 177
- (81) Vats, No. 47 (Plate I, *i*)
- (82) Vats, No. 229
- (83) Mackay, No. 426
- (84) Marshall, No. 10
- (85) Rao, *Lalit Kalā*, Nos. 3—4, p. 88, Fig. 41
- (86) Vats, No. 188, restored from the seal (*sic*) in Marshall, Pl. CII, No. *o*
- (87) Mackay, No. 326
- (88) Marshall, No. 326
- (89) Marshall, No. 345
- (90) Vats, No. 86

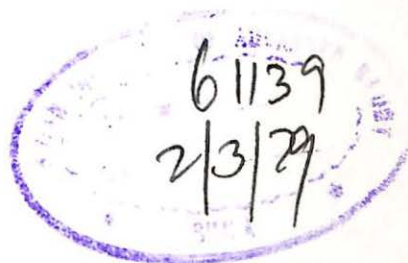
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Recent years have seen an increase of interest in the long-undeciphered Indus Script, examples of which have been recovered from a number of Third Millennium sites in western India and Pakistan. In particular, the work of Russian and Finnish teams who seek to associate the language of the script with a reconstructed 'Proto-Dravidian', has already been widely publicized. In the present monograph, the results of a new enquiry are presented. This accepts the findings of a penetrating article by A.S.C. Ross in 1938, in which it was argued that the vertical strokes, or 'numeral-signs', of the script are to be regarded as numerals. The study expands this theory, initially by adding a proposal for the 'missing' numeral 10, based on a direct comparison with the Sumerian script. Finally, proposals for a full range of numerals, a standard unit of measure, and a 'grain' sign are associated in a reconstruction of the economy in which distributed goods are seen to have been accounted for according to their grain-equivalencies. The argument, although technical, is not complicated, and may be understood by the non-expert as well as the scholar. It is supported by Notes, Text References, Bibliography and selected illustrations.

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