STUDIES IN THE STRUCTURE OF SOME ANCIENT SCRIPTS

III

THE STRUCTURE OF THE CRETAN HIEROGLYPHIC SCRIPT ¹

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1. Introduction

WHEN Evans in the early 'nineties first noticed some peculiar seals in Athens with inscriptions in a then unknown script, which he was later able to trace to Crete, he recognized at once that the signs of the seals were related to or partly borrowed from the Egyptian and Hittite hieroglyphics. Therefore, from the time of his first publications onwards,² he called the Cretan signs too "Hieroglyphs" or "Primitive Pictographs", and these names or "Hieroglyphic-Pictographic Script" or just "Hieroglyphic Script", are still used for the oldest class of the Cretan scripts to distinguish it from Evan's "Advanced Linear Classes" A and B, or the scripts of the Phaistos Disk and the bronze axe from Arkalochori which seem to be special hieratic forms of the common hieroglyphic script.


² Cf. the author's Bibliographie der kretisch-mykenischen Epigraphie (München, 1963), pp. 5 ff., 17 ff.
Evans distinguishes two classes of hieroglyphic inscriptions, "Class A, in which the signs are still of a somewhat rude and archaic form", and "a more advanced Class B" which he assigns to MM I and MM II-III respectively. Only three, however, of the sixteen inscriptions he attributes to Class A are datable and of these the well-known scarab from the Cave of Psychro (P. 9) belongs to MM II and probably even MM II b. The other two (P. 15 and 16) are MM I and the rest are unstratified finds or objects bought from dealers. The writing on some of these (such as P. 3, 5 and 7) can certainly vie with the best examples of Evans's Class B, although seals such as P. 7 do not have the more elongated form which characterizes the later seals. So far, therefore, we have insufficient evidence for recognizing two completely different and chronologically distinguished classes, although the development of the hieroglyphs we find on the seals must have taken a considerable time. There is also not sufficient evidence for the common opinion that the forms of the hieroglyphs were completely constant from MM II onwards. On the contrary, the variants of the signs listed by Evans in SM, i. 181 ff. show a remarkable vacillation in their forms even on seals which can be dated with tolerable certainty to MM II. The signs leg (no. 11), arrow (no. 13), and silphium (no. 92) and others are examples; indeed, sometimes even different parts or aspects of a thing may express the same concept.

At the same time, the inscriptions are not confined to seals, although these represent the great majority of our hieroglyphic texts. We have also graffiti on clay nodules, clay bars, labels, vases and tablets, which were scratched on the soft clay with a stylus. The fact that we sometimes meet here with the same sign-groups as on the seals and sealings must not dissuade us from recognizing that we have in these inscriptions the first form of the Cretan Linear Script which must have accompanied the hieroglyphs from the very beginning. The forms of these linear

1 SM, i. 19 ff., 149 ff.; PM, i. 195 ff.
2 SM, i. 1-16.
4 I retain Evans's names for most of the signs. This does not necessarily mean that I follow his interpretations; cf. Kadmos, II, i, p. 11.
5 SM, i. 163 ff. 6 Cf. SM, i, Fig. 116 and our Figs. 1 ff. (below, pp. 379-84).
signs leave no doubt that they were originally developed by writing with a brush or pen on some soft material like papyrus, leather or palm leaves,¹ and that they were subsequently transferred to clay.

It would therefore seem better to differentiate two types of script, (a) a stone-script, used mainly for seals, but probably also for monumental inscriptions,² and (b) a cursive script which accompanied the hieroglyphs from the start, and which should be called "protolinear" as opposed to the "Advanced Linear Scripts" A and B.³ Certain MM I inscriptions such as the potsherd from Chamaezi (PM, vol. i, 474 a) or the vase from Prodromos Botsano (SM, vol. i, Fig. 6) belong to this latter type, and apparently also the MM II inscriptions found by D. Levi in the strata of the older palace of Phaistos, which are variously assigned to H or Linear A.⁴

The main difference between the two scripts is that the hieroglyphs are plastic signs and the protolinear signs are drawn and therefore simplified to a certain extent. But it would be mis-

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¹ Cf. Pliny's well-known report, NH, xiii. 69, that the Cretans originally wrote on palm-leaves, and the so-called palm-leaf tablets of Linear Class B.
² The Venetian traveller Marco Boschini saw one in the seventeenth century at Mt. Jouktas; cf. P. Faure, Minoica, p. 142.
³ There are cases, as, e.g. some clay nodules, where we find hieroglyphic and protolinear inscriptions next to each other. Kenna (CS, p. 38) takes this as a sign that "the hieroglyphics on the seals had acquired a religious or symbolic significance ", and concludes that "hieroglyphs on seal stones may not have had the same meaning as the script derived from them". I think the reason is more simple and is to be sought in the fact that the clay nodules were used for closing vessels and other receptacles. So the officials of the palace noted on the nodules the contents of the vessels (corn P. 52 c, P. 62 c, saffron P. 57 b, wine P. 74 b, etc.), their origin, purposes etc. which was certified by the impression of the seals. The sealings of Egyptian officials on the clay nodules of jars containing wine, fats, oil, etc., are an interesting parallel (cf. S. Schott, Hieroglyphen (Mainz, 1950), pp. 31 f.). The juxtaposition of hieroglyphic and protolinear inscriptions on the clay nodules does not, therefore, justify the conclusion that the hieroglyphic signs of the seals had already at this time acquired a different meaning from the protolinear signs which were derived from them. This is also unlikely for the further reason that the same groups are found in both types of inscription (cf. p. 347, n. 6). The fact that the hieroglyphs were used as ornaments and "(were) combined with other forms of decoration on the fine three-sided stones of the MM III " does not point "to an extra-literary use " as Kenna thinks, but is a characteristic of pictographic scripts and also paralleled in Egyptian hieroglyphics.
leading to consider simplification as the main characteristic of the protolinear signs, since some of them show more details than the corresponding hieroglyphs. Examples are the dots of the sign no. 93 which are missing in the corresponding hieroglyph no. 122, or the cursive form, /, of the saffron-sign no. 88 which also has dots whereas the stamens of no. 88a are absent in variants c-e. In some cases the cursive sign is only part of the hieroglyphic equivalent, for example the pig's head in Fig. 1 b as opposed to the pig in Fig. 1 a; but these differences are also found among hieroglyphic signs.

In both scripts there is no consistency in the direction of the inscriptions, and it is not until Linear A that the writing regularly goes from left to right. Sometimes even the order of the signs in apparently identical groups is different. In both scripts also the position of the signs is not yet fixed. This is particularly surprising when the position of signs changes in the same inscription and even in the same or equivalent groups. I refer the reader to the seals CS, 167 b-c, 169 b and 170 c, where in closely related groups the trowel signs are sometimes put upside down, to the trowel signs on the clay bar P. 104 b, c, d, and the antlers sign on the same bar which is in a normal position on a, but upside down on b and c (Fig. 11 c, e, f). The irregularity in sign order and position suggests that the hieroglyphic signs—or at least certain of them—have not yet been developed into syllabic signs or even letters, since that would of necessity entail a strict order. It rather suggests that some of the signs have retained their independence and so are still to a certain extent symbols on the border-line between pictures and script-signs.

I can only refer briefly to two interesting phenomena connected with this fact. On the one hand, sign-groups may be

1 For the identity of the signs, cf. Kadmos, II, i. 8.
2 Nos. 88 j-k do not belong to the saffron sign, but represent other plants.
3 In SM, i. 164 Evans rightly remarks on p. 62 b: "The animals head is that of a pig." Nevertheless on p. 208 he assigns it to the dog's head (no. 72 f).
4 Cf. Fig. 1 c-d and below p. 350.
6 Cf. the author, op. cit. p. 115 and Minoica, p. 186.
accompanied by pictorial figures, on the other, signs found in pure script contexts are also found as elements of pictorial compositions. I have collected examples of both cases in Fig. 1 c-d and e-f. Fig. 1 c shows the well-known sealing HM 131 from the Hieroglyphic Deposit of Knossos, on which there is a horned sheep with a spear above and a crouched human figure with one hand raised beneath. Evans interprets the scene as an allusion to the nurture of the infant Zeus by the goat Amaltheia, in which respect he is followed by other authors, although this interpretation is anything but probable. One objection, which Evans saw himself, is that the animal is male and that for this reason there is naturally no indication of suckling. On the contrary the figure is shown squatting with its knees drawn up, its head leaning down and one arm extended forward. In this and similar forms the crouched figure occurs on some pictorial seals and also in two script seals, P. 29 a (= Fig. 1 d) and CG, 111 c, which misled Evans into including it in his Hieroglyphic sign-list (no. 2 a). On closer comparison P. 29 a shows remarkable similarities to the sealing from the Hieroglyphic Deposit. Here, too, the crouched figure accompanies a group which consists of the spear sign and an animal's head, which according to Evans is "apparently a goat" but could just as well be a sheep, the ass's head (no. 68), or the head of another animal. This is a case of the spear-animal's head formulae treated below pp. 370 f. and compiled in Fig. 10. Apparently we have also in Fig. 1 c a similar formula written with an entire animal instead of the head, a difference which is already known to us from comparison of Fig. 1 a and b. Since the small crouched person is pictorial in c it cannot be a script-sign in d, but must be an accompanying figure to the spear-head formulae in both cases. We meet with a similar case on CG, 111 c where the crouched figure accompanies the trowel-arrow

1 BSA, viii (1902-3), 88; PM, i. 515, iii. 467.
3 PM, iii. 467, n. 2.
4 The head is found in the same form in Fig. 10 111 e and in Fig. 2 11, associated with the gate-leg-silphium formula.
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formula, and on H. 3 where a crouched though not identical figure can be seen together with the throne-horns formula.

Seal AM 1910.242, published by Kenna (CS, 6), is an example of the opposite case. The side shown in Fig. 1 e is a pictorial scene, according to Kenna "a man with two vessels, a jug with a spout and a two-handled jar", found also on other seals together with the small man. Kenna interprets the object to the right of the vessels as "a double skin" which "may portray the contrast between the old and the new". In reality it is a script-sign, representing two birds' heads on a single neck, which is found in inscriptions on the unpublished seal HM 92 and seal P. 44 c = CS, 148 (Fig. 1 f). It is remarkable that on this seal also, in a pure script context, the birds' heads are connected with the jug with beaked spout (no. 47 a) held by the man in Fig. 1 e. Thus Fig. 1 c-d as well as e-f are striking examples of the complicated interweaving of script and picture on the Minoan seals.

2. Analysis and its Limitations

Before we begin the analysis of the sign-groups themselves a few remarks may prove useful. Since we do not know the language of the inscriptions nor the type to which the language belongs, the analysis can only be made here in a purely graphic sense. This all the more so because we do not even know the nature of the script and the character of the signs, so that we cannot tell whether signs prefixed or suffixed to "stems" are really phonetic prefixes or suffixes. In the following the words "prefix", "suffix", "interfix", etc., are therefore used in a purely descriptive sense. They mean only that the signs concerned are affixed to or interfixed into groups which are met elsewhere without them. But even in this sense the words must be used with care, as it is only rarely possible to tell if the signs are really prefixed or suffixed to the sign-groups. They may perhaps be illustrative or symbolic signs standing in some unknown relation to the groups. I refer the reader to the trowel-groups in Fig. 2

1 Cf. e. g. Mallia, Troisième Rapport, p. 69, Fig. 45, where the same vessels are ordered in two rows and the man also holds a spouted jug by the handle.

2 Evans wrongly identifies it with "the bird's head and neck" (no. 38), Kenna with "the pin" (no. 26).
I a-j. It strikes one that they are frequently associated with animal-signs like wolf, calf, cat, etc. Some of these, such as the snake-sign in f, occur as suffixes of other groups. But the fish-sign (no. 59) of group h is found in one other place only and there in a similar connection with the double axe-leg group (Fig. 3 V c). Thus we can hardly say whether the fish (as also the spider in i) is really an affix or rather a symbol, apposed to both groups. But even if this possibility is excluded there remains the other possibility that the case is not that of a prefixed or suffixed group but of a compositum, consisting of a group and an ideographic sign. The groups Fig. 2 I k, l are a good example for this. It is remarkable that the ox-head (no. 62 b) in k is affixed to a simple gate-leg group, but the animal’s head in l to a group itself already suffixed with the silphium. Further, the ox-head is prefixed in k and the animal’s head suffixed in l. Lastly, in k the ox-head is separated from the stem by a punctuation mark. This means that it is not an affix but an independent sign which can be a kind of adjunct or a constituent of a composite group. Since the punctuation of the hieroglyphic texts is as inconsistent as that of the Linear A-inscriptions, the same possibility also arises in the other groups of Fig. 2 I. The uncertainty is further increased by the fact that affixed signs can also be intercalated, as the groups I b-d show.

This is also true for signs which are more or less regularly affixed to “stems”. Figs. 3 I, II and IV show the so-called silphium sign (no. 92) added to the trowel-arrow, throne-horns, and gate-leg formulae. This sign seems really to be used as a suffix, so that I have (somewhat hesitantly) assumed it to be an “ending” (Minoica, pp. 172 ff.). But here, too, there are reasons which speak against its merely being a suffix; for instance, the fact that in II c-d and IV c it is separated from the respective groups by a punctuation mark, like the ox-head in Fig. 2 I k. Thus

1 Cf. below, p. 356 and Fig. 4 I d, f = II d, etc.
2 For composite groups, cf. below pp. 362 ff.
4 Cf. below, pp. 359 ff.
5 For the identification of the sign, cf. the author, Kadmos, II. i, 11 and 13.
we cannot dismiss the possibility of its being used here, not as a suffix, but as a further ideogram or second stem-sign added to horn, leg, etc., and if we accept the possibility here we cannot deny it for other stems such as Fig. 3 VI. A second reason is the peculiar position of the sign in the centre of the seal MM 26-31-175, which I have discussed in Kadmos, II. i, 11 ff. (ibid. Pl. 3 c), and its position on the seal P. 23 where the gate-leg formula on a and the throne-horns formula on b are reversed so that the silphium comes directly above the head of the sitting cat. If one also considers that the silphium alternates with the ox-head, trowel and crossed arms (no. 7) in the palace groups of Fig. 2 11, it becomes highly probable that it is not a mere suffix but rather an ideogram of religious meaning. In that case the groups in Fig. 3 would be composed of an initial ideogram, trowel, throne, gate or double axe, a first stem-sign, arrow, horns, leg, etc., and an added stem-sign, silphium, sometimes separated from the others by a punctuation mark.

A further difficulty is that the sign-groups are not only accompanied by pictorial figures (cf. p. 350) but also by a number of secondary signs which are either added to certain signs or groups or used to fill in empty spaces. This class includes the fleur-de-lis (no. 90), several astral elements, the S-spiral (no. 136*), and the other signs listed by Evans in SM, i. 229 ff. Evans treats all of these except No. 90 as "decorative elements". However, the affinity some of them have to certain signs or groups suggests that they have perhaps some meaning connected with those signs and therefore are more than ornaments. Examples of this are the frequent combination of the S-spiral with the ox-head, the trowel-sign or the trowel groups, the combination of moon signs or fleur-de-lis signs with the cat’s head or the sitting cat (with the fleur-de-lis this last connection is so close that the signs sometimes are ligatured). All this makes it difficult to assess correctly

1 Cf. my remarks loc. cit. pp. 12 f.
2 Cf. Minoica, pp. 171 ff. and below, p. 375.  
3 Cf. e.g. Fig. 7 VI.
4 Sitting cat with fleur-de-lis and moon CS, 129, cat’s head with moon or moons CS, 170 a (top), HM 619. 5400, MM 26-31-167, cat’s head ligatured with fleur-de-lis-no.88 P. 74 a 2 (according to Evans “arrow sign and part of another”), HM 1694 b = Kadmos, II. i, 10, Pl. 2 b; cf. ibid. references p. 6, n. 3. The peculiar sign no. 74 which Evans interprets as “lion’s head facing surmounted by
the rôles played by these signs in the composition of the groups. For example, we cannot say whether the fleur-de-lis sign is a regular constituent of the groups in Fig. 3 III b-c or merely an attribute of the calf's head. In any case, these elements of the groups must also have some meaning, so that they must be at least symbolic or half-symbolic signs, being on the verge of becoming regular script-signs. It is even possible to trace the development of some of them, as for example the S-spiral, to a regular script-sign.

The last difficulty in analysing the sign-groups is the lack of differing examples. We can of course only analyse the structure of sign-groups accurately if we have enough of them to compare, results achieved by the use of one series being matched with those obtained from other independent series. This opportunity, however, presents itself only in a few cases, as our Figs. 2 ff. show. So the fixation of the stems, affixes, etc. remains in some cases uncertain, while in other cases there are alternatives between which we cannot decide. As an example I give the groups in Fig. 8 I a-b, reviewed on p. 361. Following Evans (SM, i. 262 ff.), I have assumed that the building sign (no. 43) prefixed in a to be suffixed in b, a change for which there are parallels. The alternative would be that the stem of the group consists of the building and the ox sign and that the branch sign (no. 101) suffixed in a is interfixed in b. There are also parallels for this. The second solution would be more probable if the final sign in c (no. 20, according to Evans "a mason's level") were a variant or equivalent of the building sign, the first if group d could be supplied similarly. As it is, the question must remain open. In what follows we shall find such ambiguities frequently, a difficulty arising from the scarcity of our material.

For all these reasons it must be kept in mind that the terms stem, prefix, suffix, etc., in the following chapters have no linguistic significance but are used in a purely descriptive sense.

the sacred fleur-de-lis probably also belongs to the ligatures of cat's head and fleur-de-lis. 1 Forschungen und Fortschritte, xxxvi (1962), 115.

2 Cf. below, p. 358. 3 Cf. below, p. 361.

4 For the alternation of animals' heads in related groups, cf. below, pp. 370 f. and Fig. 10 I-III.
3. Prefixes and Suffixes

We shall begin with the prefix double axe (no. 36), a sign which in Linear A and B, too, appears most frequently in the initial position. ¹ Fig. 2 shows it prefixed to the palace groups in II b–c and replaced by a suffixed trowel sign in d. ² We find it in the initial position in Fig. 3 VI b, but replaced in a by a prefixed throne sign, ³ and in c–d by a suffixed lyre (no. 29) and cross pommée (no. 112) respectively. ⁴ A similar relationship can be seen in Fig. 4 I where the double axe is prepositioned to the sepia (with varying secondary signs) in groups a–b. In c the group is extended by a silphium (with S-spiral and fleur-de-lis). The same stem can be seen in d without the prefixed double axe but with the snake sign (no. 84) suffixed instead. Group e could be a combination of the double axe-sepia group (a–b) and a group consisting of the cross pommée and the rare sign, Mallia, no. 19. ⁵ On the other hand, the sign from Mallia could be a suffix to a group consisting of sepia-cross pommée prefixed by the double axe. On comparison with groups I f and II d (which has yet to be discussed), the latter would seem to be the more likely alternative. In that case, the relationship between groups I e and f would be the same as between I c and d.

In Fig. 4 III a–b we have a group consisting of the saffron sign (no. 88) and sign no. 27/28. ⁶ In c this stem is combined with a second group and extended by the dagger- or sword-like sign no. 17. ⁷ In d it is combined with the wolf’s head-cross pommée-group. ⁸ In e it is preceded by the double axe with two further prefixes, sign Mallia, no. 12, ⁹ found only at the beginnings of groups, and sign no. 135 a which I separate from no. 135b–c ¹⁰ and which is also found in initial positions (e.g. Fig. 5 IV b). Thus the double axe-prefix seems here to be preceded by two other prefixes. A last example is Fig. 9 I c which is discussed

² Cf. below, p. 374.
³ For the additional double axe, cf. below, p. 373.
⁴ Cf. below, pp. 374 f.
⁵ * For the identity of no. 27 and 28, cf. the author, Kadmos, II. i, 8 ff. with Abb. 1-2.
⁶ Cf. below, p. 364.
⁷ Cf. below, p. 362 ff.
⁸ Cf. below, p. 370.
⁹ Mallia, H. 13, 21 d, 22b, 23 b.
We shall see there that the group is composed of two two-sign groups with the double axe prefixed.

Similar to the double axe is the use of the unexplained sign no. 113 that has so far only been found on two bars, P. 102b and P. 110b (Fig. 4 II b and d). In both cases it takes the place of the double-axe prefix so that the two signs seem to be interchangeable. The relationship between the groups II d and e is again the same as that between the groups I e and f (=II e) or I c and d.

At the same time these examples show that both prefixes, double axe and no. 123, alternate with the suffixed serpent sign, which in other groups too is found in the final position. For instance, in Fig. 2 I f it is a suffix of the trowel-eye formula. On the other hand, we find the snake as an affix in 6 I c where it alternates with the prefixed or suffixed crossed arms (no. 7). Also, in Fig. 4 IV we find the snake in the final position, but here the lack of comparable groups makes it hard to say if it is a suffix or a stem-sign. It certainly belongs to the stem in Figs. 5 I a-f, 5 IV a-b and 7 V a-e, where, as we shall see later, the vessel signs are intercalated between the stem-signs double axe and serpent. Comparing Figs. 5 I a-c, we find a stem sepia-serpent which in a is followed by the cat's head ligature no. 74, just as the simple cat's head follows the trowel-eye formula in Fig. 2 I e. In Fig. 5 I b the same stem is prefixed by the gate sign. In Fig. 5 I c the sepia-serpent stem is combined with a second group consisting of cross pommée-saw and suffixed with a further cross pommée, making one of the rare five-sign groups. The same combination of sepia-serpent-cross pommée (with a different prefix) is found in d where the cross pommée is separated from the stem by a punctuation mark.

Another suffixed sign, no. 27/28, can be separated in Figs. 5 III a-e. It is found also, together with a prefixed arrow, in the palace-group in Fig. 2 II f, and in Fig. 5 IV a, but in the latter case whether as a prefix or as a suffix we cannot tell, since the direction of this inscription is uncertain. If we separate it, a stem

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1 The third example mentioned by Evans, *SM*, i. 226 (P. 62b) does not contain no. 123 but the breast-sign; cf. Fig. 8 IVb.  
2 Cf. below, pp. 360, 369.  
3 Cf. the author, *Kadmos*, II. i, p. 7 with n. 3.  
4 Cf. below, p. 364.  
5 Cf. the author, *Kadmos*, II, i, 8 ff.
strainer-serpent (or vice-versa) remains, which is also part of IV b, prefixed there by the above-mentioned sign no. 135 a and suffixed by the silphium. If we assume that the arrow stands for the silphium in IV c, we have the same stem there. A different solution, namely strainer + arrow-serpent is suggested by IV d, where the strainer is separated by a cross from the group arrow-calf's head.

The recently mentioned palace group 2 II f with the affixes no. 27/28 and the arrow sign suggests that the groups in Fig. 6 VIII a-c are similarly built up. In that case their stem would consist of a single sign, and no. 27/28 would be interchangeable with the sepia sign. A similar change can be seen in Fig. 6 VII where the stem double branch-no. 93/122 is suffixed by the arrow (with fleur-de-lis) in a, and by the sepia in b. If this analysis is correct, Fig. 5 III f could contain a double suffix, sepia-arrow. On the other hand, there are groups in which no. 27/28 seems to belong to the stem, for instance the above-mentioned groups in Figs. 4 III and 6 I. In 6 I the stem no. 27/28-horns is associated with the crossed arms in a-b, and with the serpent in c. In 6 II the group mallet-no. 27/28 (found only in Mallia) is combined with the cursive form of the spear sign in a and b (?), and in c with a second group. No. 27/28 also seems to belong to the stem in 6 III (where it is reduplicated in b) and 6 IV.

The cross pommée in 6 IV b can be taken for an added sign—it was already recognized as a suffix in Figs. 3 VI d and 5 I c-d, in d of the latter series separated from the stem (sepia-serpent) by a punctuation mark. A similar punctuation is found in Fig. 6 V where the cross pommée and the corresponding amphora are also separated from the stem by crosses. As we remarked on p. 352, the punctuation mark makes it more likely that the added signs are ideographic and are not merely phonetic suffixes. The

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1 As an additional sign we find here the "holy branch", which belongs either to the whole group or to the serpent. The serpent is also connected with the "holy branch" in P. 116 c; cf. below, p. 372.
2 For the identity of the signs cf. above p. 349.
3 Listed in SM, I under no. 13 f (arrow), by mistake; cf. Mallia, p. 32 with Fig. 13.
4 Cf. below, p. 365.
5 Cf. below, p. 366.
groups therefore seem to be composita of the spear-eye group with ideograms. The same idea is also suggested by the interchangeability of the cross pommée with suffixed lyre and prefixed throne and double axe in Fig. 3 VI and in the parallel groups Fig. 6 VI a-b (= P. 103 a/c) with the breast sign, which is elsewhere never found as a simple affix.

Finally, we may remark on the peculiar fact that the cross pommée is not confined to the final position. In Fig. 5 I f it is intercalated between the sepia and serpent signs, instead of being suffixed to them as in I c-d. We will return to this phenomenon later.

Summing up, we may say that a number of groups have additional signs prefixed or suffixed to the stem. Occasionally, as in Fig. 6 VIII, the stem may consist of a single, obviously ideographic, sign. In most cases the stem consists of two signs. Considering our remarks on p. 353, we must leave it open whether these stems too are built up by combining two ideographic signs. Usually these groups have only one prefix or suffix. Figs. 3 VI a-d and Fig. 4. I c-f (II c-e) show that certain prefixed signs can be replaced by certain suffixed signs which obviously belong to the same category. Sometimes, however, as Fig. 3 III shows, the same signs alternate at the beginning of groups. So that, at least in these cases, there seems to be no essential difference between prefixes and suffixes. This makes it hardly surprising that other affixes also, such as no. 27/28, are found both at the beginning and the end of groups (Fig. 5 III b-e, IV a). In other cases stems are prefixed and suffixed at the same time (Figs. 2 II f, 5 IV b and 6 VIII). Finally, there are groups with several prefixes or suffixes (Figs. 4 III e-f and 5 III f), an accumulation of affixes that reminds one of the Phaistos Disk. So we may say: if we represent constant group elements by A, B, C and mobile elements by X, Y, Z, the most common types of group are AB, ABX, XAB, XABY and XAY; yet groups of type ABXY and XYAB are also possible. In the subsequent course of this investigation it will become clear that these basic types are subject to considerable variation.

1 Cf. below, p. 371.
2 Cf. below, p. 374.
3 Cf. below, p. 361.
4 Cf. below, p. 374.
Apart from prefixed and suffixed signs, one occasionally meets with signs which are intercalated in stem-groups. Following Evans (SM, i. 262 f.) I have already pointed out a few such cases in Minoica (pp. 184 ff and Fig. 3). The most instructive example is the seal P. 46 (Fig. 7 I a-c). On the three sides of this seal we find the trowel-eye formula, trowel-arrow formula, and a third group in which a tree is put between the trowel and the arrow sign. Since the tree is a well-known sign of the Hieroglyphic Script it is unlikely that it would be used here as the "pictographic" representation of a tree, contained within the trowel and the arrow sign. That would also mean that the same group occurs on two sides of the same seal, a phenomenon for which we have no parallel. The same reason excludes the possibility of the tree being a phonetic complement to the preceding trowel sign. This would mean accepting the added improbability that the same group was written differently on two sides of one seal. That leaves only one possibility, as I have remarked already (loc. cit. pp. 184 f.), namely that the tree is an interfixed sign and forms a new group, the meaning of which is different from the simple trowel-arrow and trowel-eye formulae. What we learn is that the meaning of groups can be changed by the intercalation of a new sign. On the other hand, there must be a connection between the three groups, all being variants of the trowel formula deliberately put on the three sides of the same seal. Thus we have here a new Bauprinzip modifying simple AB-groups into groups of type AXB.

There is a similar example in Fig. 7 II b, where sign no. 102 a is intercalated in the stem breast-no. 27/28. It is interpreted by Evans as "a leafy spray", but it could just as well be a cursive form of the tall, narrow tree in Fig. 7 I c.

It can hardly be coincidence that the third trowel formula, the

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1 Cf. SM, i. 217, no. 97, where, however, various tree signs are mixed.
2 In this connection I refer the reader to the peculiar combination of the trowel-eye and trowel-arrow formulae on seal P. 27 d, where the common trowel-sign is placed in the cross-hatched field in the middle while the arrow and eye are put into the other fields on either side; cf. Minoica, p. 174.
3 Cf. Figs. 7 II a and 8 III.
trowel-adze group in Fig. 7 III a, is also found with an interfix. This time it is the seated bird (no. 80),\(^1\) which is put between the trowel and the adze signs (Fig. 7 III b). As I have shown in *Minoica* (pp. 184 ff.), no. 80 is used in the same way on the seal P. 41 b (Fig. 9 IV b).\(^2\) It is very interesting that the only comparable sign of the Phaistos Disk, the "seated dove" (Evans no. 32), is also used as an interfix there, namely in group B 15\(^3\) = Fig. 9 IV a. Here it is placed in the *Kompositions fugue* between Ipsen's stems no. 11 (fish-crocus) and no. 12 (woman-flower).\(^4\) In the Disk-group A 9, too, the "seated dove" seems to be intercalated between "angle" and "manacles", as these form a stem in B 17. If this surmise is correct, it is an impressive demonstration of the close connections between the script of the Disk and the common Hieroglyphic Script.

Further examples for interfixation we find in Fig. 7 V a ff. It is remarkable that in this case too the simple group double axe-serpent and the interfixed groups double axe-vase-serpent belong to the same inscription; \(b\) stands on side \(a\) of bar P. 118, and examples of group \(c\) on its other sides. This second instance of simple and interfixed groups in the same inscription makes it all the more likely that their meanings are in some way allied.

As a third example, on the clay nodule HM 174 (= P. 54) we find two sealings (Fig. 7 IV a-b) next to each other on one side, and the graffito IV c on the other. Here we have two interfixed forms of the trowel-eye formula, differentiated from each other by the interfixes no. 26 and calf's head (no. 64).\(^5\) At the same time their meaning must be different from the simple trowel-eye group, contained in the compositum IV c. They stand obviously in a similar relation to the composite group IV c as V c does to V b.\(^6\)

In these three cases the interfixed groups occur together with simple groups or with composita containing the simple groups. There are, however, also cases where interfixed groups vary with

\(^1\) For the connection between this interfixed group with the other interfixed or composite groups of the seal, cf. below, p. 361 and *Kadmos*, II. ii, 92 ff.

\(^2\) Cf. also *Kadmos*, II. i, 76 ff.

\(^3\) The groups are counted as in *SM*, i, Figs. 128-9.

\(^4\) As Ipsen correctly remarks, *Indogermanische Forschungen* xlvii (1929), 27; cf. below, p. 365 and *Kadmos*, II. ii, 94 ff.

\(^5\) Cf. *SM*, i, no. 64 and *Mallia*, p. 33 with Fig. 14.

\(^6\) Cf. below, p. 363.
affixed ones, that is to say where affixed signs are used as interfixes and vice-versa. One example, which I have treated in *Minoica* (p. 186), is the seal AM 1938.792, which was then only partly known. In the meantime it has been published by Kenna (*CS*, 167). On this seal both trowel groups are accompanied by the calf's head (Fig. 7 VII a-b) and the group spear-calf's head (Fig. 10 III a, treated below p. 370) is found on the main side. Group 7 VII a is identical with 7 IV b, except that the calf's head is prefixed instead of being interfixed. Group 6 VI d from the seal AM 1938.11661.2, which I have discussed in *Kadmos*, II ii. p. 92ff., is a similar case. Here a special form of the S-spiral which often accompanies the trowel sign or the trowel-arrow groups is intercalated. Two further cases in point are Fig. 5 I f, where the cross pommée, which is suffixed to the combination sepia-serpent in I c-d, stands between these signs; and the ship sign which is inserted within a well attested group of two signs in Fig. 5 I e, but which is found as a suffix in Fig. 5 II a-b.

As a last example, I give the groups Fig. 8 I a-b. As I have already observed (p. 354) there are two possible interpretations of these groups. The building sign (no. 43) could have changed from a prefix to a suffix (a phenomenon of which other examples are treated on p. 358). On the other hand, the stem could just as well consist of the signs building-ox-head, in which case the double branch would be a suffix in a and an interfix in b.

It is needless to say that signs which can change their positions in this way can hardly be phonetic. This leads to the conclusion that not only the interfixes but also their enclosing signs (trowel-eye, trowel-arrow, double axe-serpent, etc.) have an ideographic character. This conclusion is corroborated by the observation that the interfixed vases in Fig. 7 V c-e have different shapes. What is more, the three signs in 7 IV b are separated by dots (omitted by Evans), just as the enclosing signs, trowel, etc., can be separated by crosses or other punctuation marks. Thus we find here the same "eccentricities of punctuation" as in some of the Linear A groups. They can only signify that the signs they separate are to be understood as independent symbols.

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1. Cf. Fig. 7 VII a-d and remarks on p. 353 above.
2. Cf. below, pp. 369 ff.
5. Composite Groups

In Figs. 4 III c-d, 7 V b, f and other instances, we have already encountered groups which are not of the usual form ABX, XAB or AXB but contain two groups with two signs each: AB + CD. A good starting point for the discussion of groups of this kind is the clay bar P. 116 (Fig. 8 II a-c). On side a line 1 of this bar we find a single trowel sign, on side b line 1 and on sides d/e the trowel-arrow formula, and finally on side a line 2 a group composed of the trowel-arrow formula and a second group silphium-sepia. Both the single sign and the groups are followed by numbers. This means they either signify units counted themselves or the donators, deliverers, receivers, etc., of certain things. In any case they must have similar functions in the context concerned, or belong to the same category. On the other hand, their meaning is modified in one case by the combination of the simple trowel sign with the arrow, and in the other by the combination of this group with a further group. We may infer also that in the composite group II c the trowel sign or the trowel-arrow group is the basic element and the silphium-sepia group an additional element or a kind of "adjunct", modifying its sense. Indeed, in some cases the way the second elements are written leads to the same conclusion. I refer the reader to Fig. 8 III a where the silphium-cross pommée group is slightly smaller and placed higher than the vase-breast group. A similar example is Fig. 8 V b, where the vase sign (not recognized by Evans) stands above the double axe. In IV a-b and d-e the arrow sign is placed either above or below the breast sign. In all these cases the writer obviously intended these signs to be read together and then combined with the other signs which are written in the usual way. In Fig. 8 II c, IV d-e and V b (and also in Fig. 7 IV c, V b) this is emphasized by a cross separating the composed groups. These crosses, which stand in the Kompositionsfuge, have thus the function of separating and connecting at the same time. They are evidently meant to convey that the groups between which they stand are at once independent and linked together, that is to say, that they form a composite group. This method of punctuation is also found in other hieroglyphic texts and in some Linear A
groups. Taken together with the peculiar method of writing some of the added groups, the punctuation proves that the groups concerned really are double groups and not ordinary two-sign groups with prefix and suffix or two affixes. Moreover, in many cases the constituents are found as elements of other combinations. For the second (the opening) constituent of Fig. 8 IV b, I refer the reader to the gate-swine group (Fig. 1 a) discussed above (p. 349), for the second of IV d to Fig. 7 V a-b. For all these reasons there can be no doubt that the double groups are combinations of "stems". Figs. 8 II ff. further show that certain stems can be combined with several others, and can also change their positions in the combinations. In II c the trowel-arrow group is the second constituent and in VI a-b the first. Similar changes can be observed in Fig. 8 IV, where the breast-arrow group is combined with various others (b, c and e must be read from right to left).

A further proof that the elements of these groups are in fact stems lies in the fact that they are found with affixes. As examples I quote Figs. 4 III, 5 I, 6 II, and 8 III. In this last case the vase-breast group is combined with a second group in a, but prefixed by the gate sign in b and by its alternative, Mallia no. 16, in c. This means that adding affixes or whole groups must, in a way, serve similar purposes. In other words, the modification of the meaning of a two-sign group can be effected by affixes and interfixes or by adding a second group. It is, therefore, not surprising that these methods alternate in the same inscriptions. Examples, some of which have already been mentioned, are Figs. 8 II a-c (from the clay bar P. 116), 7 V b-c (from P. 118), and Fig. 11 e and f (from P. 104). The interfixed groups Fig. 7 IV a-b and the double group IV c also come, as we saw, from the same clay nodule (HM 174 = P. 54). I have discussed a further case in Kadmos, II. 2. p. 92 ff., the eight-sided seal AM 1938.1166 (CS, 165) which contains in line 2 the interfixed group Fig. 7 VI d, in line 5 the composite group 8 VI a, and in line 8 the interfixed group 7 III b. Since the three groups are found in the last lines of

1 Cf. the author, Kadmos, II. ii. 89 ff.
2 Cf. also the change of position of cross pommée-spear in Fig. 9 II b-d. For remarks, cf. p. 365.
each of the three sections of the inscription, and since they are variations of trowel formulae, we may assume a "syntactical" or a substantial connection between them. The meaning of the trowel formulae is modified here twice by an interfix and once by the addition of a second group. These examples should, I think, suffice to show that the employment of affixes, interfixes and added groups are allied methods of modifying the sense of hieroglyphic groups.

6. Five-Sign Groups

The foregoing remarks make it possible to understand the formal construction of larger groups which have hitherto resisted analysis. Group 9 I c (mentioned above, p. 355) is our first example. A comparison with I a on the one hand and with I b on the other shows that c consists of a combination of two groups, goat's head-spear and goat's head-no. 27/28, suffixed (or rather prefixed as it must be read from right to left) by the double axe. That is, it consists of a combination of the type AB + CD and a mobile element X. It is, however, impossible to decide with the means at our disposal whether this belongs to the first constituent or to the whole group, that is whether the whole is of type XAB + CD or X + AB + CD.

Obviously, Fig. 8 IV e is a similarly constructed group which probably belongs to the composita of the breast-arrow group. The right-hand (the leading) element of the compositum is a three-sign group containing a group cross pommée-eye and the sign no. 76 which is found only in this place. As the bar is inscribed from right to left, no. 76 seems to be a prefix and, judging by the punctuation, belongs more to the cross pommée-eye group than to the whole combination. In contrast to this, in Fig. 4 III c the added sword- or dagger-like sign no. 17 (according to Evans an "uncertain implement or instrument") seems to be a suffix of the second constituent, as is the cross pommée in Fig. 5 I c (a surmise corroborated by the punctuation of 5 I d). Unfortunately, we have in none of these cases enough comparative material to reach a final decision.

1 Cf. the author, loc. cit. 2 Cf. above, p. 356.
Things are easier in Fig. 9 II. The comparison of II \( b \) with \( a \) and \( c-d \) leads us to the conclusion that \( b \) is composed of two two-sign groups, cross pommée-spear and mallet-Mallia no. 19. As we have noticed before, here too the constituents change their order. In \( c \) and \( d \) the cross pommée-spear group is moved from first to second position. In \( b \) the composite group is suffixed by an unknown sign which Chapouthier considers to be no. 98. In \( c \) and \( d \) the composita are prefixed by the more familiar signs gate and sepia. The combinations are therefore of types AB + CD + X and X + AB + CD, or perhaps AB + CDX and XAB + CD. This means that in these cases the double groups are extended by a prefix or suffix which belongs to the whole group or to one of its constituents. Since both these types occur, one would also expect groups of type AB + X + CD, where an interfix has been placed in the *Kompositionsfluge*. No such cases have, however, yet been identified in the hieroglyphic texts. To be sure, examples of composite groups with interfixed signs are observed in Fig. 9 III b-c. Both come from the same clay bar (H. 21 a-b) and give a further proof that interfixing a sign modifies the meaning of a group. But only the first constituent is found separately (in III a), whereas the second defies analysis, as we do not know the meaning of the reduplication.\(^1\) At least it is safe to say that the interfixed mallet sign (no. 24) does not stand here between the composed groups but is intercalated in the second constituent. A similar example is seal *Mallia* Fig. 11 (Fig. 6 II c). Here, indeed, the horns sign (no. 30) is placed in between two two-sign groups, the ox-head-cross pommée group (with parallels in Fig. 10 II) and the group mallet-no. 27/28 (also found in Fig. 6 II a). But we cannot deny the possibility of its being put into the centre of the seal for aesthetic or other reasons.\(^2\)

An undeniable group of the form AB + X + CD is found, however, on the Phaistos Disk. It is the group B 15 (Fig. 9 IV a), already mentioned on p. 360. There the “seated dove” is really placed in the *Kompositionsfluge* between Ipsen’s stems no. 11 (fish-crocus) and no. 12 (woman-flower).\(^3\) Since we have already

\(^1\) Cf. below, pp. 366 ff.
\(^2\) Cf. my remarks on MM 26-31-175 in *Kadmos*, II. i. 11 ff.
\(^3\) Cf. the author, *Kadmos*, II. i. 76 ff. and above, p. 360.
pointed to the close connection between the script of the Disk and the common Hieroglyphic Script, this phenomenon might be of importance for both the scripts.¹

7. Reduplication and Reiteration of Signs

There are in our texts two further interesting phenomena which we have to discuss. One of these, just mentioned, is the reduplication of signs, a feature which has been already pointed out by Evans.² It occurs quite frequently. But, of course, we cannot always decide whether we have to do with genuine reduplication or not. In some cases the double signs may be accidental, for instance if the constituents of a compositum end and begin with the same sign. The following list of examples of reduplicated signs is not intended to be exhaustive: reduplication of first signs we find in Fig. 9 III d, V b-c, and VI e; reduplication in the middle of a group in Fig. 9 III b-c, and IV b-c, and on the seal MM 26-31-175 discussed by the author in Kadmos, II, i, pp. 11 ff. (ibid. Pl. 3 b-c); reduplication of finals in Fig. 6 III b,³ Fig. 9 VI b and d (= Fig. 11 e).

The significance of reduplication is as yet uncertain.⁴ It is remarkable that groups with and without reduplicated signs occur in the same inscriptions. For instance, the groups antlers-arrow-arrow and antlers-arrow+arm (?)-doubleaxe(Fig. 11 e-f) are found on the same clay bar (P. 104 b/c).⁵ This seems to imply that groups with single and with reduplicated signs have a different meaning. On the other hand, one finds reduplicated forms in places where the simple form is regularly used, for instance on seal CS 167 where the trowel-eye group is not supplemented by the usual form.

¹ It is remarkable that the corresponding "seated bird" of the common Hieroglyphic Script in Fig. IV b, and its parallel sign in IV c (cf. Kadmos, II. i. 76 ff.) have the same positions after reduplicated signs as the mallet in Fig. 9 III c.
² Cf. SM, i. 262 f. and the author, Minoica, pp. 189 f. and Forschungen und Fortschritte, xxxvi (1962), 115, where similar cases in Linear A inscriptions are also mentioned.
³ From the seal P. 26 b where the reduplicated group breast-27/28-27/28 is preceded by horns-27/28-27/28.
⁴ Bossert (Sántas und Kupapa (Leipzig, 1932), p. 19) considers the reduplication of final signs as phonetic (sán-ti-ti), whereas Chapouthier (Minos, i (1951), 72 f.) considers it as an indication of the dual.
⁵ Cf. below, p. 372.
trowel-arrow but by trowel-arrow-arrow (Fig. 9 VI b), so that the reduplicated form stands in the same "context" as the simple form elsewhere. Besides this, both trowel formulae are bound together by accompanying calf’s heads (Fig. 7 III a-b), so that the reduplication can only modify the meaning of the trowel-arrow group very slightly. This is corroborated by the seal MM 26-31-175. As I have shown in Kadmos, II. i, pp. 11 ff., the reduplication of the middle signs of the groups on sides b and c has an aesthetic or religious purpose and thus has hardly any bearing on their meaning.\footnote{We must therefore confine ourselves to saying that in certain cases signs can be reduplicated without changing the sense of the groups.} The same seems to be true for the tripling of signs, for instance the three vases on the seal published by Demargne in Mél. Dussaud, i (1939), 102, Fig. 1 (= Chapouthier, loc. cit. p. 72, Fig. 1 a). Chapouthier considers them as an indication of the plural, just as he considers reduplicated final signs as an indication of the dual. His conclusion is, "que, au moins au stade des hiéroglyphes, la langue minoenne, à l’instar de la langue égyptienne, possédait un duel et un pluriel, qu’indiquent le redoublement ou le triplement du dernier signe ; et peut-être faut-il étendre cette conclusion à l’écriture linéaire". Even if his analysis of the seal were correct, the conclusion would be unlikely. Otherwise one would expect reduplicated or tripled finals more often in connection with objects with the numbers 2, 3, etc. Besides this, his analysis of the seal is incorrect: this is not a case of a tripled final but of the well-known three vases formula which occurs on P. 4 c, 5 b and other seals, and is combined here with the gate-leg formula on the same side of the seal.\footnote{Demargne (loc. cit. p. 123) rightly remarks that the gate-leg formula is also connected with a vase on P. 48, and alludes to the three vases formula.}

This brings us to the second phenomenon, namely that groups like the "three vases" can be constructed by reiterating a single sign or by combining related signs. In SM, i (p. 162) Evans has pointed to a peculiar example of this: there is in the upper

\footnote{1 Cf. author, Kadmos, II. i. 11 ff.}

\footnote{2 Cf. Sundwall’s observations that in Linear A and B groups also, signs "anscheinend ohne Bedeutungsunterschied verdoppelt werden können" (Altkretische Urkundenstudien, p. 7), and comment by the author, Minoica, pp. 189 f.}
section of the clay label P. 85 a "a remarkable collocation of the human arm, leg, and crossed arms" and "in the section to the left, below, is the branch sign and leg". A phonetic inscription of eight signs could hardly contain four which represent human members, and the probability that three of these signs should be in consecutive order is almost nil. Besides, this is not an isolated case. Apart from the "three vases" on P. 4 c, 5 b, etc., I refer the reader to the following cases: two vases grouped around a sun or star symbol on P. 9, two vases in EC IX, Pl. 16 and 45 no. 1450, five suns or stars between "holy branches" on P. 4* b, three animals' heads on P. 6 a = H. 1 a, two pairs of goats' heads facing each other in EC II, p. 1, Fig. 1 (Chapouthier has them upside down), four similarly placed asses' heads EC IX, p. 61, Fig. 5 b, the eleven cats' heads arranged in a circle on P. 64 a, and the four cats' heads placed one above the other on CS, 170 a.

This therefore seems to be a principle of the script which one might call the principle of reiteration. It is, moreover also found on pictorial seals, for instance on the sealing PM, IV, Fig. 597 A, k, with three holy knots between two sacred shields.

8. Recurrent Signs

In the cases discussed so far, the related signs stand in a consecutive order. In other cases they are found on different sides of the same seal or in different parts of the same inscription. We commence with seal MM 26-31-152, which is reproduced after a cast from the Ashmolean Museum on Pl. 1. The calf's head mentioned above (p. 361) in connection with Fig. 7 IV b and VII a-b occurs on three sides (a-c). On the fourth side (d) there is an ox-head with horizontal horns (like Evans's ox-head no. 63 d). This accumulation of calves' and bulls' heads in a relatively

1 According to Evans "heads of ox and two goats", and according to Chapouthier "une tête de boeuf, une tête de chèvre . . . et une tête malaisée à identifier". As I showed in Kadmos, II. ii. 85f., the last head is identical with the animal's head of AM 1938.1166 l. 1.

2 Cf. author, Kadmos, II. i, 7 and Alexiou, ibid. II. ii, 81 n. 6.

3 Stawell Collection 8 G. My thanks are due to the Ashmolean Museum for their permission to publish the photograph and to Dr. Carl Albiker, Karlsruhe, for taking it. I must thank Mr. W. C. Brice for bringing to my notice a drawing of the seal with marginals which was found in Evans's papers.
short inscription is surprising. It is made all the more so by the sign at the left end of side \( d \) where the bull's head is on the right. The sign occurs only on this seal, but its meaning cannot be doubtful. A marginal note of Evans, alluding to the sealing \( PM, I, \) Fig. 514, shows that he recognized the sign as nothing but a somersaulting toreador. Even the most convinced followers of the phonetic theory can hardly assume that a toreador, a bull's head and three calves' heads will meet on one seal by the accidental grouping of phonetic signs. In other words, they must be ideographic signs which stand in a close relation, a conclusion which is corroborated by the dots under or between the signs.

Moreover, this too is not a unique case. Similar relations of signs may be observed on the clay bar \( P. 107 \) (bull's head with straight horns on sides \( a \) and \( b \) and calf's head on side \( d \) ); on the clay bar \( H. 27 \) (calf's head on sides \( a \) and \( c \) and the animal head \( Mallia, \) no. 5, on side \( b \) ); on \( P. 78 \) (calf's head on side \( a \), antelope-like head on side \( b^1 \) ); on \( P. 76 \) (uncertain animal head on side \( a \), two goats' heads on side \( b = \) Fig. 9 I c, and a further goat's head on side \( c \) ); on \( CS, 170 \) (calf's head on side \( b \) and four cats' heads on side \( a \) ); and finally on the seal \( CS, 167 \) reviewed on p. 361, where the calf's head appears not only in connection with the trowel groups of the sides \( b \) and \( c \) (Fig. 7 VII a-b), but also in the main group of side \( a \) (Fig. 10 III c). This peculiar recurrence of signs representing objects of the same category cannot be coincidental, but must indicate some relationship of sense.

We have finally the fact that signs representing different objects of the same category alternate in related groups. On p. 361 we mentioned an example. The groups Fig. 7 V c-e consist of the double axe-serpent group with interfixed vases, but the shapes of the vases vary. In Ve the vase is a two-handled amphora missing in Evans's sign lists, but also found on other seals.\(^2\) In V \( d \) it is a two-eared jar with open mouth (no. 50 \( a-g \)), and in V \( c \) an earless jar with closed mouth (no. 50 \( h, k \)). According to Evans (\( SM, i. 201 \)) it "may be gathered from its (sc. the earless jar's) repetition in the same formula with the double axe and zigzag as the others" that the different types represent essentially the same

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\(^1\) Evans, on the other hand, is of the opinion that "the goat's head appears on both faces" (\( SM, i. 166 \)).

\(^2\) Cf. author, \( Kadmos, \) II. i. 11.
sign. This argument is not, however, conclusive if different objects of the same category alternate in the same groups. That this is possible is shown by the fact that the shapes of vases vary not only in Fig. 7 V, but also in the groups in Fig. 8 V: here group a is written with the above-mentioned jug with beaked spout (no. 47), group b on the other hand with no. 49 a, a handled vessel the content of which is indicated by a dash (Evans, loc. cit.). The same phenomenon may be observed in Fig. 8 III, where a contains a sign similar to the last mentioned (no. 49 c), b a vase the content or decoration of which is indicated by a curved band, and c a vase which has the same shape as the two-eared jars, no. 50 a-g (Fig. 7 V d), but without the dots indicating its contents. It cannot be doubted that these signs are not mere variants of vase signs but different kinds of vases or vases with different contents. Considering that the vase signs of Fig. 9 V are interfixed and the ideographic character of interfixed signs was proved already on p. 361, we may infer that the other vases, too, are ideographic signs which can alternate in identical or related groups.

A similar situation is met with in Fig. 10 I-III. In the groups of I, the mallet-sign, no. 26, is associated with various animals' heads; in a-b with the facing ox-head with horns slanting upwards (no. 63 c, g), in c-d with the facing ox-head with a bar or strokes above it (no. 63 f, h-m), in e-f with the calf's head (no. 64), in g with the above-mentioned unknown animal's head, in h with the ass's head (no. 68), and in i-j with the goat's head (no. 65). It is evident that related or identical groups are found here with different animal's heads. The same is true for Fig. 10 II where the varying heads are combined with the cross pommée; in a we find the ox-head seen in profile (no. 62 b), in b the above-mentioned facing ox-head with horizontal horns (no. 63 d), in c the facing ox-head with the slanting horns of I a-b (no. 63 c, g), in d the calf's head (no. 64), and in e-f the wolf's head with protruding tongue (no. 73). Finally, we find in Fig. 10 III the spear sign\(^1\) combined in a with the ox-head seen in profile, in b with the wolf's head,\(^2\) in c with the calf's head, in d-e with the unknown

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1 Evans, no. 14, the cursive form listed as no. 13 f.; cf. Mallia, pp. 32 f. and Fig. 13. For the form of the sign compare Marinatos, \(\Sigma\nu\gamma\nu\eta\), BSA, xxxvii (1936-37), pp. 187 ff.

2 Cf. CG, p. 20.
animals' head, in f with the ass's head, and in g-h with the goat's head. Probably these groups represent composite names or titles containing the element "spear", as in the well-known family of Carian names Ma-ύσσωλος, Καρ-ύσσωλος, Άκτα-ύσσωλος "spear-bearer of Ma, Kar, Akta"; or better "belonging to the spear of Ma" etc. Names or titles are also suggested by the occurrence of spear signs or spear groups at the beginning of inscriptions as on P. 47 a-b (Fig. 6 V a-b), and at the beginning of the first two sections of AM 1938.1161. I have already shown (p. 350) that the well-known sealing of Fig. 1 c contains a similar combination, namely the spear with a horned sheep, accompanied by the same crouched figure as the spear-animal's head group of Fig. 10 III d.

The alternation of animals' heads—in some cases the same heads—in three different series of groups can leave no doubt that these consist of ideographic signs, and not of phonetic signs repeatedly combined by chance with mallet, cross pommée, or spear.

9. Interrelated Signs

Finally, we shall discuss the fact that there are interrelations of formally different signs which can only concern their sense. This implies that the signs in question are ideographic and not simply phonetic elements. We shall consider only one example here: the interrelations of the antlers-sign, no. 99, with certain other signs which seem to belong to the religious or administrative sphere.

The groups in Fig. 11 a-b and f are obviously composita in the sense discussed above p. 362. Their first element is the

2 Cf. author, Kadmos, II. ii 85 f.
3 Cf. also the alternation of ox-head and ass's head in Fig. 8 I, the alternation of animal heads in Fig. 8 IV b-c, and the alternating animal heads in the axe groups AM 1938.1166 line 4-5 (Kadmos, II. ii, p. 85 f.).
4 According to SM, i. 218 "a forked branch or double spray", but cf. Bossert, op. cit., pp. 7 ff. with Fig. 1. It is, however, doubtful whether the Linear A and Cyprian signs in Bossert's Fig. 1 f-h are variants of the antlers sign.
antlers-arrow group of Fig. 9 IV c, the arrow sign of which is reduplicated in 9 VI $d = 11$ e.¹ The second constituent of $11$ $a-b$ is a group consisting of the palace sign (no. 41) and the peculiar sign no. 3 which is interpreted by Evans as "human bust or idol somewhat resembling certain marble figures from Early Cycladic and Minoan graves". We need not discuss here the arguments for and against this interpretation. Suffice it to say that I would consider the interpretation as an idol as the more likely, not only because of the strange shape of the sign (it is closed at the bottom), but because a "human bust" whose form differs considerably from no. 3 has in the meantime been found on a clay bar from Mallia (H. 22 $a = $ Fig. 4 IV c). Bossert (loc. cit. pp. 8 ff.) compares some Hittite cult-titles written with the "holy branch" (compiled by him in Fig. 11), and interprets the Minoan groups accordingly as "des Šanti Palast, Oberpriester" or "Wohnung des Oberpriesters des Šanti" (p. 16). This translation is doubtful, but Bossert is certainly right in so far as the "branch" must mean in the Minoan script, too, something like "holy, sacral", since it is also apposed to the double axe (P. 100 $d$), the serpent (P. 116 $c$), and other religious signs.²

The antlers sign and the "idol" (no. 3) are also found in groups c–d,³ the antlers and the palace sign no. 41 in the Mallia-group $g$. Besides this, I would point to the fact that groups e–f come from the same clay bar as c so that we have on this bar three occurrences of the antlers sign. In e–f the antlers-arrow groups are combined with the trowel-eye formula and the arm⁴-double axe respectively. The association of the antlers sign with the trowel recurs in group $l$, the association with the eye in group $h$,

¹ Cf. above, p. 366.
² Cf. the examples given by Bossert, loc. cit. p. 17, Fig. 10 a–e. They must be separated from his Figs. 10 f–h, since these contain the hieroglyphic corn sign and not the holy branch. The confusion of these signs dates back to Evans (SM, i. 218, no. 100).
³ Remarkable is the connection of the "idol" and the ladder-like sign (no. 45) in group d. It reminds one of the well-known idol-head found near Knossos (PM, IV, Fig. 438 = SM, II, no. 1716), which has the ladder-like sign (with a small loop on the left) under its forehead.
⁴ The sign cannot be accurately identified. It is certainly not no. 42 (right angle), with which Evans and Bossert identify it.
where the double axe also recurs.\(^1\) Group \(i\), too, contains the double axe, but here the interrelation between the antlers-arrow group and the double axe is unclear, as the order of the signs and groups on the seal (P. 24 \(c\)) is controversial. I have assumed that, since the stem mallet-silphium is sometimes prefixed by the double axe, the double axe also in this case belongs to the group of line 1, beginning with the throne-sign on the right.\(^3\) Evans, too, connects the double axe with this group, but believes that it begins on the left. Therefore he reads: "double axe-silphium-mallet-throne antlers-arrow",\(^3\) whereas he reads in Fig. 116 \(h\): "double axe-arrow-antlers". Bossert (loc. cit. p. 8 f., Fig. 2a) on the other hand reads: "throne-mallet-silphium antlers-arrow-double axe" and takes the cross on the lower right before the antlers as a \textit{Worttrenner} between the upper and lower groups. But, as I have already noted in \textit{Minoica}, p. 175, a cross in this position cannot separate the two groups already separated by the fact that they are written on different levels. Nor can it be an initial sign, as this would have to stand before the upper and not the lower group. The remaining possibility is that the cross in this case, too, does not separate but rather connects two constituents of a composite group, a usage we have already observed on p. 362. If this is correct, the function of the cross would be to connect the beginning of the lower group with the beginning of the upper group, that is, to show the interdependence of the antlers sign and the throne into which the antlers sign is already half written. The seal Fig. 11 \(l\), which was unknown to me at the time, shows that this is indeed the case. Here the antlers are obviously nothing but an adjunct of the throne which is ligatured with the "holy branch" as well. On one side of this remarkable ligature stands the wolf's head (also connected with the antlers in \(k\)), on the other the trowel, found in connection with the antlers in group \(e\). Thus the combination of the signs in \(l\) is the same as in \(j\). Only the adjuncts are different. In \(j\) the "holy branch"
(with two volutes) is placed in the throne sign instead of the antlers of groups i and l. Since i and j are found on the same seal (P. 24), the double ligature of l is replaced here by two simple ligatures, throne + antlers on side c, and throne + holy branch on side a. In other words, the interrelation between throne, antlers, and holy branch, which is expressed in l by an artistic combination of all three signs, is represented on P. 24 by two combinations of two signs placed on different sides of the seal.

This survey shows that the antlers sign stands in close relation to certain signs which constantly recur in the groups compiled in Fig. 11. We cannot at the moment understand the nature of these relations, but this much is clear, that these relations, partly expressed by complicated ligatures (such as Fig. 11 i, j, l), are relations of sense and cannot merely be accidental groupings of phonetic signs. The signs must be ideograms belonging to the same sphere of thought. It is interesting to see that the palace sign (a, b, g) as well as the throne-sign (i, j, l) occur among these signs. This, too, cannot be mere coincidence and is, therefore, a further proof of the ideographic character of this family of signs and of the homogeneity of their sphere of application.

This conclusion is finally confirmed by the fact that the signs of this family and some obviously related signs also alternate in other combinations. The reader may remember that we observed in Fig. 3 III that there, too, the throne alternates with the double axe, and that both alternate with the gate in IV-V. The same alternation of throne and double axe can be seen in IV a-b where the double axe is moreover apposed in a. On the other hand, we see in VI c-d that both prefixes can be replaced by suffixed lyre and cross pommée, and the same alternation of throne, double axe and lyre is found among the prefixes of III b-d. The alternation of throne and lyre can also be observed in the horns groups of II a-d and III a. These alternations also show

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1 For the palace sign, which is derived from the Egyptian script, cf. SM, i. 197 f., PM, i. 358 f. Fig. 257, 11, p. 55, and Sundwall, "Der Ursprung der kretischen Schrift" (1920), p. 7, no. 4; for the throne sign (no. 20), interpreted by Evans as a "template", cf. R. Jahn, Archäologischer Anzeiger, 1901, p. 21, N. Platon, Μνωικοί θρώνοι, Kret. Chronika, vii (1951), 408 ff., Fig. 27, and the author, Minoica, p. 177 and Kadmos, ii, 1, 11, n. 13.

2 Cf. above pp. 355 and 373.
that we remain here in a sphere of closely related signs. It is for this reason that I attempted a proof in *Minoica*, pp. 171 ff. that the alternation of throne, double axe, etc., is not an alternation of related phonetic but of related ideographic signs. That this alternation can be traced through to Linear A and B\(^1\) and that the hieroglyphic throne sign is replaced there by a new linear sign,\(^2\) may be considered a further proof that we have to do with ideographic and not with phonetic signs.

Summing up, it is safe to say that the peculiarities we have observed indicate a basically ideographic script. That does not, of course, rule out the existence of phonetic elements, but at this stage we cannot separate these from the ideographic signs. Anyhow, it is clear that phenomena such as the alternation of affixed and interfixed signs, the alternation of interfixed objects of the same category, the reduplication and symbolic arrangement of middle signs,\(^3\) the interrelations of the signs observed in Figs. 3, 10 and 11, and the artistic ligatures of Fig. 11 i, j, l, defy a phonetic explanation. They point to a script which builds up its groups by various, and in some cases complicated, combinations of ideographic elements whose meaning was perhaps only known to a class of initiated scribes and priests. R. Jahn was already very near to the truth when he said in 1901 that “wir auf den kretischen Steinen in andeutenden, dem Eingeweihten verständlichen Zeichen den kultischen Inhalt ausgedrückt haben, den uns die mykenischen Goldringe im Bilde zeigen” (loc. cit. p. 23). But he throws out the child with the bath-water when he concludes that we cannot be dealing with a regular script, or at least not with “einer Bilderschrift in dem Sinne, wie Evans will, mit einer Schrift, in der beliebige Worte und Sätze durch die Nebeneinandersetzung der Bildzeichen ausgedrückt werden”. Nowadays, nobody will doubt that the Cretan hieroglyphs constitute a regular system of writing,\(^4\) out of which several other scripts were developed. Only it is a different type of script and builds up its groups in a different way from that we know from the

\(^1\) *Minoica*, p. 178 with Fig. 2 and Pl. 3.
\(^3\) Cf. *Kadmos*, II. i. 11 ff. with Pl. 3 c and above pp. 353, 367.
\(^4\) Cf. the remarks of Evans, *SM*, i. 21, n. 1.
Egyptian, Hittite and similar hieroglyphics. Therefore, we should not despair of deciphering the Cretan hieroglyphs, but rather endeavour to grasp the peculiar character of the script and to understand the principles on which its groups are constructed. The present writer will be satisfied if this paper has somewhat clarified these principles.

KEY TO FIGS. 1-11 BELOW

Fig. 1

| a | P. 22 a |
| b | P. 62 b |
| c | PM i, Fig. 373 |
| d | P. 29 a |
| e | CS 6 |
| f | P. 44 c |

II a BM 1934. 11-20-1
| b | P. 30 d (CS 150) |
| c | P. 25 a (CS 151) |
| d | CS 165, 6 |

III a P. 64 a
| b | CS 170 b |
| c | MM 26-31-152 |
| d | P. 86 a |

IV a P. 18 a
| b | P. 23 al. |
| c | Private Collection, Switzerland |

V a CS 169
| b | AM Collection of casts (Stawell 8) |
| c | P. 16 |

VI a P. 24 c
| b | P. 110 a |
| c | P. 101 a |
| d | BCH 70, 81, Fig. 3, no. 7 c |

Fig. 2

| a | P. 73 a |
| b | CS 167 c |
| c | CS 167 b |
| d | P. 54 a 2 |
| e | HM 1537 a |
| f | CS 169 |
| g | MM 26-31-175 |
| h | P. 45 |
| i | P. 29 b |
| j | CS 165, 8 |
| k | P. 19 a |
| l | MM 26-31-156 |

II a H. 1 b
| b | P. 64 c |
| c | H. 8 a |
| d | BCH 70, 84, Fig. 3, no. 7 d |
| e | P. 7 b (CS 98) |
| f | BCH 70, 88, Fig. 8 |

Fig. 3

| a | P. 3 b al. |
| b | P. 5 a al. |
| c | P. 25 b |

II a P. 49 (CS 95)
| b | CS 96 |
| c | MM 26-31-155 |
| d | P. 47 e |
| e | AM Collection of casts III 4 |
| f | P. 80 a |

II a P. 89 b
| b | P. 102 b |
| c | AM Collection of casts III 4 |
| d | P. 110 d |
| e | P. 80 a |

III a P. 31 c
| FIG. 5  | I   | a: P. 34  | b: P. 61 b  | c: P. 27 c  | d: MM 26-31-161  | e: P. 100 a  | f: P. 80 a  |
|         | II  | a: H. 6  | b: P. 27 a  | c: P. 104 c  | d: H. 20 a  |
|         | III | a: P. 100 a  | b: P. 44 d  | c: P. 29 c  | d: HM 571  |
|         |     |           | e: HM 1537 d  | f: P. 110 c  | |
| IV a P. 94 b  | b: P. 105 a  | c: P. 39 (CS 138)  | d: P. 30 d  | |

| FIG. 6  | I   | a: P. 117 a 1  | b: P. 31 b  | c: P. 105 b  |
|         | II  | a: H. 27 c  | b: H. 30 a  | c: *Mallia* Fig. 11 |
|         | III | a: MM 26-31-156  | b: P. 26 b  | |
|         | IV a P. 109 d  | b: P. 93 a  |
|         | V a P. 47 a  | b: P. 47 b  |
|         | VI a P. 103 a  | b: P. 103 c  |
|         | VII a HM 1537 c  | b: P. 93 b  |

| VII a P. 108 a  | b: P. 93 a  | c: *BCH* 70, 81 Fig. 3 No. 7 a |

**Fig. 7**
- I a-c P. 46 a-c
- II a MM 26-31-156 b P. 64 d
- III a P. 24 b (CS 166) al. b CS 165, 8
- IV a P. 54 a 1 b P. 54 a 2 c P. 54 b
- V a P. 84 b b P. 118 a c P. 118 b-d d P. 89 b e HM 1694 d f P. 114 a
- VI a HM 1537 b b BM 1934, 11-20-1 c HM 1694 d CS 165, 2
- VII a-b CS 167 b-c

**Fig. 8**
- I a P. 83 a b P. 107 b c P. 92 a d MM 26-31-173
- II a P. 116 a b P. 116 a, d, e c P. 116 a
- III a P. 77 b P. 107 c c H. 23 a
- IV a P. 96 a b P. 62 b c P. 66 a, 67 a d P. 118 a e P. 103 b
- V a *Annuario* 19/20 p. 104 Fig. 250 b P. 114 a
- VI a CS 165, 5 b CG 163
- VII a P. 30 d (CS 150) b P. 113 a
Fig. 9

I a P. 101 b
b P. 94 a
c P. 76 b
II a H. 7 a
b H. 30 c
c H. 21 c
d H. 22 b
III a HM 11. 158
b H. 21 a
c H. 21 b
d P. 87 b
IV a Diskus B 15
b P. 41 b
c HM 1868 a/c
V a P. 59 b
b P. 63 a
c P. 85 d
VI a P. 46 c
b CS 167 c
c P. 101 a, 102 a
d P. 104 b
e P. 69 b

Fig. 10

I a PM i, Fig. 207, c 1 (CS 169 c)
b Private Collection, Switzerland
c P. 50 b
d P. 63 b
PM i, Fig. 207, c 3 (CS 170 b)
f H. 27 c

II a H. 2
b MM 26-31-169
c Mallia, Fig. 11
d MM 26-31-168
e P. 115 a
f HM 11. 149
III a H. 22 c
b CG 110 d
c PM i, Fig. 207 k (CS 167)
d P. 29 a
e HM 1840 c
f Private Collection, Switzerland

Fig. 11

a P. 101 a
b P. 102 a
c P. 104 a
d P. 103 a
e P. 104 b
f P. 104 c
g H. 12 a
h CG 109 d
i P. 24 e
j P. 24 a
k P. 44 a
l Private Collection, Switzerland
FIG. 1
FIG. 2

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STUDIES OF SOME ANCIENT SCRIPTS

Fig. 8

Fig. 9
FIG. 10

FIG. 11