

PAUL YULE

TECHNICAL OBSERVATIONS ON EARLY NEOPALATIAL SEAL-IMPRESSIONS*

The purpose of this paper is to determine which of the two main types of signets, metal rings or gems, was preferred for sealing during the early part of the neopalatial period and to discuss the possible significance of this preference. Consideration will also be given to the questions of which other types of signets were used and who might have owned them. It is hoped that these comments will supplement the excellent work of Betts and Gill.¹

Although photographs and drawings have been available since 1902,²

* I should like to express my gratitude to the Keeper of the Ashmolean Museum for kindly allowing me to examine and publish gems in the collection. This paper has had a long development from the time it was delivered in Prof. Kopcke's seminar at the Institute of Fine Arts, New York University in the Spring of 1974 and these ideas did not develop in a vacuum. Thus, I would also like to thank John Younger and Ellen Davis for their expert criticism. The critical advice of Dr. Pini also led me from several false paths. It should be noted that I have not had the benefit of handling the sealings in the Heraklion Museum, although I have carefully examined them in their vitrines.

The following special abbreviations are used:

Altkreta = H. Bossert, *Altkreta*, Berlin 1923

Aussenberg = Lynda Aussenberg, *Minoan Gold Signet Rings and Related Impressions*, AM thesis, Institute of Fine Arts, 1974 (unpublished)

CretS = V.E.G. Kenna, *Cretan Seals*, Oxford 1960

GGFR = John Boardman, *Greek Gems and Finger Rings*, London 1970

Levi, HT = Doro Levi, *Le cretule di Hagia Triada e di Zakro*, *ASAtene* 8—9, 1925—26, 71—156

Levi, Zakro = *Ibid.*, 156—201

M & H = S. Marinatos and M. Hirmer, *Crete and Mycenae*, Munich 1959

PM = Sir Arthur Evans, *Palace of Minos*, 4 volumes & Index, London 1921—36

Younger = John G. Younger, *Towards the Chronology of Aegean Glyptic in the Late Bronze Age*. Doctoral thesis, University of Cincinnati, 1973 (University Microfilms 73—24, 867)

¹ Cf. John Betts, *New Light on Minoan Bureaucracy*, *Kadmos* 6, 1976, 15—40; M. A. V. Gill, *Seal and Sealings: Some Comments*, *Kadmos* 5, 1966, 1—16. Also cf. Kenna, *Cretan Seals*, Oxford 1960, 38; CMSII. 5, xiii; Aussenberg, 28, 31 and 34; Younger, 32—44.

² D. G. Hogarth, *The Zakro Sealings*, *JHS* 22, 1902, 76—93 and later Levi, HT & Zakro, 71—201.

the study of these sealings is hindered from several considerations. First, they are difficult to photograph well, for even good photographs often flatten the relief or put areas in shadow, and may as a result give a false idea of the texture of a worked seal or of the surface of an ancient seal-impression. Second, many are published in the form of drawings which are usually supplemented by no photographs or by photographs of poor quality and with no scale. Third, nodules are often worn, broken or imperfectly impressed. Lastly, significant differences in the accuracy and styles of drawing of the several artists employed for the publications of Evans, Hogarth and Levi further hinder the task of comparison.³ These problems will be largely resolved through the high standards of the forthcoming CMS volumes which are to be devoted to sealings.

Nevertheless, since in Crete from MM III to LM IB only approximately fifty stratified intaglios are known, by contrast with as many as 449 stratified legible sealing designs, the impressions provide much more evidence than do the signets for the study of glyptic chronology and development.⁴ They also reflect more accurately the proportion of gems to rings in antiquity, since metal rings are not as likely as stones to have survived.⁵

Table 1. Seal-types from sealings

	metal bezels	gems	not distinguishable
Zakro	26	163	9
(other than fantastic designs)	(26)	(79)	(9)
Haghia Triada	39	100	6
Zakro plus Haghia Triada	65	263	15

³ Cf. PM I, 696, fig. 518; Hogarth, JHS 22, 1902, 77—88, figs. 1—30; Levi, HT & Zakro figs. 1—238.

⁴ 57 of these types are identifiable from the Hieroglyphic Deposit (MM III A) and 49 from the East Temple Repository (MM III B). The remainder are from Zakro, H. Triada, Sklavocampo and Tylissos. Other stray impressions are also known.

⁵ Nearly all of these were assembled by John Younger in his doctoral dissertation (Younger 18—45 and 463 n. 2). The MM III date for the Zakro deposit offered by Biesantz (Kretisch-mykenisch Siegelbilder, Marburg 1954, 129) cannot be sustained following the confirmation by Betts that impressions from the same rings were found at several sites. The one Marine Style vase from Sklavocampo is not very typical of the style (Marinatos, Ephem, 1948, 69—96 esp. 82—87 pl. 2.2). The major seal deposit with accompanying Marine Style pottery seems to be that of Zakro (Hogarth, JHS 22, 1902, pl. 12 1 & 3) although it is still unclear how much of this pottery is diagnostic of LM IB.

I. Distinctions between gem- and ring-impressions

In order to understand the difference between impressions from gems and those from metal rings, it is useful first to consider general and technical features of the intaglios themselves.

a) Shape: Gems are largely limited to lentoid and, secondly, amygdaloid forms which leave circular and elliptical impressions, by contrast with ring bezels which usually produce oval ones.⁶ Also an amygdaloid is at this period more convex in section than a metal ring-plate. This distinction, however, tends to become blurred, particularly in sealings which are imperfectly impressed.⁷

b) Size: Lentoids datable to the beginning of the Late Bronze Age are fairly small, ranging consistently between 12 and 16 mm, the average being 14 mm. A few larger examples of this period, measuring up to 23 mm in diameter, are known from the mainland.⁸ By contrast, the dimensions of ring-bezels during this period are usually larger and range up to 35 mm in width.⁹

c) Surface finish: Moreover, close examination of gems and metal rings reveals differences of quality of surface which are due, to a large extent, to the physical properties of the materials; since the technique of carving required for gold, which is malleable, was different from that applied to the stones of the period, which are usually brittle-hard. Stones of the chalcedony family were worked primarily by abrasive techniques which left distinctive tool-marks. Metal rings with very thick ring-plates could only have been cast, and their finer details later chased.¹⁰ The technical distinctions between metal and stone intaglios are most readily apparent in unworn examples, particularly with respect

⁶ Younger, 148—150, 204—205. Three round ring bezels with carved designs are known: Younger no. 26 (Sphoungaras-lead), CMS I no. 410 (Phylakopi-ivory) and CMS VII no. 68 (apparently purchased on Crete-gold). Interestingly enough, the last ring passed into the British Museum in 1842, thus guaranteeing its authenticity. I am indebted to Mr. Bailey of the BM for this information.

⁷ Some impressions of three-sided prisms may masquerade as lentoids or amygdaloids. For example, CMS I no. 233 leaves a round 'lentoid' impression and CMS XII no. 185 an elliptical 'amygdaloid'.

⁸ Younger, 149—150.

⁹ Ibid., 205; J. Hazzidakis, *Τύλισος Μινωϊκή*, *Ephem* 1912, pl. 16 F (seal impression, length 35 mm).

¹⁰ I have not handled these rings. I owe observations on the casting of ring bezels to Dr. Pini.

to the quality of line in thin features, such as arms, hair or legs.¹¹ In goldwork there is often a loss of organic cohesion in the treatment of the human figure, and parts of the body are formed by simple strokes (Fig. 1).¹² Stippling is also used in goldwork to build up forms or to show details such as hair.¹³ In stone-cutting (or, better, grinding) there is more opportunity for infinite modelling and for an interplay of light between contrasting concave and convex surfaces (cf. Pl. V).

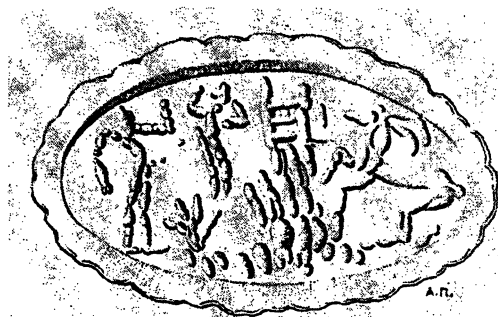


Fig. 1. Pylos (CMS I 292)

d) Theme: Since only two Cretan rings with the usual oval type of bezel have been published from MM III-LM I contexts, any discussion of contemporary ring iconography must begin with a study of the numerous sealings from Haghia Triada and Zakro and made by rings from LM II or later contexts.¹⁴ There are significant differences between the iconography of goldwork and that of glyptic. First there is evidence

¹¹ The term 'engraving' is avoided here as it denotes the actual removal of metal by means of a burin. This was not possible until the advent of steel, which, according to R. J. Forbes was discovered about 1400 B.C. in Anatolia and remained a Hittite monopoly for a hundred years (Studies in Ancient Technology 8, Leiden 1964, 216—217). The most comprehensive discussions of ring manufacture are Aussenberg, 49—56 and Younger 200—204. However, the methods used to manufacture the intaglio plate are still a matter of controversy. Glyptic technique is most readily visible in 'talismanic' gems and in Boardman's Cut Style (GGFR, 48, 392, 394). In goldwork the most telling examples are CMS I nos. 16, 17, 129, 219, 292; Kenna, Cretan Seals, pl. 20, second row from the bottom, middle, the 'Archanes Ring', which I accept as ancient.

¹² Cf. Fig. 1, from grave Δ (= gr. IV) Pylos, MH/LH I—III context; Pl. 6, obtained at Knossos; Sourvinou, Kadmos 10, 1971, 62 pl. I.3, from Sellopoullou (precious metal HM 1034) LM II—IIIa context; Sakellarakis, Praktika 1967, pl. 137a, Fourni (precious metal HM 1010) LM IIIa (?) context; CMS I no. 11, Mycenae LH II context; CMS I no. 16, LH I context.

¹³ Infra, n. 24.

¹⁴ Archaeological Reports for 1958 (1959) 19 fig. 30, LM IB context; Fig. 2 Isopata, LM IB—II context (Younger, nos. 70 and 468 respectively).

to imply that many or even most Cretan gems of the period are of the 'talismanic' type.¹⁵ Naturalistic 'stone' compositions contain few figures, and the tendency is to neglect monumental designs in favor of single lions, birds, goats and fantastic hybrids (see Table 2). These are drawn without an elaborate setting, but with the addition of simple background features such as branches. By contrast, in ring iconography there is a far greater proportion of developed narrative compositions.¹⁶ John Younger

Table 2. Iconography of sealings

	HAGHIA TRIADA				ZAKRO			
	designs		impressions		designs		impressions	
	gems	rings	gems	rings	gems	rings	gems	rings
'talismanic'	8	—	61	—	1	—	1	—
bucrania	1	—	1	—	—	—	—	—
compos./fantastic animals	8	—	74	—	90	—	411	—
birds	14	1	182	1	—	—	—	—
lions	5	1	12	1	7	1	12	2
dogs/wolves	10	3	37	5	6	—	7	34
bulls	10	6	19	8	6	5	7	—
goats/deer	12	—	29	—	16	—	19	—
griffins	7	—	133	—	2	7	7	2
cult scenes	5	16	12	280	6	13	18	37
(1 or more figs.)								
human combat	2	2	6	5	—	2	—	5
miscellaneous	8	3	82	50	15	4	47	12
sanctuaries/shrines	—	—	—	—	5	—	14	—
cows	—	—	—	—	—	1	—	1
not distinguishable	—	—	—	—	1	—	2	—

¹⁵ Younger, nos. 1—34; GGFR 46. Only about one fifth of Younger's examples are 'talismanic' or peripheral to this group. Yet, the large number of stones of this type without archaeological origin and now in collections suggests that they played a more important role than the excavated evidence suggests. Artemis Onassoglou informs me that about 900 are known. From the period under discussion only 62 impressions from 9 types are known (Table 2). If Younger's Popular Style is reduced in number by lowering the dating for some of the seals, the preponderance of 'talismanic' seals is even greater (Younger, 415—418).

¹⁶ For example, Fig. 1, Pl. 6; Kadmos 10, 1971, 62 pl. I.3; M & H 98 pl. III; GGFR 53 fig. 125 from Fourni (precious metal HM 980), LM IIIA1 context.

has listed the excavated examples, and has found that they fall into three major categories:¹⁷ overtly religious scenes; possible religious scenes; and miscellaneous subjects, apparently secular.

The greatest number of rings belong to the first grouping (sixteen examples) and include such themes as women at altars, group scenes with several figures, and sacred shields with knots.¹⁸ The second group (twelve examples) includes women, griffins, caprids with snake-frames, and women with monsters.¹⁹ Subjects of the third group (eleven examples) range from scenes of hunting, combat and bull-leaping to representations of animals.²⁰ While the religious significance of these subjects is a matter for debate, the fact remains that they are significantly more often associated with goldwork than with glyptic. In short, elaborate group-scenes and women at altars are rare in gems, while subjects characteristic of stone are not found in metalwork or in impressions from metal rings.²¹ For example, Levi, HT, type 2, a four-sided hieroglyphic seal impression, has only one problematic metal analogue; and there are no gold intaglios of the 'talismanic' class or of the fantastic monsters known from Zakro and Haghia Triada.²²

e) Style: Rings, as distinct from gems, have their own style of carving and figure-design. Representations of women are far more common in goldwork than in glyptic, and in goldwork they also tend to be more stylized. This is most evident in the exaggerated buttocks of seated and kneeling figures and in the schematized heads of women in early examples (Fig. 2).²³ There is a preference, especially in rings from

¹⁷ Younger, 208—209.

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Ibid.

²¹ Cf. CMS I no. 279 and IX no. 163. These and the few other existing examples do not invalidate the point.

²² The gold four-sided prism in the Giamalakis Collection (Xénaki-Sakellariou, *Etudes crétoises* 10, 1958, no. 110, pl. 20) is problematic in that there are no good comparisons for the signs or the way they are worked. I do not accept the argument (*ib.*) regarding a gold prototype for the prism that produced the impression in the Haghia Triada deposit. Boardman noted that the fantastic Zakro designs seem to have been impressed by stone lentoids (GGFR 42). For examples of this type of carving cf. Chapouthier and Demargne, *Etudes crétoises* 6, 1942, 69 no. 2 fig. 46a; CMS I no. 270; IV no. 290; V no. 677; VIII no. 152 and Zakro types 71, 72, 74—76 in the rendering of the wings.

²³ Additional comparisons are M & H pl. 111 b, Kalyvia grave II, precious metal, HM 44; GGFR 53 fig. 125; Evans, JHS 45, 1925, 66 fig. 56, said to come from Amari, west of Ida.

later contexts, for 'busy' textures, as for example in the garments.²⁴ This texturing is also noticeable in the reticulation of the hair and in the extensive use of smoothly undulating fine lines, which are unusual in glyptic. Again, with some notable exceptions, modelling tends to be less fluid and plastic than with glyptic.

John Boardman has suggested that the themes depicted on rings seem often to have been inspired by monumental compositions, which were becoming familiar from wall-painting and vases in relief.²⁵ Some of these themes have clearly been transposed from a rectangular to an oval field, and they often convey a sense of monumentality which separates them from the miniaturist quality of gem-designs (Pl. VI).²⁶



Fig. 2. Isopata (PM III 68, Fig. 38)

II. Problematic types of signet

In addition to metal rings and gems, other types of signet are known which combine the features of each of these groups: for example, gold-covered gems and stone rings.²⁷

²⁴ Garments-Pl. 6; Fig. 2; Altkreta 233 pl. 324b, LH (?) context. Foliage-Fig. 1; Archaeological Reports for 1968—1969 (1969) 33 fig. 43. Hair-Fig. 2; CMS I no. 219.

²⁵ GGFR 38.

²⁶ Cf. CMS I nos. 86, 108, 126, 127, 179, 180, 200 etc.

²⁷ Stone rings: Pls. 3—5; Edith Dohan, Excavations in Eastern Crete, Sphoungaras, Univ. of Pennsylvania Anthropological Publications III.2, Phil. 1902, 69 fig. 43; CMS I nos. 89 and 383; IV 58D. Here and in other places where I have cited 'Dubitandae' I do not consider the seal to be dubious. Other possible ringstones are CretS 157, 224 and Etudes crétoises 10, 1958, no. 172.

a) Gold-covered gems: CMS IV no. 39 D and V no. 200 are good examples of gold-covered seals, and the example shown in Plate I was probably also coated with gold. The gold sheathing would have made the outlines and details on the original designs less clear on the seal surface and in its impression; the owner evidently prized a more showy signet than one that would have left a fine impression.²⁸ Gold-covered seals such as the Benaki seal and another in the Ashmolean (K 203) always have cores of common stone or of some other material; but undoubtedly the finer stones were not intended to be covered in gold. For it is the author's feeling that many seals, particularly foliate-back, four-sided prisms in hard stone, 'talismanic' seals, and many agates have been subjected to a process of artificial intensification of colour or bleaching. For example, the specimen in Pl. III,²⁹ from the Ashmolean Museum, has apparently had the red intensified in the fine agate: and it makes little sense that an artist would go to the trouble to treat a stone in order to bring out dramatic qualities and then cover it with gold.

There is some problem about the type of seal responsible for the impression excavated from the entrance of the royal tomb at Isopata (Pl. II). Although round, the intaglio was probably of gold (though not necessarily from a ring) rather than of stone, as has been suggested.³⁰ Betts supposed that the impression could have been that of a gem influenced by ring iconography, but the smooth, precise working of the spiral frieze at the bottom, which is formed by dots connected by S-grooves, would have been difficult to carve in hard stone, particularly in the cryptocrystalline varieties preferred for the gems of the period. In these materials one would expect (at least in the Bronze Age) a more

²⁸ With such pieces the question of the non-reversibility of the seal-image really becomes tenuous as a refinement too subtle to be conveyed in this medium. On this cf. H. Biesantz, *Kretisch-mykenische Siegelbilder*, 5—10; M. Mellink, *AJA* 59, 1955, 337—338; H. Reusch, *Orientalische Literaturzeitung* 1957 nr. 5/6, 210—211.

²⁹ A sign of such treating is a whitening of the stone, but not always along the natural lines of the banding. Is this the result of uneven porosity of the stone? Also, with some stones, such as CretS 131, the outer surface is whitened but the interior of the string-hole is still red: the seal was apparently roughed-out and the stringhole bored after the chemical treatment. This 'patina' is not caused by contact with skin acids and oils, which the porous stone would have absorbed along with their brown pigmentation. Such brown staining is observable on light stones such as CretS 166. Interestingly enough, only certain styles seem to have been subjected to bleaching. I hope to treat this topic more fully in my dissertation on the typology of early Cretan glyptic. An excellent account of stone colouring is found in A. Billing, *The Science of Gems, Jewels, Coins and Medals*, London 1875, 110—114.

³⁰ Betts, *Kadmos* 6, 1967, 27.

mechanical spiral, as in the case of CMS I no. 14 from Mycenae with its drill-marks and straight cuts. Also, this extraordinarily fine impression of the lumpy surface of the bull, especially in respect of the treatment of the belly and hindquarters, resembles strongly the modelling of certain gold intaglios.³¹ The original which made this impression may have been of a type outside the current categories of seals.

b) Stone rings: Nearly all of the oval impressions from LM I seem to be from metal rings, but stone rings may account for some of them. The two types may be distinguished on the grounds of theme and style. Unfortunately, since only nine stone intaglios are known, they are not well represented as a group.³² Rings of this type were perhaps used primarily as signets and not as ornaments of daily wear, since they would be so easily broken.³³ Pl. IV, an impression from a ring of rock-crystal, bears a representation of two bulls on either side of a tree. Unlike the scenes on most metal rings, it seems to be a 'genre' subject, devoid of obvious religious paraphernalia or content.³⁴ On another example (Pl. V), excavated from Mycenae, cows are placed heraldically, licking and suckling their calves. Again there is no hint of religious significance. The broad and smooth style of carving on both of these intaglios is distinctly in the manner of carved stone and unrelated to goldwork. Another stone ring, CMS I no. 89, represents the 'master of the animals' motif with the central figure between two lions, one of which he suspends by a leg and the other by the neck. While this subject is unknown in goldwork, abundant parallels exist in glyptic.³⁵ Among the most striking of these stone rings is the well-known one said to come from Avdu (Pl. III). The subject of the design, a goat-drawn chariot, differs from the other examples of this group in that it appears to have been

³¹ Cf. CMS I nos. 125, 274 and 238.

³² *Supra* n. 27.

³³ The hoop-sizes of these are unpublished except for that of Pl. 3 (13 mm) and Pl. 4 (20 mm). Kenna notes that the hoop of Pl. 4 is a later addition (AJA 68, 1974, 11). Evans cited 17 mm as a normal hoop-size for a woman and 19 mm for a man (PM III 140 n. 2). However, many twentieth-century people have smaller fingers than this and could wear a 13 mm ring (Aussenberg 47).

³⁴ Compare with CMS I nos. 58 and 155, gold rings which depict respectively heraldical calves and goats on either side of a tree. These are possibly related to such cult-subjects on rings as those of CMS I no. 87 or GGFR pl. 153 with their heraldic griffins and lions tethered to a central pillar.

³⁵ Cf. CMS I nos. 144, 145, 233; IV no. 293; IX no. 153, 154 etc.



Plate I. CMS I 253
(courtesy of I. Pini)

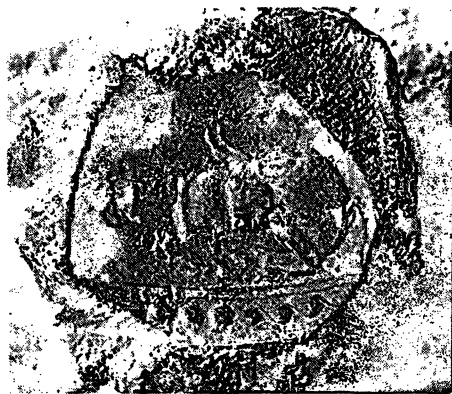


Plate II. Sealing from
royal tomb at Isopata



Plate III (courtesy of Ashmolean Mus.)



Plate IV. CMS XIII 27

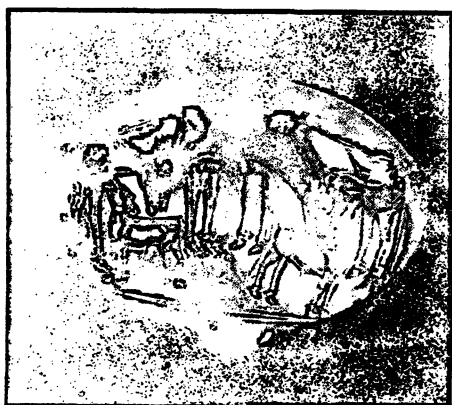


Plate V. Athens NM 1376

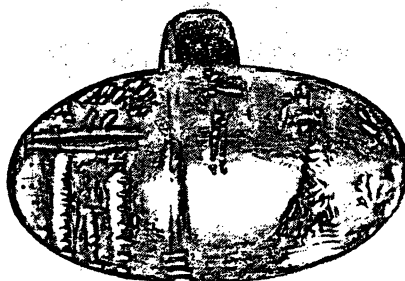


Plate VI. Ashmolean Mus.
(courtesy of J. Boardman)

copied from a horizontal composition of a larger scale.³⁶ The evidence suggests that, in both style and subject-matter, stone rings are essentially dissimilar from metal rings, and that they may be considered as gem intaglios elaborated and made into ring bezels.

III. The seal-impressions

So much for the distinction between goldwork and glyptic. In what follows, the identification of the types of signet responsible for the impressions has been made on the grounds of a) the shape of the impression b) the distinction between cult scenes and other themes, and c) the style of carving as reflected in the impression. By taking into account all three criteria, it is possible clearly to identify the class of signet responsible for most impressions, even though several of the sealings on display in Heraklion are broken or only partially impressed.

a) Counts of types: It follows that, from the catalogues of Levi and Hogarth, one can determine whether rings or gems were used more frequently for sealing (Tables 3 and 4). We find that not as many rings as gems were used to impress nodules. Out of 343 types, fifteen could not be definitely classed in either one or the other category. At Zakro 84% of the impressions are from gems (3.9 per signet), 14% are from rings (also 3.9 per signet) and 2% are indistinguishable. At Haghia Triada 61% of the impressions are from gems (6.8 per signet), 37% are from rings (10.5 per signet) and 2% are indistinguishable.

Ring- and gem-impressions are also found together on the same nodules. These data are difficult to interpret and may as easily reflect the random chances of survival as the bureaucratic procedures of the Minoans.

Table 3. Impressions per seal Type

Zakro	3.9 sealings per ring:	761 total distinguishable impressions
	3.9 sealings per gem:	198 different motifs
HT	10.5 sealings per ring:	1105 total distinguishable impressions
	6.8 sealings per gem:	145 different motifs

³⁶ This was suggested to me by M. A. V. Gill.

Table 4. Type references for Haghia Triada
and Zakro sealing Tally

1) ZAKRO

Hogarth, JHS 22, 1902 (types)

gems: 5—7, 17—94, 102—104, 107—142

rings: 1—4, 8—12, 15, 96—101, 105—106, 143

indistinguishable: 13—14, 16, 95, 143, 144

Levi, Zakro (types)

gems: 147—160, 162—178, 180—182, 184—186, 192—194, 197—199

rings: 183, 188—191, 195—196, 200

indistinguishable: 161, 179, 187

gem designs 163 82%

gem impressions 644 84%

ring designs 26 13%

ring impressions 103 14%

indistinguishable 9 5%

indistinguishable 14 2%

198

761

2) HAGHIA TRIADA

Levi, HT (types)

gems: 2—22, 24, 26—50, 52—53, 55, 57—62, 64—78, 81—83,

88—89, 91—92, 94—96, 99—106, 115—116, 119—121,

124—125, 131, 136, 142, 147

rings: 23, 25, 51, 54, 56, 63, 79—80, 84—87, 97—98, 107—114,

117—118, 122, 128—129, 132—135, 137—141, 143, 145—146

indistinguishable: 1, 90, 93, 123, 127, 130

numbers 126 and 144 do not exist as individual types

gem designs 100 69%

gem impressions 683 61%

ring designs 39 27%

ring impressions 410 37%

indistinguishable 6 4%

indistinguishable 12 2%

145

1105

b) Iconography: Certain iconographic tendencies are apparent in the case of each deposit. The Zakro designs are less varied in theme, for ninety fall into the homogeneous class with composite-fantastic animal designs. Boardman attributes these unusual impressions to stone lentoids created by one master, presumably an East Cretan.³⁷ It seems that the gems, the impressions, the master, or all three travelled also to Haghia Triada and to the Harbor town of Knossos where some of these sealings

³⁷ GGFR 42; Supra n. 22.

were also excavated.³⁸ Also characteristic of Zakro is the representation of shrines or sanctuaries. Sealings depicting birds and 'talismanic' subjects appear among the Haghia Triada sealings but hardly at all among those from Zakro. At both sites goats and deer are common.

The count of the impressions by theme (Table 2) is, at Haghia Triada, largely affected by several designs each of which is represented by many impressions; from type 125, for example there are 251 impressions.³⁹ Evidently the number of impressions is not large enough to allow us to determine with certainty which subjects were most popular in the Bronze Age, or if iconographic differences between the deposits are a result of chance or regional variation.

c) Usage: Since documents of papyrus or other writing-material have not survived along with the impressed nodules, one cannot determine exactly how these sealings were used or by whom. From the impressions published by Betts and others in the Heraklion Museum it is reasonable to accept that documents travelled between east, south and central Crete.⁴⁰ What the writing-material could have been is open to question⁴¹, but papyrus is known from both Assyria and Egypt at this time.⁴² It may be noted that in Classical times papyrus seems to have been imported, as it did not grow in the Aegean.⁴³ If these sealings

³⁸ Younger 31—32. CMS XII no. 174 appears to be the sealing referred to in PM II 254 n. 1 as having been acquired at the 'Windmills'.

³⁹ Levi, HT type 13 (123 impressions), 95 (102 impressions), 105 (60 impressions), 118 (45 impressions).

⁴⁰ Clearer examples exist in the Heraklion Museum than were available to Betts, *Kadmos* 6, 1967, pl. 1.

⁴¹ For ancient writing on leather see Naphtali Lewis, *Papyrus in Classical Antiquity*, Oxford 1974, 9 and G. R. Driver, *The Judean Scrolls*, Oxford 1965, 407—408.

⁴² For evidence on early Egyptian writing on leather and papyrus see A. Lucas (revised by J. Harris), *Ancient Egyptian Materials and Industries*, London 1962. Lucas furnishes the museum numbers for leather documents as early as the Sixth Dynasty (p. 364) and for papyrus documents as early as the First Dynasty (p. 140). A text from middle-second millennium Nuzi is the earliest known possible mention of papyrus in Mesopotamia (E. Lacheman, *Harvard Semitic Series* 13, 53 text SMN 315—transliteration Lacheman, RA 36, 1939, 156—Copy). The other goods listed on this receipt, mostly wooden household and agricultural objects, do not allow us to conclude that *ni'aru* was used as a writing material at this time. There is also a possibility that this word does not have the same meaning as later in Neo-Babylonian where it is better attested (cf. *Akkadisches Handwörterbuch*, 784). I would like to thank Gary Beckman and Prof. Dr. George Steiner who helped me with this text.

⁴³ N. Lewis, *Papyrus in Classical Antiquity*, 11—12.

belonged to small, folded documents⁴⁴, it is unfortunate that we know so little about the circumstances in which they were found, for these might have revealed how they were filed.⁴⁵

Regarding the identity of the owners of the rings, it seems reasonable to suppose that they can be linked with the administrative or ruling segment of the population, since precious metal was rarer and more expensive than stone and not as accessible to the population at large. This would help to explain why there are fewer ring- than gem-designs. However, it appears that not all oval ring-impressions were from originals of precious metal, or for that matter from those covered with soft metal foil. The LM I ring from Knossos of bronze riveted together⁴⁶, and other surviving rings made from commoner metals, suggest that they may not all have had a foil plating.⁴⁷ Impressions in which rivets are visible may point to the use of this cheaper type of ring in contrast to the usual ring with a heavy metal bezel. A type of ring related in its construction to the former is that of Pl. I. The steatite seal plate is fastened to a copper hoop by countersunk rivets. A similar style

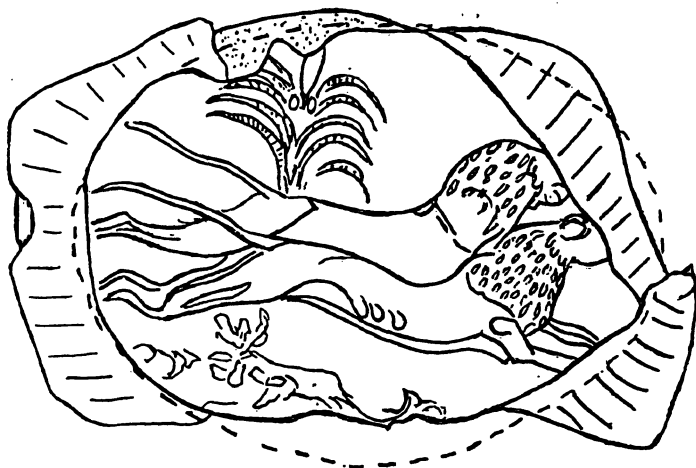


Fig. 3. Zakro (HM 40)

⁴⁴ Betts, *Kadmos* 6, 1967, 23. Judging from the thickness of the strings these nodules could not have held much heavier than lightweight documents.

⁴⁵ F. Halbherr, *Resti dell' Eta Micenea scoperti ad Haghia Triada presso Phaestos*, *Rapporto delle ricerche del 1902*; *MonAnt* 13, 1903, 29: 'Il pozzo di saggio scavato sull' orlo delle rampa verso l'angola nordovest dell' anticamera del megaron'.

⁴⁶ *Archaeological Reports for 1958 (1959)* 19 fig. 30 = Younger no. 70.

⁴⁷ Heraklion Museum no. 970, said to come from Avgo (GGFR 393); CMS IV nos. 167, 230; V nos. 266, 267 and 614.

of rivetted construction may be deduced for the ring which made the impression of Fig. 3, which has a deep rivetmark in the palm and a shallow one under the belly of the lower lion.

Since some rings were made of gold and others of less precious metals, the mere fact that a man possessed a ring is not a sure indication of his status. Efforts to associate rings with priestesses on considerations of iconography are also frustrated by archaeological finds.⁴⁸ It is hoped nevertheless that these tentative remarks may shed some light on the manufacture and ownership of seals at the time of the New Palaces.

⁴⁸ Aussenberg, 46—47; rings have been excavated from tombs containing both male and female skeletons. The evidence neither confirms nor contradicts the theory that the rings belonged to women. That they probably also belonged to men seems quite reasonable.