THE CUT STYLE RECONSIDERED

by

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A. State of Research

One cannot discuss Bronze Age glyptic without noticing the great diversity in conclusions reached by specialists about almost every issue. While a number of scholars have been active in Aegean glyptic studies, the field is still underdeveloped and there is dissent even over elementary methodological problems such as the degree of accuracy with which one can date gems on the basis of ceramic evidence. In a field also plagued by casual documentation and premature conclusions, Professor John Boardman's Greek Gems and Finger Rings is a welcome addition, for in this book he attempts not only to identify but to document the major trends within Late Bronze Age glyptic. Among the groups which he isolates is the so-called Cut Style, which is retained as a convenient misnomer for a class of gems which takes its name from

the straight gouges and drill marks which are the marks of this type of carving. It is this particu class which will be reconsidered in this paper in of further clarifying its position with Aegean gl In order to formulate a redefination of the Cut S consideration will be given to chronology, materi style, iconography, and provenance. In view of th association with the 'talismanic' class, these tw will be contrasted throughout the discussion. The at this point a review of the pertinent literatur appropriate to lend an idea of the evolution of t lems encountered in dealing with the Cut Style as isolated entity.

Anyone who works with Aegean gems must ackno A. Furtwängler's pioneer effort in Die antiken Ge which brought order to the material at a time whe scientific knowledge was available. However, in F ler's book only four plates were devoted to the F Age, and the field remained neglected for over a of a century except by Sir Arthur Evans in a brie

important, section of his monumental Palace of Minos.[2] The next major step forward was the appearance of Frühkretische Siegel by Professor Friedrich Matz. While Aegean chronology rests on a framework of pottery styles, Matz was the first to point out the differing rhythm of glyptic and ceramic development. Thus, he proposed a chronology varying from that of the three part pottery sequence established by Evans.[3] In place of Evans' Early, Middle, and Late Minoan periods, Matz suggested that more useful descriptive terms would be Early Minoan (comprised of Evans' Early Minoan to Middle Minoan II), Classical Period (Middle Minoan III-Late Minoan II), and the Late Period (Late Minoan III on). Yet, more significant was Matz's definition of Mainland versus Cretan style: he saw whirling movement and Rapportmuster, a term denoting a fluid composition of interlocking elements, as characteristic of the Cretan style in contrast to the architectonic nature and structural opposition of elements typical of the contemporary Mainland style.

More recently, Matz's chronology has been superceded

by that of his student, Hagen Biesantz. This new chron is also composed of three parts: gehemmte Bewegung (Ea Minoan III-Middle Minoan II), freie Bewegung (Middle M III-Late Minoan I), and the nachlassende Bewegung (Lat Minoan II-III).[4] The stylistic criteria proposed by Pro fessor Biesantz for distinguishing Cretan from Mainlan style has been criticized on the grounds that the exam on which he builds his arguments are superior pieces o therefore, not necessarily representative ones. While these criteria are thought to be overly strict, they still useful if applied with caution.[5] More helpful is his listing of dated seal/sealing groups.[6] A further tempt at establishing a workable glyptic chronology f the Aegean is that of Xenaki-Sakellariou in Giama The three stages which she proposed are as follows: 1. l'époque prépalatial (beginning Early Minoan II), 2. des premiers palais (whose beginning coincides with t Hieroglyphic Deposit at Knossos, Middle Minoan II-III and whose terminus is unclear), 3. periode des second palais (Middle Minoan III-Late Minoan III).[7] However,

the three chronologies of Matz, Biesantz, and Xenaki-Sakellariou still cannot account for the great diversity of the material. Among the unresolved problems remain the questions of whether different seal styles can be distinguished within larger periods and whether they represent real chronological distinctions or merely regional variations.

This challenge was taken up by Rev. V.E.G. Kenna in Cretan Seals, his most original and, in almost every way, best work. But despite the fact that he deals directly with the material to be discussed in this paper and that he attempts to establish a more precise stylistic sequence, his book is still of only limited usefulness and is, in fact, often outright misleading. Criticisms of this book are so numerous that only a few most relevant to the subject of this paper need be mentioned. While both stratified and unstratified stones are the basis of his gem chronology, the actual documentation for his system is haphazard and weak. References to Ashmolean gems appear in the form of museum object numbers, but he illus-

trates them by their catalogue numbers, forcing the reader to use a concordance to correlate text and plates. As in his other publications, Kenna often illustrates his points by using unpublished gems, especially those from the Heraklion Museum. Yet, what is most disturbing about this book is the lack of critical facility on the part of the author. His discussion of 'talismanic' stones serves to illustrate this. Certainly no scholar would dispute the magical or protective significance which a gem might acquire in its use as a personal signet, but Kenna erects an entire edifice based on this assumption[8] and on the theory of the talismanic use of gems first suggested by Sir Arthur Evans.[9] For Kenna, the history of Aegean glyptic can be written in terms of the waxing and waning of the 'talismanic' influences.[10]

Kenna has also written a large number of other books and articles which reiterate and reaffirm his views, particularly regarding the use and occurrence of the 'talismanic' stones.[11] Due to the extraordinary degree of repetition, it becomes the reader's task not simply to read the text but to screen it for updated material. Each

statement must be evaluated even though references are often lacking and, considering Kenna's many publications, this is a very time consuming task.

Since the Corpus der minoischen und mykenischen Siegel has been adequately treated in a series of reviews[12], few comments need be made here. The CMS is an immense and useful endeavor in which several eminant scholars have taken stands on such issues as provenance, chronology and terminology. The study of gems has been enriched thanks to its comprehensive visual material and problems formerly glossed over or known only to a handful of experts have become broadly accessible for discussion among the scholarly community. However, the volumes are of varying quality. The fine CMS I by Agnès (Xénaki)-Sakellariou is cited frequently throughout this paper because the majority of the stones published in it derive from archaeological excavations. These gems, most of which are from the Mainland, are part of the foundation on which a somewhat shaky gem chronology has been built. Of the volumes which deal with stones of all periods, the modest simplicity of Sak-

ellariou's chronology can be contrasted to Kenna's unqualified confidence in his ability to fit gems neatly into the relatively fine breakdown of the pottery chronology in his CMS IV, VII, VIII and XII. In CMS IX M. and Mme. Effenterre have made use of a four part division which is a slight expansion of the tripartite classification suggested by Sakellariou.[13]

As previously mentioned, Boardman's survey book, Gr Gems and Finger Rings, in spite of its brevity, is the most recent major guide to Aegean glyptic. Here, clarity of style is combined with reliable and thorough scholarship. Statements are seldom, if ever, made without corroberating references. In the Late Bronze Age Boardman's gem chronology is less specific than Kenna's, but it can be documented by reference to excavated material.

Cut Style gems have also been treated in Giamalakis as members of the decoratif palatial style.[14] Sakellariou believes that this type is characterized a tendency toward stylization. Musculature is abstracted into geometric forms and there is a rigidity in the motifs as

as well as an interest in linear form and a vivid contrast of light and shadow. The figures themselves are suppressed in favor of an emphasis on the treatment of abstract surface pattern.[15] However, in the opinion of this writer, while Boardman's classification seems convincing, Sakellariou's grouping is too heterogeneous to be called a 'style' since some of the gems are carved rather naturalistically.[16]

Kenna in The Cretan Talismanic Stone in the Late Minoan Age also seems to make reference to Cut Style glyptic when he mentions a quasi-talismanic style of stone which "veers toward naturalistic character" during Late Minoan IA and B. He describes these gems as rarely showing signs of summary work, distortion or fragmentation for their execution is as careful as that of "seals proper".[17] The stone which Kenna refers to, in the opinion of the present writer, do not relate to the Cut Style as a group and do not comprise a valid homogeneous class except insofar as they are a minor variant of the main body of 'talismanic' gems.[18] "Talismanic' gems have a

characteristic iconography composed of such motifs as the 'libation vase', bucranium, cat or lion masks or the foreparts of a fish, and nearly all of the examples cited by Kenna clearly fall into this category. The two possible exceptions -- Figures 50 and 73 -- thematically and stylistically seem to relate more closely to the Cut Style. Noting that these "peripheral" examples are not in characteristic Cretan style, Kenna feels that their provenance, even if known, would be of little help in assigning them a place of origin.[19]

B. Research Problems

Glyptic, like pottery, is of enormous importance since it occurs in relatively large quantities and, thus, its development can be traced more completely than that of other, less well preserved art forms. However, in the case of gems (and other types of glyptic in general), whether the pieces which have been preserved are representative of what formerly had existed still remains an open question. Boardman graphically illustrated this problem by stating that if the approximately five thousand known Bronze Age Aegean gems or devices were apportioned evenly over their period of manufacture, the production would average only six per annum.[20] Obviously, an enormous amount of material has been lost and our conception of the production of ancient gems is further skewed by concentrations of examples at certain points and gaping voids at others. In the case of the Cut Style, there are less than one hundred published examples. Furthermore, the vast majority of these extant examples come not from archaeological excavations but from the art trade, and of the approximately ninety examples of the Cut Style referred to in this paper, only thirteen are published which derive from controlled contexts spanning some four hundred years.

In the face of such limited documentary evidence, the inaccessibility of seals and sealings from excavated sites becomes particularly problematic. Much of the Cretan material on deposit at the Heraklion Museum is still not readily available to scholars and is still unpublished. Unfortunately, material relevant to this study from Gournia, Praisos, Asou, Phaistos and other sites falls within this category. Hopefully, the publication of the CMS volume devoted to the Heraklion Museum will rectify this most immediate problem. Finally, there are not many recent studies of Aegean Bronze Age glyptic which concentrate on specific problems; most have been content to only superficially survey the material. Yet, the best of this group, Boardman's Greek Gems, in spite of its brevity, does blend a general view of Greek glyptic with many piercing analyses of individual classes and styles. Because of the limitation of space demanded by his survey format, Boardman was able only to briefly describe the main characteristi of the Cut Style, which he saw as fundementally defined by technique. The present writer feels that other criteria may be brought in to refine and elaborate the secondary stylistic and iconographic features which Boardman also suggested. Further dimensions may be added to the Cut Style so that it becomes more than merely a broadly descriptive term for a manner of carving. The present writer also wishes to emphasi

the stylistic and iconographic features which he feels are also useful in disassociating this group from that of other Aegean gems, especially from that of the closely related 'talismanic' stones. As a class defined both by style and technique, the Cut Style is more homogenous and is more easily definable than its predecessor, the 'talismanic' gro Finally, because the Cut Style also has more definite chron logical limits than does the 'talismanic' class, this redefinition goes further than creating an artificial extension of one class of gems at the expense of another. It seeks to scrutinize thoroughly and to amplify Boardman's original conception of the Cut Style and its place in the history of Aegean glyptic.

However, in order to better understand the Cut Style, comparison to the 'talismanic' class is necessary. Cut Styl designs, like those of 'talismanic' stones, are rendered by straight cuts or gouges although the handling is generally more cursory in the latter class. Also characteristic of the 'talismanic' class is the extensive use of filling ornament such as a net pattern, zigzag, or tube cut. By alter ing the angle of the tube to the face of the stone to be carved, a full or semi-circle may be obtained. In the broad sense the term 'talismanic' has been applied to a type of carving regardless of the iconography.[21] Nevertheless, ther

is a typical 'talismanic' iconography. The most characteristic examples depict 'libation' vessels, cuttlefish, birds, fish, 'rustic shrines' and even boats. Boardman distinguishes from 'talismanic' stones proper the earlier 'architectural' gems which rely on straight cuts running perpendicular to each other to form their designs. The spaces between the main cuts are filled with lighter diagonal lines or net patterns.

However, to attempt a separation of the Cut Style from 'talismanic' gems when dealing with certain motifs, particularly with fish and trees, creates an artificial and arbitrary distinction. In the depiction of these motifs, and to a lesser extent that of birds, the two groups merge into each other with imperceptible gradations.[22] Therefore, little mention will be made of gems depicting these motifs; nor will the drilled variants of the Cut Style be discussed since neither are of any use in isolating the decisive steps in the creation of the Cut Style.[23]

In his discussion of the Cut Style, Boardman elected to include these examples that were inseparable from the 'talismanic' gems, drilled varieties of the Cut Style themes, and both elaborate and simple gems (Cf. Figures 2-9 and 16-32, for example). The present writer believes that this study has shown that the wide ranging diversity in style, technique

and dating of Boardman's examples is explained by the fact that the Cut Style is clearly not a style at all, but a class, and that any attempt to discuss this grouping as an isolated and independant style is methodologically unsound. The Cut Style must be considered within the framework of its connections to, as well as differences from, the surrounding classes of Aegean gems.

In view of Boardman's emphasis on technique as the primary characteristic which distinguishes the Cut Style, the present writer has elected to use this criterion as a point of departure. From a consideration of the more general matters of technique, material and shape, the discussion will procede to a more specific analysis of the iconography, style and provenance of Cut Style gems. For the sake of clarity, each has been organized into a separate section, although owing to the close connections between iconography and style or style and provenance, it has not been possible, or even desirable, to draw the lines among these various approaches too distinctly.

II. CUT STYLE CHARACTERISTICS

C. Technique

Attempts at discussing the technical distinctions between the various glyptic styles are hampered by a lack of evidence about carving technology and particularly about that of the Bronze Age Aegean. No workshops have been found in this area which are particularly enlightening. Potentially, the most informative workshop is the presumed one dating from the Middle Minoan I-II period at Mallia. However, it is as yet not fully published and no tools have been mentioned by the excavators.[24] Nor has the 'workshop' in the palace at Knossos provided any tools.[25]

Evans made references to the use of the cutting wheel for the carving of 'talismanic' gems.[26] Its early use is documented in Egyptian Dynasty XVIII wall painting[27] and examples of this tool have actually been found in Egypt.[28] In Mesopotamia the bow drill is attested to as early as the Akkadian period and evidence for the cutting disk exists in the Old Babylonian period.[29] Other inferences about Bronze Age carving technology, at least to a limited extent, may be drawn from descriptions of modern carving and of carving in the Classical period.[30]

One may theorize that a particular tool is capable of making certain lines but it cannot always be proven. This is due in part to the fact that often an abrasive finishing obscures tool marks and that frequently such marks have gradually been worn away through normal wear and aging. Nevertheless, from the limited repertory of cut marks one may postulate that a limited number of tools were used in the 'talismanic' and Cut Styles. At least three different types of tools seem to have been used in the Cut Style: the bow with various drills (including cutting tubes), the running wheel and various abrasive grav Cutting was accomplished through an abrasive rather than actual cutting process since bronze or copper used for tool is not as hard as some of the stones which were carved.[31] Also, the irregular way in which a material such as chalcedony would fracture if carved by scraping further suggests that the technique involved was an abrasive one. It is know that carvers in Pliny's time used an iron graver (lima) wit a cutting surface of emery set into resin.[32] While this may a later invention, it seems reasonable that a small wooden tool and a suitable abrasive mixed into a binder might have been used for finishing even in the Bronze Age.[33]

A graver is obviously better suited to scraping or abrading a straight rather than a curved line on a small object such as a gem, whereas a small abrasive wheel can

better negotiate curves. This is especially the case if the curves are irregular ones. Yet, where the surface to be carved is highly convex as with amygdaloid stones, the graver is fully capable of executing curved lines. A different more file-like graver would be best suited for the straight cuts of 'architectural' or 'talismanic' designs[34] and in the fringed forms of the animals of Figure 63.

On close inspection the tool marks of the tubular drill are obvious on numerous Cut Style gems such as Figure 3. In this stone the use of the cutting disk is likely in those cuts (particularly in the zigzag ones) which gently taper off at the ends. Close examination with a powerful hand lens also reveals the circular marks of the wheel in the bend of the animal's back which were not completely removed in the final abrasive finishing. However, the wheel was not used to form the body of the griffin in a single cutting motion. The body seems to have been formed with two rough cuts and the transition between them worked out with great care. Modelling and finishing were also done with a wheel. Thus, in the Cut Style, as exemplified by this gem, the wheel appears to have been used both for cutting and for modelling, while in 'talismanic' seals it is used, if at all, only to carve out entire simple forms.[35] Other Cut Style gems, not so carefully rendered, show no evidence of the use of the wheel for either rough carving or for modelling.[36]

While the cutting of the stone's surface may have actually been a rather long and laborious process of back and forth cutting strokes, the forms themselves suggest a hasty execution.[37] That is, they are summarized by a series of cuts which, in their linear interplay, have a rapid and nervous rhythm (Cf. Figures 7, 9, 13, 21, 22, 37, etc.). In the Cut Style, technique and style are inextricably linked. The stylistic dynamism is a product of the specific tools used. On the other hand, the whirling composition of many designs (such as Figures 5, 6, 22, 32, 49, and 59a) indicate that motion was intended by the artisan and should not be dismissed as a mere product of the technique employed.

D. Materials

In looking at the materials used in the production of Cut Style gems, a pattern emerges which seems to serve as one more criterion for distinguishing it from the 'talismanic' class. The material overwhelmingly favored in the production of 'talismanic' gems was carnelian, with agate and jasper far behind in order of occurrence.[38] While carnelian continued to be preferred for the making of Cut Style gems, agate and jasper occur in greater proportion to carnelian than in the 'talismanic' group.[39] Today carnelian and sard are considered semi-precious stones, however, in the third century A.D., Gaius Julius Solinus refers, in his compilation of minerals and their places of origin, to carnelian as "better than marble but yet accounted as the basest of all jewels".[40] It is possible that even further back in antiquity carnelian was considered a cheaper stone than either agate or jasper. It is significant to note that a greater proportion of the more carefully carved Cut Style gems are made of a finer material than their 'talismanic' counterparts.

To the writer's knowledge, neither carnelian nor sard are mentioned by ancient or modern authors as coming from Crete.[41] Pliny wrote that the principal source or carnelian

was Babylon (where it must surely have been imported), although an inferior variety was known to come from Paros and Assos.[42] Sard is also mentioned as coming from Sardis and Egypt, and agate from Thebes.[43] However, the literature dealing with the origins of these stones is haphazard, and it seems possible that carnelian and sard, which generally are so common, may also occur in a natural state on Crete, if only in pebble form.

E. Shape

To judge from the listings in the catalogue, the gem shape most favored in the Cut Style was the lentoid with the amygdaloid occurring almost as frequently.[44] Both shapes seem to appear in Aegean glyptic at the same time[45], although in the 'talismanic' class the amygdaloid shape is far more prevalent.[46] While there is a clear propensity to depict the lion in the amygdaloid field (Cf. Figures 33-42a) and the goat in a round field (Cf. Figures 16-32), no other

correlation emerges between shape and motif or style. Nor can shape be used as a guide to establishing the provenance of these gems.

The cylinder was not favored by Aegean gem carvers as evidenced by the fact that of the approximately fifteen hundred published native Late Bronze Age gems, only about seventy are true cylinders.[47] This shape, however, seems to be disproportionately more frequent in the Cut Style than in other Late Bronze Age Aegean styles.[48] Whether or not these cylinders were actually used for sealings is impossible to say. Preserved impressions made by native cylinders are extremely rare.[49] However, the proportion of cylinders vis a vis conventional gems is so small that this is to be expected. It is possible that such a stone as Figure 7 was not intended for sealing purposes, since it is imperfectly formed with one end smaller than the other.[50] Nor are the ends of the cylinder parallel. Figure 65 is a broken, conical, demi-cylinder which leaves at best a very poor impression.[51] While it seems reasonable that such gems were intended solely as decorative objects, there is not enough evidence to determine whether or not true cylinders were used to make sealings or were valued simply for their aesthetic and amuletic qualities.

F. Iconography and Style

One of the bases by which the true Cut Style distinuishes itself from both the 'talismanic' class and from he main body of Aegean glyptic is by its iconography. 'hile the lion is the animal which occurs most frequently n Aegean glyptic (except in Late Helladic IIIC)[52], the oat and the griffin seem to be most popular in the reperory of the Cut Style.[53] The goat is usually drawn with a pear near or in its back. But it is the griffin which is he motif par excellence of the Cut Style and which is deicted on the finest and most characteristic examples (Cf. 'igures 1-15). The depiction of the human figures is very are, although at least one example exists in Figure 65.[54]

Manifest in the Cut Style is a subtle interaction betveen style and technique. There is little or no effort to camouflage or to work out the tool marks. Indeed, they are ised to advantage, for relatively few cuts and simple forms are successfully used in suggesting convincingly volumetric animal bodies (especially as in Figures 5, 6, 15, 59, etc.). There seems to have been an active striving to render these forms with the greatest possible economy. But at the same time a rhythm is expressed in the interplay of linear patterns,

as for example in the zigzag and wing striations in Figures 3, 4, 9, and 13. In both the 'talismanic' and Cut Style classes, the confident yet sketchy forms generally suggest a rapid execution.

Typical of Aegean glyptic in general, the artist strives to fill the entire field, almost always with only a single figure and base line. Because of this simple composition and the lack of distinguishing secondary characteristics, it is difficult to make meaningful chronological or stylistic distinctions between gems. In discussing the composition of individual examples, one can never relate one figure to another; only the formal and spatial relations between the component parts may be discussed. While phyllomorphic motifs occasionally are included in the compositions, they do not give a suggestion of an actual landscape. Characteristically, the figure is simply placed in the field parallel to the surface plane with no suggestion of a setting.[55] The profile of the more vertical goat is almost always rendered in a circular field (Cf. Figures 16-32). In contrast, the amygdaloid field is preferred for the more elongated, crouching lion (Cf. Figures 33-42). The bent legs and curved horns of the goat echo the outer limits of the field and often results in a lively composition filled with interior movement (Cf. Figures 17, 22, and 28). The lion is usually fitted neatly into its field

but circular motion is not as evident as with the goat.

While one may speak of a compositional harmony between the figure and its field, a consistent approach to the depiction of the figure itself is characteristically lacking. Typical of this is the full, rounded bodies of the animals which are in marked contrast to the sketchy treatment of the legs. Their hindquarters bend downwards (Cf. Figures 3, 4, 7-10, 26, 33, etc.) and there is a suggestion of tension in the carving of the animal bodies. Wings are relatively large and one or both are outspread so as to display each individual feather and wing marking.

Basic distinctions in style may also be observed between 'talismanic' and Cut Style gems. A major difference between these two classes is in the clarity of approach to the subject matter, for the present writer sees a fundamentally different attitude at work in their composition. Characteristic of the animals represented in Cut Style gems, each component part is rendered with clarity and emphasis, as in the treatment of the feathers and wing markings. On the other hand, the 'talismanic' designs evidence an overt attempt to depict motifs in an ambiguous manner. The clearest example of this is the motif variously described as the foreparts of a fish, bundles, and even sepia.[56] In Figure 44 these 'fish' form what appears to be the uprights of horns of consecration. First the essential form of the motif was carved; then the artist could

use the tubular drill to render either binding cords for bundles or gills for fish. The eye could be added, if so desired, with a simple drill mark and may be the only distinguishing feature between the fish and bundle. The same intentional ambiguity between the 'papyrus fresco' and 'lion mask', as well as between other motifs, serves to characterize the style and to distinguish it from the Cut Style. To attempt a clear and precise identification of motifs is to miscontrue the intention of the artisan.[57] This interest in visual puns may also explain the tendency toward fragmentation which is also characteristic of the 'talismanic' style.

Two unusual major gems (Figures 44 and 45) relate stylistically to both the 'talismanic' and Cut Style gems, and due to their striking quality, cannot be ignored. Like the latter group, their designs are executed in an economical and sketchy fashion, although the greater refinement of their carving creates an impression of startling plasticity. It was primarily this unusual three dimensionality in the modelling that led Boardman to suggest that these two gems may be from the hand of the same artist, although he was very cautious in dealing with them.[58] The ambiguity of the motifs in Figure 44 has already been discussed in relationship to 'talismanic' iconography, but their presentation is equally unusual. The forced attempt at foreshortening seen in the fish in Figure 45 has already been noted by Evans[59] and the rendering of

lly placed crab shell in Figure 44 seems to be
ttempt. The attentive fish consciously directs
ward the viewer and the owl glances back over
er' with the same vivid expression. In the per-
eatment and directed gaze of the animals, the
have been attempting to infuse greater vitality
gures to a degree unknown in any other extant
' or Cut Style stone. There are no parallels in
tic for such a fish, owl or crab and the rather
in which the fish and owl are depicted is alien
itional representations of animals on Aegean
specifically, while the animals represented on
ems derive their movement from the silhouettes of
ns, tails and legs juxtaposed in various directions,
ted on Figures 44 and 45 are animated by the addi-
illusionistic third dimension. That is, Cut Style
ıd to crowd the limits of a two dimensional field
ıwl and fish of Figure 45 respectively recede into
ıund and advance toward the viewer. The fish in
almost appears to be bumping his nose against the
: an invisible fishbowl. The sophistication and
)f these figures surpass the more iconic suggestion
: typical of both 'talismanic' and Cut Style gems.
ın be said about these two unusual pieces is that
:y render superbly naturalistic motifs in a basically

abbreviated Cut Style or 'talismanic' vocabulary, t
be dated with caveat to Middle Minoan III-Late Minc
But since the terminus post quem has not yet been s
determined for the 'talismanic' group, their datinc
remain uncertain.[62]

G. Provenance

Since Cut Style gems are known from actual exc
and from reports as having been found in quantity h
Crete and the Mainland, it is most likely that they
produced in both locations. But before discussing t
dence for this assertion, it should be kept in minc
gems are the most portable of all objects and are c
being unearthed, as are cylinder seals, far from th

of manufacture. Also, the small bulk of a set of seal carving tools found at Tell Asmar suggests how easily the ancient gem carver could have moved from place to place with his 'workshop'.[63] Furthermore, in the period from which these gems derive, Mycenaean objects have been found in Cretan graves side by side with native objects, and vice versa.[64] Peripatetic craftsmen, highly portable objects, and extensive international trade are features of the period which make it impossible for the archaeologist to assume that for a gem the place of discovery is the point of origin. Nor can stylistic analysis completely solve the problem. Attempts to distinguish Cretan from Mainland gems are often risky and have led to such interesting situations as one side of a stone being given to a Mainland artisan and the other mistakenly attributed to one from Crete.[65]

The localization of glyptic schools or styles would seem best approached by working with those gems whose provenance is certain. Unfortunately, the vast majority of Aegean gems are unprovenanced. In addition, the data regarding the find spots of seals falls into two categories of uneven usefulness: 1. excavated seals and 2. seals whose origins were identified by the finder, dealer or a similar source. The second category has obvious drawbacks. Yet, by simplifying the find places into either Cretan, Mainland or Cycladic,

the provenances of Cut Style gems may be summarized as follows with reference to the catalogue numbers on pages 73-83.

Table I: The Provenance of Cut Style Gems

E: excavated seals and sealings
R: reported provenance

Mainland	Crete	Cyclades
E 7	E 1	E 75
E 22	E 39	
E 24	E 42	R 25a
E 28	E 55	R 31
E 33		
E 37	R 3	
E 69	R 5	
E 74	R 12	
	R 13	
	R 14a	
	R 17	
	R 21	
	R 25	
	R 34	
	R 38	
	R 43	
	R 46	
	R 54	
	R 57	

The most striking observation regarding this data is that the excavated seals and sealings derive mostly from the Mainland. In addition, three of the four examples from Crete (Figures 39, 42, and 55) were found in and around Knossos which was thoroughly Mycenaeanized by Late Minoan II. In contrast to the excavated examples, those whose provenance is only reported are known, or attributed, exclusively to Crete,

with the exception of one from Thera.[66] Of the group reported as coming from Crete, the precise location on the island is usually unspecified. Finally, since only three examples are known from the Cyclades, this can hardly be considered a representative sample. Thus, due to the atypical data available, the origin of a Mainland, Cretan or Cycladic group style cannot be defined by means of provenanced gems.

However, certain cautious observations may be made regarding the iconographic and stylistic features of the designs as they occur on the Mainland or Crete. Of the excavated Mainland examples, a strong preference is shown for the motif of a simple goat or lion (Figures 22, 24, 28, 33, 37). While these motifs may also occur among the Cretan group (Figures 17, 21, 25, 34, and 38), there are differences in execution among several supposedly Cretan examples and their excavated Mainland counterparts. Figure 17 is far more three dimensional and plastically modelled than comparable Mainland gems. A special care is shown in the organic formation of the goat's body, horns and legs so that they fit harmoniously into the field. A cylinder reportedly from Crete (Figure 42) may be associated with 'talismanic' gems because of its abbreviated forms, zigzag motif and the style of the fish.[67] The 'talismanic' group is considered to be fundamentally a Cretan artistic manifestation.[68] The gems depicted in Figures 46 and 57 also correspond stylistically to gems which are unequivocally of the 'talis-

manic' class.[69] Thus, there is slight indication, albeit tentative, for a differentiation between certain Mainland and Cretan Cut Style gems. This evidence is admittedly weak and thus, stylistic analysis must remain paramount.

In Siegelbilder Biesantz laid much of the groundwork in this area. He adapted criteria largely conceived in the analysis of pottery decoration to define the essential stylistic characteristics of Mycenaean and Cretan glyptic. His major criteria are structural/syntactic. Fundamentally he saw Mycenaean compositions as reflecting a tectonic and structured approach which is manifest in both ceramic decoration and glyptic.[70] Its counterpart is the Cretan atectonic, oblique and torsional principle evidenced in these same media. Similar conclusions were reached by Professor Arne Furumark in his monumental study of pottery decoration. However, since both concepts of what constitutes Cretan and Mycenaean style were evolved basically through the study of ceramics, they are less well suited to the differing requirements for the formal analysis of engraved gems. The difficulties are particularly evident in the case of the Cut Style whose simple motifs are difficult to analyse in any meaningful way with criteria which presuppose a more complex composition. In dealing with the Cut Style one must always remember that it is a style dominated by the single figure composition. It is never a question of how two motifs interact structurally,

but rather of how the component parts are joined to form the design. Cut Style figures cannot be related to a setting, either temporal or spatial. Thus, in the debate over a Mycenaean or Cretan origin, linearity versus naturalism, and structure versus fluidity seem to be the most appropriate criteria applicable to the relatively less complex handling of Cut Style glyptic.[73]

With the onset of Late Minoan II, Mycenaean syntactic principles begin to appear in the art of Knossos.[74] Thus, we might expect the earliest (Late Minoan IB) Cut Style designs to reflect Cretan composition and style while those which are possibly later would show Mycenaean influence.[75] Applying the syntactic standards suggested by Biesantz and Furumark, we see that the Figure 1 and 2 designs, for example, seem to conform to Cretan compositional criteria. The carving of the bodies is smooth and rounded; in each there is a subtle rapport between the figure of the griffin and the circular field which it fills.[76] In Figure 3 the silhouette of the animal creates a long, curvilinear sweep from beak to tail with the difficult angular joining of neck and body obscured by the placement of the forelegs. The head and beak are turned back to fit more neatly into the limits of the field and to accentuate the circular motion of the composition. This treatment is rendered with a naturalism and a fluidity not found

in Figures 10, 12, 14 and 25a. The design of the demi-cylinder in Figure 65 expresses a spontaneity and animation fully in keeping with Cretan style. There is a pronounced rhythm in the figure who leads and is in turn led by the griffin.[77] This design may be contrasted to that of a Mycenaean cylinder excavated from Rutsi which has technical affinities with the Cut Style (Figure 64). The iconography of the two is similar, yet in the Mainland design the figures are less animated. A combination of fewer spikey, abstract forms and diagonals results in a static composition. An example more clearly Mycenaean in structure is Figure 28. The neck of the goat is abruptly joined to the body at a right angle which may be contrasted to the more flowing treatment of the Figure 1 griffin. In its structure the Cut Style goat may be described as tectonic, as opposed to the naturalism and fluidity of Figure 1. These stylistic observations apply to the handling of the lion as well as to the goat,[78] and in the opinion of the present writer, reflect a more deliberate and analyzing Mainland style.

Obviously, problems arise in attempting to distinguish Mainland from Cretan gems by means of stylistic criteria. For example, the design of Figure 54 is more structured and linear than that of its Figure 3 counterpart. The composition is dominated by forms which are parallel and which meet at approximately ninety degree angles.[79] The more rec-

tangular joining of wings and body, the patterned wing and formal relationship to the baseline suggest to the writer a Mycenaean composition. Yet, Figures 3 and 54 are so close technically that they may be also quite convincingly attributed to the same artistic ambiance in view of the similar manner with which the double baselind, zigzag and tubular drill are used.

It is evident that the matter of determining provenance is not a simple one since differences between gems may be more reflective of quality than a differing point of origin. Also, some of the gems may have been cut by Cretan artisans for Mainland masters or patrons or vice versa. Several possible situations disallow a clear distinction, i.e. Mainland or Cretan. The difficulty then must lie in the attempt to force Cut Style gems into a rigid system of classification. On the other hand, for several designs, more clearly reflective of Cretan compositional principles (Figures 1, 3 and 5), an early date is reinforced through stylistic comparison to the stratified Figure 1 sealing. Thus, one might theorize that the style emerged in Crete but soon became Mycenaeanized as a result of the subsequent wave of Mainland influence.[80] However, in view of scanty evidence, this must remain only a hypothesis.[81]

H. Chronology

1. The 'Talismanic' Class

The dating of the Cut Style cannot be considered in isolation from that of other gems styles, particularly the closely linked 'talismanic' group. Regarding the dating of the 'talismanic' class, Boardman has written that although examples are known from later contexts, the main series begins in Middle Minoan III. Also, there is no strong reason to believe that the production of these gems survived the destruction of the provincial centers in Crete at the end of Late Minoan I, especially since none of them betray motifs which belong to later periods.[82] Kenna, however, is "fairly certain" that 'talismanic' gems were used within Late Minoan I and II, that there was a decline in their manufacture only in Late Minoan IIIA-1, and that they discontinue altogether in Late Minoan IIIB.[83]

The few scattered 'talismanic' gems from archaeological contexts which have been published provide an initial date for the style but not a terminal one. The majority derive from Middle Minoan III to Late Minoan II contexts.[84] However, regarding their later (Late Minoan III) occurrence, the mere fact that they were found in these levels does not mean per-

force that they were produced at the time. While no sealings of the 'talismanic' type were found in the palace at Knossos, they have turned up at such sites as Haghia Triada, Zakro and Gournia,[85] and thus may be a provincial group. It is tempting to theorize that the style died with the Late Minoan IB destruction of the provincial palaces, but this cannot be substantiated since there have been so few sealing deposits found which postdate Late Minoan IB. "Talismanic' gems themselves have been excavated from the palace at Knossos which also weakens this supposition.[86]

To reinforce his gem chronology, Boardman has pointed out several iconographic parallels between 'talismanic' designs and vase painting. His own examples, however, suggest that his terminal Late Minoan IB dating could as easily be moved upwards to Late Minoan II since so many of these examples postdate Late Minoan IB motifs.[87]

From the stratigraphic evidence, the existence of a real stylistic progression within this group is questionable. In Talismanic Stones, Kenna theorizes the following evolution: fragmentation of forms, abstraction of the individual elements and finally metamorphosis of the parts into new combinations.[88] To prove this hypothesis he presents the gems in his catalogue by site in roughly chronological order.[89] But this format is not consistently followed and significant differences between supposed early and late gems do not emerge. Indeed, the

'earliest' gems from Sphoungaras are stylistically closest to the 'later' Gypsades gems.[90] While no dates are given for the Sphoungaras gems in Kenna's listing, those from Gypsades graves II and VII are dated to Late Minoan I, although they were found in a Late Minoan II context.[91] One may conclude that Kenna's chronology is based on conventional and preconceived notions of stylistic evolution and an overconfidence in the capabilities of ceramic evidence to resolve fine chronological distinctions. Thus, on stratigraphic evidence, the present writer rejects Kenna's thesis and fails to see indications of a demonstrable stylistic evolution with the 'talismanic' class.[92]

2. The Cut Style

Fortunately, a number of Cut Style seals and sealings are known from controlled excavations. The major published examples are as follows:

1. The earliest firmly datable example is a sealing from Haghia Triada depicting a griffin (Figure 1), dated prior to the Late Minoan IB destruction.[93] The design finds a close parallel with that of Figures 3-5.

2. Figure 75 depicts a lentoid from Thera which is similar in technique to Cut Style gems, yet differs in its style. Its chief importance lies in the fact that it is firmly datable to before the Late Minoan IB destruction of the island.[94] In the heavy ribbed outline of the animal and the clumsy articulation of the head, fore and hindlegs, this griffin stands apart from the Cut Style. A completely different intention is manifest and anatomy is articulated rather than suggested.
3. The sealing of a bird from the Grand Staircase of the palace at Knossos (Figure 55), although it appears only in Evans' sketch, seems to compare in its style closely to Figures 3 and 54. It is impossible to determine the exact stratum in which this sealing was found due to the nature of the destruction of the building. The collapse of the upper floors and the staircases and the subsequent weathering of the superstructure have precluded a clear understanding of the stratigraphy.[95]
4. A Cut Style cylinder was excavated from 'warrior grave' III at Knossos depicting goats and lions (Figure 42). This stone is most useful since the grave from which it comes was undisturbed and contained stemmed goblets from the Late Minoan IB-II period.[96]
5. A finely modelled Cut Style lentoid depicting a goat was

associated with Late Helladic I-III ceramic and excavated from grave 529 at Mycenae (Figure 24). As is often the case the several burials within the tomb prevents a precise dating of the grave gifts.[97]

6. Another Cut Style gem with the lion motif (Figure 39) whose dating is less clear was excavated from a 'warrior grave' at Ayios Ioannis, near Knossos. In spite of the absence of decorated pottery in the grave, it is fairly clear that the tomb must be assigned to the period prior to the destruction of the Late Minoan II palace at Knossos on the basis of other objects.[98]
7. The Cut Style lentoid from grave 515 in the lower towm at Mycenae depicts a goat with a spear in its back (Figure 28). The context in which this gem was found is datable by the presence of Late Helladic IIB ceramic.[99]
8. One of the finer Cut Style examples is a cylinder from tomb II at Prosymna (Figure 7). While the lion is difficult to recognize even right side up, the griffin is depicted in the elaborate style of Figure 3. Unfortunately, the contents of this tomb were disturbed so that it was neither possible to ascertain the number of persons buried, nor the original placement of the burial objects.[100] Presumably, the cylinder was found along the north side of the burial chamber with numerous beads and small fragments of

ivory[101], giving the impression that the cylinder and other objects were flung about in haste by the tomb robbers. Thus, it cannot be associated with any specific burial, but it can be dated on ceramic evidence to Mycenaean IIA-IIIA:1.[102]

9. Another Cut Style gem from grave XIII of the same site was found with Late Helladic III ceramics (Figure 22).[103] The subject is a goat with a spear piercing his neck.

10. Excavations in the lower town at Mycenae produced other Cut Style gems from several different graves. Since Tsountas found little pottery in his excavations there, the dating of graves 1 to 103 is uncertain. Only a general dating of ca. 1500 to ca. 1200 B.C. is possible for these graves and for the Cut Style amygdaloid from grave 12.[104] This gem (Figure 33) bears a simple depiction of a lion who turns his head around.

11. The Figure 69 gem was also found in grave 12 at Mycenae and may be dated similarly to the preceding example. A quadruped, possibly a goat, is depicted with his head raised.

12. Figure 37 is an amygdaloid depicting a lion, excavated from a dome grave at Menidi in Attica. The associated pottery is of the Late Helladic IIIB type.[105]

13. Figure 74 is a lentoid excavated from the Mycenaean necro-

polis at Perati. Found in chamber tomb I, grave 2, it depicts an unidentified animal with his head turned backwards. Associated with thie gem was Late Helladic IIIC ceramic.[106]

To conclude from the archaeological evidence, the preceding 'talismanic' class of gems reaches a climax and then drops off in Late Minoan IB-II. Although little comparative material exists in other art forms to date the Cut Style, archaeological evidence is able to supply a date of Late Minoan IB for its onset. Thus, the two groups overlap chronologically to a certain extent. Further indication of this is that examples such as Figures 47 and 48 are known which have one side carved in the 'talismanic' style and the other possibly in the Cut Style. However, fixing the terminus for the Cut Style by means of stratified examples is difficult since stones found in Late Helladic III levels could easily be holdovers from an earlier time.

Boardman has attempted to construct an internal chronology for the Cut Style. He does not include the examples in Figures 3 and 54 as being in the Cut Style (exemplified by Figures 10, 13, and 14) but feels them to be earlier.[107] The basis for this distinction is their more careful modelling and the presence of the zigzag motif which hearkens back to

'talismanic' iconography. However, the present writer is not convinced that Figures 3 and 54 should be considered apart from the Cut Style since many of the gems which Boardman associates with them are virtually identical to Cut Style gems in style and iconography except for the presence of the zigzag motif.[108] Furthermore, Figure 13, cited by Boardman as a Cut Style gem, uses the zigzag and in Figure 10 the legs of the animal form a similar pattern. In fact, the zigzag rhythm is inherent in the formation of the bodies and legs of Cut Style figures.[109] This rhythm is the natural result of the technique used in 'talismanic', 'architectural', and Cut Style gems. To isolate such a motif in hopes of separating otherwise similar gems is arbitrary. The zigzag serves simply to underscore the close technical (hence formal) relationship between 'talismanic' and Cut Style gems. In addition, several gems in the fine style of Figures 3 and 54 are rendered without the zigzag[110] and two of the seals which Boardman associated with these two examples are clearly 'talismanic' in theme and style.[111] As previously mentioned, the 'talismanic' group which also uses the zigzag was probably being produced well into Late Minoan II and overlapped with the production of such gems as Figures 3 and 54. Thus, it seems that there are serious weaknesses in isolating the zigzag as a particular characteristic of either

Cut Style or proto-Cut Style gems.

Boardman's early dating for Figures 3 and 54 does find some, albeit weak, support from excavated material. The Late Minoan IB sealing from Haghia Triada (Figure 1) depicts a winged griffin which is similar in its form to the one in Figures 3, 4, and 5. In both the carving is simple and smoothly modelled to eliminate rough transitions between the upper and lower parts of the body. In each design the griffin lifts its head up and turns it around to fit neatly into the field. Also similar is the summary treatment of the creature's legs. Closely related is the sealing of a bird (Figure 55) from the palace at Knossos which predates the Late Minoan II destruction.[112] The bird is depicted with outspread wings and the eye, body and wings are decorated with tubular drill marks. In addition, the top of the composition is filled with a zigzag pattern. Only one other stratified example is close to the elaborate style of Figures 3 and 54 designs (Figure 7), but it derives from a later context which may or may not indicate the actual date of its manufacture.[113] Finally, the appearance of a simpler style such as in the motif of the goat is found most commonly with Late Helladic III pottery and lends support to Boardman's idea of the development of the Cut Style toward increasing simplicity.[114]

Considering the similarities in iconography and style
g Figures 3, 7 and 54 and the other examples which Board-
considers as Cut Style proper (Figures 10, 13, and 14),
present writer feels his distinction is an artificial
Whatever technical differences exist are more than
ensated for by the thematic ones. While there are indi-
ons that Figures 1, 3, 5, and 54 come early within the
e, their differences may also reflect a qualitative rather
a chronological distinction.

I. Conclusions

With the advent of John Boardman's Greek Gems and
ger Rings, the Cut Style was defined and the provenance
a class of gems formerly inconclusively assigned to di-
se stylistic groupings was clarified. Since Boardman's
cussion of this class was brief, the purpose here was to
onsider his conception of the Cut Style, taking into
ount broader questions and implications of style, icono-

graphy, technique and materials. To attain this end, the Cut Style was compared to other glyptic groups, particula to the so-called 'talismanic' class to which it was relat on grounds of technique. Because this class was largely defined by technique, I have moved from the general to th specific, first discussing technical aspects and then pro ceeding to matters of style, provenance and chronology.

The Cut Style may be distinguished from other Late Bronze Age glyptic groups on the grounds of technique and material. It is characteristized by an extensive use of t running wheel and various drills, including the tube dril The wheel is used both for cutting and modelling rather t for simply rough cutting as in the 'talismanic' class. Ca nelian was the principal material used in the production both Cut Style and 'talismanic' stones, but a higher pro- portion of other, more exotic materials such as agate, ja per, or chalcedony were used in the Cut Style. In the Cut Style, the lentoid seems to have become more popular, sup ing, to some degree, the amygdaloid which was the most fr quent shape among 'talismanic' gems.

The iconography and style of the Cut Style are disti tive, yet do not suggest that it is a true style, but is rather a class. The motif depicted on the finest and most characteristic examples is the griffin. A clear preferenc

is apparent for the depiction of animals rather than for plants or other motifs. Manifest in the Cut Style is a subtle interaction between style and technique. Undoubtedly, the same simple tools could have produced more finely modelled designs if this had been the original intention. The artisans were content to allow tool cuts to remain visible, resulting often in a nervous, oscillating rhythm. This cannot be explained as simply evidence of careless workmanship. Even in a simple design such as Figure 32, which pays little attention to fine modelling or detail, there is a great energy and animation enhanced by the jagged interplay of lines which cannot be explained as the unintended product of an ungifted artisan. Among the most important characteristics of the Cut Style which emerged in this study was that the Cut Style, with its simple one motif composition exhibits a fundamental clarity not present in 'talismanic' designs. This clarity may be contrasted to an intentional ambiguity between different motifs and a greater dependence on abstract pattern in the 'talismanic' group.

Relative to the Cut Style, the cheaper materials, more cursory technique, and simple iconography of the 'talismanic' class lend support to Boardman's suggestion that it may be simply a cheap variety of gems and not valued primarily for magical or talismanic qualities.[115]

Judging from the numbers which have survived, Cut Style gems appear to have been manufactured both on Crete and the Mainland. Designs such as Figure 1 seem to correspond to the criteria established by Biesantz and others for the Cretan, as opposed to the Mycenaean, glyptic style. Yet, many of the examples are rendered in a more rectilinear and structured manner. This is particularly true of the less imaginative depictions of Cut Style goats and lions. It was pointed out that the Mycenaean artisans of Knossos did not entirely forge what their predecessors taught them and thus, these stylistic distinctions must be applied with the utmost caution.[116] Despite the dependence on Cretan 'talismanic' style, strong stylistic affinities are also evident to more linear and structured Mycenaean products. Provenance may not be reliably determined with reference to excavated gems or on the basis of stylistic analysis. Differences in style may be explained as easily on the basis of chronological considerations.

The chronology of the Cut Style cannot be considered in isolation from that of the 'talismanic' class which gradually appears during Middle Minoan III. A Late Minoan IB terminus for the latter group, while attractive, cannot be conclusively demonstrated. Such a date is dependent on the assumption that the 'talismanic' class is associated with the provincial palaces which suffered so heavily from

the seismic destructions at the end of Late Minoan IB.[117] While no sealings made by 'talismanic' stones are known from the actual palace at Knossos, gems themselves were found within the confines of the palace area, indicating that they are not necessarily a purely provincial class.[118] Furthermore, the analogies between 'talismanic' glyptic motifs and those of decorated pottery do not cease in Late Minoan IB but seem to continue to appear into Late Minoan II.

Early examples which suggest an initial date for the Cut Style are a sealing from Haghia Triada and a lentoid from Thera datable to Late Minoan IB destruction levels. Since only thirteen stratified Cut Style gems are published, only the most tentative inferences may be drawn about the chronology of the group. Nevertheless, Boardman has attempted to construct an earlier proto-Cut Style group. He was unwilling to include the gems depicted in Figures 3 and 54 with the Cut Style proper (Figures 10, 13 and 14) because of their relatively finer carving and the presence of the zigzag, which he thought hearkened back to the earlier 'talismanic' class. However, the occurence of the zigzag is not limited solely to these elaborate seals, but also appears on the simple goat seals which seem to occur later in the class. Figures 3 and 54 are differentiated from the more common examples of the Cut Style more by their quality than by any meaningful difference in style or iconography.

It is hoped that on the grounds of iconography, technique, and style, a strong thread of continuity is apparent linking the various examples of the Cut Style discussed here. While indebted to Boardman, this consideration elaborates on and enlarges his conception of the characteristics of the class, and assigns the Cut Style a more secure place among the glyptic styles of the Late Bronze Age.

Appendix: The Terminology of Minerals Used in Aegean Gems

Archaeologists seldom agree with mineralogists over terminology used for rocks and minerals, and the study of Aegean Bronze Age glyptic is no exception to this. The publication of the CMS has made the erratic and subjective nature of the identification of stones used in the production of gems obvious to the student interested in ancient materials and industries. A look at the lists of materials in the various volumes readily indicates that each author has his or her own favorite designations and that there is little consistency in the terminology.[119]

Confusion over terminology was as common in antiquity as it is in present day scholarship. Then, as now (particularly among scholars of ancient art), the primary criterion for distinguishing materials was color.[120] However, the description of a color is highly subjective and if the colors are described at all, the student is totally reliant upon the author's interpretations of subtle changes in hue.

Steatite is continually confused with serpentine, and as a term is preferred by most writers.[121] But the

most problematic designations are sard, carnelian, agate and sardonyx -- all varieties of chalcedony.[122] Chalcedony is chemically about ninety to ninety-nine percent silica oxide (quartz) and variations in color result from the addition of various impurities.[123] Mineralogists have defined sard as a uniformly colored, semi-precious, translucent type of chalcedony, varying in color from chesnut brown to orange-brown, to reddish-brown. Carnelian is a uniformly colored red to reddish-brown type of chalcedony.[124] The two terms encompass a full range of colors and blend into one another. Onyx, in the strictest sense, consists of milky white bands alternating with deep brownish-black bands; in sardonyx, the white contrast with brown bands and with red for carnelian onyx.[125] Finally, agate is another subvariety of chalcedony with a distinct banding in which successive layers differ both in color and translucency.[126]

While the various terms do not form strictly distinct groups, they may be applied to glyptic material in hopes of standardizing the existing haphazard terminology. Certainly even without knowing the color of stones, one can distinguish those materials which are banded and those which are not, or between fine banding and broad zones of color. In CMS I there seems to be

no firm distinction between agate and sardonyx. Gem numbers 235 and 238 are alternately banded in darker and lighter material and conform to Frondel's definition of agate. Gem numbers 14, 63, 83 and 135 are plain translucent stones which are neither white, nor dark and light. Yet, they are designated as onyx.

In CMS IV onyx is not listed as a material at all. One wonders whether the translucent, unbanded number 242 should be called sardonyx. Apparently sard is understood by the authors as a material which is always banded.[127]

CMS VII seems to rely on different criteria for the identification of materials. Numbers 72 and 135 are identified as agate although they are unbanded, and the sardonyx and onyx designations are not used. Nevertheless, numbers 64, 95 and 154 which are identified as carnelian are actually finely banded. Again, in CMS VIII the onyx and sardonyx terminology does not occur. Curious also are the designations "yellow flecked chalcedony" for a banded darkish stone (number 102) and "flecked agate" for an unbanded stone (number 46).

CMS IX has the most elaborate descriptions of materials of all the volumes of the CMS.[128] Its authors favor agate and to a lesser extent, sardonyx at the expense of onyx and sard, which are not even mentioned.

However, within their groupings of materials, they are usually consistent.[129]

CMS XII presents specific, but at the same time, the most confusing designations."Red-brown"chalcedony (number 286) and"brown chalcedony" (number 199) appear to be carnelian and sard using Frondel's descriptions; Kenna does not appear to clearly differentiate sard and carnelian. Thus, he lists "carnelian colored sard" (number 183), "brown colored sard" (number 148), and "dark brown carnelian" (number 185) for materials which appear to be indistinquishable in the photographs. Also unusual is the term "pale yellow chalcedony" (number 200) which normally would be referred to as carnelian.

The purpose of this discussion is not to apply arbitrary technical terms to gem materials, but to point out inconsistencies in the terminology used by, and among, various authors. It is a plea for a standard, yet generalized, descriptive terminology for the identification of materials. The CMS is the ideal vehicle for initiating such a standard set of criteria, since part of its goal is to establish a firmer methodological groundwork upon which glyptic studies may procede.

FOOTNOTES

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The abbreviations used are those listed in "Notes for Contributors and Abbreviations," AJA 74 (1970), 1-8. The following special abbreviations are also used:

Annuario= Annuario della R. Scuola Archeologica di Atene

CMS I = Agnes Sakellariou, Corpus der minoischen und mykenischen Siegel (Berlin, 1964)

CMS IV = J.A. Sakellarakis and V.E.G. Kenna, Corpus der minoischen und mykenischen Siegel (Berlin, 1969)

CMS VII = V.E.G. Kenna, Corpus der minoischen und mykenischen Siegel (Berlin, 1967)

CMS VIII= V.E.G. Kenna, Corpus der minoischen und mykenischen Siegel (Berlin, 1966)

CMS IX = Henri and Micheline van Effenterre, Corpus der minoischen und mykenischen Siegel (Berlin, 1972)

CMS XII = V.E.G. Kenna, Corpus der minoischen und mykenischen Siegel (Berlin, 1972)

Cretan Seals = V.E.G. Kenna, Cretan Seals (Oxford, 1960)

Furumark, Pottery = Arne Furumark, The Mycenaean Pottery, Analysis and Classification (Stockholm, 1941)

Giamalakis = Agnes Xénaki-Sakellariou, "Les cachets minoens de la collection giamalakis," Etudes crétoises 10 (1958), 1-95

Greek Gems = John Boardman, Greek Gems and Finger Rings (London, 1970)

Palace of Minos = Sir Arthur Evans, The Palace of Minos, 4 volumes and index (London, 1921-1936)

Siegelbilder = Hagen Biesantz, Kretische-mykenische Siegelbilder (Marburg, 1954)

Talismanic Stones = V.E.G. Kenna, The Cretan Talismanic Stone in the Late Minoan Age, Studies in Mediterranean Archaeology 24 (Lund, 1969)

1. A. Furtwängler, Die antiken Gemmen III (Berlin, 1900).

2. Palace of Minos I, 271-285, 669-721; IV, pt. 2, 442-467, 484-618.

3. F. Matz, Frühkretische Siegel (Berlin, 1928), 27-29, 144 n. 9. Matz bases his early Cretan period on the Mesara tholoi seals. His chronological overview is suggested in the general text and he concerns himself mainly with Early Minoan glyptic.

4. Siegelbilder, 52-69.

5. Personal communication from Dr. Kopcke, 14 November 1973. See also E. Vermeule, Review of Cretan Seals in AB 43 (1961), 244 and especially M. Mellink, Review of Siegelbilder in AJA 59 (1955), 338.

6. This is updated to a slight degree by M.A.V. Gill, "The Knossos Sealings: Provenance and Identification," BSA 60 (1965), 58-98 and CMS I which lists a large number of provenanced mainland gems also listed by Biesantz.

7. Giamalakis, xii-xiv.

8. Cretan Seals, 1 and 11.

9. Palace of Minos I, 669-674. Kenna greatly undervalued the role of Evans who originated the theory of the talismanic use of gems. Cretan Seals, 1.

10. Cretan Seals, 45 and 74.

11. "The Art of the Cretan Seal," AAA 4 (1967), 130-135; CMS VII; CMS VIII; CMS XII; "Cretan and Mycenaean Sea in North America," AJA 68 (1964), 1-12 (this material is t same as used in CMS XII); "The Historical Implications of Cretan Seals," AA (1964), 911-954 et al.

12. See J. Boardman, Review of CMS I in Gnomon 38 (19 264-267; W. Schiering, Review of CMS II and IV in Gnomon 4 (1972), 417-420; J. Boardman, Review of CMS IV in Class. Rev. ns 21 (1971), 462-463; M. Szabo, Review of CMS VII ir AJA 73 (1969), 475-476; W. Schiering, Review of CMS VII ar CMS VIII in Gnomon 43 (1971), 54-60; E. Vermeule, Review c CMS VIII in AJA 72 (1968), 292.

13. CMS IX catagorizes gems as Prepalatial, Protopala Neopalatial and Mycenaean (both Mainland and Crete). CMS I divides them into Early Minoan, Old Palatial and New Palat These broader classifications seem better suited to a corp than a tentative and overly-refined system of dating.

14. Giamalakis, xvii, plates IX and X.

15. Giamalakis, no. 185.

16. I fail to see the stylistic similarities between such designs as Giamalakis, nos. 185 and 355. The style is thought to correspond with LM II ceramic development by Xénaki-Sakellariou in Giamalakis, xvii.

17. Talismanic Stones, 31 n. 60.

18. Talismanic Stones, 31 n. 60. MMA 26.31.177 and 26.31.209 are not illustrated; CMS XII, nos. 169 and 200 are 'talismanic' gems; other 'talismanic' stones include: CMS I, no. 436; CMS VII, nos. 48, 52, 55, 65, 74 and 222-225; CMS VIII, nos. 54, 60, 62 and 158; Cretan Seals, no. 262.

19. Cretan Seals,148. These comments are directed
) Figures 13, 32, 35 and 69 which I consider to be Cut
:yle gems. While Kenna's observations are plausible,
: cites no supporting evidence for his conclusions.

20. Greek Gems, 16.

21. A firm definition of what actually constitutes
:alismanic' style is yet to be offered. In the broadest
:nse the term applies to a style of carving regardless
: iconography. In this paper, the talismanic use of
ıese gems is not stressed. However, if they were used
)r talismanic or quasi-religious purposes, one would
tpect that their iconography would be limited to motifs
.th more obvious religious significance. Kenna defines
ıis class loosely to include designs with no direct icon-
jraphic link to the more typical 'talismanic' designs.
)r example, Talismanic Stones, plate 20.1 depicts a bull
ı a finely modelled palatial style. The plate 24.1 design
: geometrically patterned and is usually included in the
ırchitectural' class. Proof for the talismanic use of
ıis class is weak enough for gems whose iconography has
)vious religious or cult significance (such as the 'li-
ıtion vase', horns of consecration, etc.), and is complete-
/ lacking for other only technically related to 'talisman-
:' gems. One argument regarding the 'talismanic' significance
: this class which is particularly conjectural is that
ıich deals with the amygdaloid shape--the most common
ıape of 'talismanic' gems. The statement that the al-
)nd has special significance because "almonds in Crete are
:ill associated with love and fertility," seems particular-
/ naive. (Talismanic Stones, 7.)

22. One cannot always be specific about the cri-
ɛria which separate 'talismanic' from Cut Style gems.
have tended to include examples with distinct features
ıd finer carving as being more typical of the Cut Style.
ıus, in Talismanic Stones, plates 4 and 24, Kenna includes
ɛveral Cut Style gems depicting birds as 'talismanic'
lthough many are superior in their carving to more typical
talismanic' products. For depictions of fish which
ay fall into either category see Figures 43, 46, 47,
9, 50 and 51; CMS I, nos. 462; CMS IV, nos. 186, 187;

CMS VII, no. 229; CMS VIII, no. 50; CMS IX, no. 58; CMS XII, nos. 186, 190 etc. For trees (often with other figures: selected examples are Figures 70 and 72; CMS I, no. 404; CMS IV, no. 244; Giamalakis, no. 162. For birds: selected examples are Figures 56, 58 and 61; Levi, Annuario 8-9 (1925-1926), figs. 41-44; Giamalakis, nos. 146, 150, 406; CMS VII, no. 69, 165; CMS VIII, nos. 57, 158; CMS IX, nos. 54, 57, 61 and 62; CMS XII, nos. 141, 150 and 210.

23. Greek Gems, 394. These gems, dated by an example from Kamilari, probably occur around Late Minoan I and are related in a general way to the Cut Style in their iconography. The goat is the most frequent motif, often appearing with phyllomorphic ornament (Cf. CMS VII, no. 247 and CMS IX, no. 101-103). While some examples listed by Boardman such as CMS I, no. 478 are related technically because a simplicity in their carving technique is obvious, the style is not as fine as that of Cut Style examples. However, the main reason for omitting this group remains a stylistic one for these gems deviate too greatly from the consistent carving of the Cut Style.

24. André Dessenne, "Mallia," in BCH 81 (1957), 693-695; André Dessenne, "Communication des ateliers de pierre gravées à Mallia," Académie des incriptions et belles lettres: Comptes Rendus (1957), 123-127. Here Dessenne himself admits that this 'workshop' could be a kind of depot. While tools from excavations may go unnoticed, a likely candidate is reproduced in F. Chapoutier, Pierre Demargne with André Dessenne, "Fouilles a Mallia, exploration du palais," Études crétoises 12 (1962), plate 44, lower right hand plate, second unnumbered object from the upper left. This tool is not from the atelier.

25. Palace of Minos IV, 594.

26. Palace of Minos IV, 497.

27. Kenna first pointed this out (Cretan Seals, 70). See Percy Newberry, The Life of Rekhmara (Westminster, 1900), plate xvii. However, it should be noted that Rekhmire lived in the New Kingdom and not the Middle

Kingdom as Kenna has said which vastly changes the date when the running wheel was used in Egypt.

28. Émile Vernier, La bijouterie et la joalerie égyptiennes (Cairo, 1907), 62-66 and 139.

29. H. Frankfort, Cylinder Seals (London, 1939), 5.

30. See especially Pliny, Natural History 36.54.

31. Clifford Frondel, The System of Mineralogy III (New York, 1962), 199. The hardness of the various quartz related stones (rock crystal, amethyst and the chalcedonies) is 6½ to 7 on Moh's scale while that of copper or bronze is considerably less.

32. S.H. Ball, A Roman Book on Precious Stones (Los Angeles, 1950), 85.

33. I owe this idea to Richard Stone of the Institute of Fine Arts. Theophrastus documents the early use of emery from Naxos (Caley and Richards, Theophrastus on Stones (Columbus, 1956), 147-150)and Pliny may have referred to diamonds (adamas) as an abrasive (Natural History 37.15) although these two materials have not been found in excavated'workshops'.

34. Cf. Greek Gems, 43.

35. Palace of Minos I, 675, fig. 494.

36. Cf. Figure 71 which I have examined with a hand lens.

37. This observation was first made by Dr. Günter Kopcke.

38. This was determined from a statistical tally of Late Bronze gem materials listed, as they appeared in CMS I, IV, VII, VIII, IX and XII; Giamalakis and Cretan Seals.

39. Ibid. The finer Late Bronze Age gems display a preference for agate, the various chalcedonies, jasper and then hematite.

40. Solinus, Collectanea Rerum Memorabilium II in S.H. Ball, A Roman Book on Precious Stones (Los Angeles, 1950), 11 and 280.

41. Although agate is mentioned as occurring on Crete (Pliny, Natural History 37.54). Carnelian is not mentioned is modern geological reports due to its economic insignificance.

42. Pliny, Natural History 37.31.

43. Pliny, Natural History 37.54. Although no mention can be found in geological reports, the ocurrence of carnelian and onyx in Egypt is certain. Carnelian is abundant in pebble form in Egypt's eastern desert and in at least one locality in the western desert (A. Lucas, Ancient Egyptian Materials and Industries (London, 1962), 386-387). Agates, onyx and jasper have been recorded as occurring in Anatolia and the Pontic region (H. Karajian, Mineral Resources of Armenia and Anatolia (New York, 1920), 137). Onyx has been reported as coming from Sanaa in the Yemen by the Arab mineralogist Tiefeschi (1253 A.D.) and from the area of the ancient royal city of Zafari by Al Hamdani in the tenth century (S.H. Ball, A Roman Book on Precious Stones (Los Angeles, 1950), 274).

44. The terminology used to describe the various shapes used by Aegean gem carvers is still not standardized. Figures 9, 32 and 68 are referred to as lenticular, which seems to be used interchangeably and extensively with lentoid in Cretan Seals (especially nos. 1P - 49P). Glandular is also another general term for gems which range from slightly oval (such as in Figure 53 to those which are slightly broader amygdaloids (Figures 59a and 62). This terminology is barely adequate for the diversity of shapes encountered in Aegean glyptic and an attempt at standardization has only recently occurred with the advent of CMS IX, 258-259.

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45. Greek Gems, 384.

46. Talismanic Stones, 26.

47. These figures were determined by a tally of published examples. For an excellent listing of Aegean cylinder seals, both imports and native products, see Hans-Günter Buchholz in George F. Bass, "Cape Gelidonya: A Bronze Age Shipwreck," TAPA ns 57 pt. 8 (1967), 148-159. A few further additions may be found in Kenna, "Ancient Crete and the Use of the Cylinder Seal," AJA 72 (1968), 321-335.

48. Several of the examples illustrated are not in the Cut Style and one is not Aegean (Figure 66), but they are either technically or stylistically related. Cf. Figures 7, 42, 43, 63, 64, 66 and 67.

49. J.L. Benson, "Aegean and Near Easter Seal Impressions from Cyprus," The Aegean and the Near East. Studies Presented to Hetty Goldman. Edited by Saul S. Weinberg, (Locust Valley, 1956), 59-79.

50. This may be seen in C. Blegen, Prosymna II (Cambridge, 1937), fig. 444.5.

51. Cf. St. Alexiou, "A Parallel to the Priest-King Relief from Knossos," AAA 2 (1969), plate 1, for a sealing of this gem.

52. Agnes Sakellariou, Mykenaike Sphragidoglyphia (Athens, 1966), 127.

53. In discussing the goat Kenna prefers a different terminology from that which I use to describe what seems to be the same animal. The terms "Cretan goat", "long haired goat", "goat", "wild goat", "quadruped" and even "stag" all seem to refer to the goat. It is doubtful whether species of this animal can actually be distunguished on the basis of depictions on gems. The term 'goat' refers to a large family of hollow horned ruminants whose horns usually curve backward. The ibex is also a variety of wild goat but cannot easily be distinguished in these depictions due to their small size.

54. Professor Günter Kopcke brought this gem to my attention.

55. The only exception to this is Figure 13 in which there may have been an attempt to depict the griffin above the point of the viewer, who sees the underside of the wings.

56. Talismanic Stones, plate 8.6; Greek Gems, 392; CMS I, no. 7. They appear to be intentionally ambiguous and very little distinguishes one motif from another.

57. Infra, note 87.

58. Greek Gems, 390 and 101. It is most unusual for an amygdaloid or lentoid to be cut on both sides in this period. It is also rare in LM III, but common on Island Gems.

59. Palace of Minos I, 677.

60. While Figures 44 and 45 do not closely compare with the Cut Style designs, neither do they find parallels in any Aegean glyptic. Since they do not conform with the existing seal classifications, it may be wise to follow Boardman's hint that these may not be Bronze Age stones. In CMS IX, x, the possibility is mentioned of a Hellenistic origin for certain Aegean Bronze Age gems. This is an interesting possibility but in the case of Figures 44 and 45, it can only be offerred as a theory. The question is further complicated by the fact that one side of the Figure 45 gem which depicts an owl is probably not finished.

61. Greek Gems, 392.

62. Infra, 36-38.

63. An itinerant seal carver's tools were found in Akkadian levels at Tell Asmar in the Diyala, however, they have not yet appeared in photographs. H. Frankfort, Cylinder Seals (London, 1939), 5; H. Frankfort, The First Season's Work at Tell Asmar and Khafaje Oriental Institute Communications 16 (Chicago, 1933), 47.

64. Siegelbilder, 41, 47 and 49; E. Davis, The Vapheio Cups and Aegean Gold and Silver Ware, Doctoral dissertation, New York University, 1973, 38.

65. John H. Betts, "The Vapheio Gems: A Note of Clarification," AJA 70 (1966), 368-369; V.E.G. Kenna, "The Vapheio Gems - A Further Comment," AJA 71 (1967), 409-410.

66. Infra, 38-39.

67. Cf. Greek Gems, Text figures 90, 91, 98 for these motifs.

68. Talismanic Stones, 24-25. Here Kenna lists only 10 'talismanic' gems with definite Mainland provenance while I estimate 50 have been excavated from Crete. Both he and Boardman favor a Cretan origin for this group (Greek Gems, 394). Like Boardman, I find no compelling reason for attributing the 'talismanic' gems from Grave Circle B at Mycenae to Mainland artisans (CMS I, nos. 6 and 7).

69. Cf. Talismanic Stones, plates 2,3, 5-11.

70. Siegelbilder, 37-51.

71. Ibid.

72. Furumark, Pottery, 112 and 234.

73. These criteria are adapted from E. Davis, The Vapheio Cups and Aegean Gold and Silver Ware, Doctoral dissertation, New York University, 1973, 28.

74. E. Vermeule, Greece in the Bronze Age (Chicago, 1964), 146; Greek Gems, 46; Siegelbilder, 46-47; Furumark, Pottery, 166-169.

75. However, in Knossos, the torsional, atectonic principle was not completely lost.

76. To some degree this is simply indicative of a refined feeling for composition and need not be used as a criterion for determining Mycenaean or Cretan influence.

77. This gem was originally published by St. Alexiou "A Parallel to the Priest-King Relief from Knossos," AAA 2 (1969), 429-435. From this article a Cretan provenance is established. In the use of rhythm and movement I feel that this gem exemplifies Cretan style.

78. Commenting on Cut Style gems depicting the goat, Kenna feels that they are a quasi-talismanic depiction of a quarry subject and represent a class more common to the Mainland than to Crete. This point is illustrated with Figures 23, 30 and 31. Inexplicably, Figure 21 "appears to be Cretan in all respects" and is only perhaps related to what is considered by Kenna to be a Mainland group. This point is left unclear and I fail to see the distinction between these gems. Kenna also suggests that all of these gems are members of a class manufactured "with an eye to Mainland use" (CMS VII, 187).

79. Boardman has discussed elaborate gems such as Figures 10, 11, 13 and 14 as products of a Mycenaeanized Crete (Greek Gems, 46-54). However, his stand on this issue is not strong. In his list of Cut Style gems he uncritically accepts the attributions of other scholars for these gems to Cretan artisans (Greek Gems, 394). These gems are as follows: Figures 12, 19, 21, 27, 35; Cretan Seals, no. 11P; Giamalakis, nos. 185, 255, 257, 261 and CMS VII, no. 235; Xanthoudides, Archaeologike Ephemeris (1907), plates 7.69, 8.148 and 8.161.

80. Here it is interesting to note that in CMS IV, VII, VIII and XII that Kenna assigns the bulk of Cut Style gems to Crete and one must assume the reason for this is their formal similarity to the 'talismanic' group.

81. The composition of the Figure 54 design is almost identical to one which Biesantz used to illustrate Mycenaean composition. Cf. Siegelbilder, 26-27, Abb. 1d.

82. Greek Gems, 46.

83. Talismanic Stones, 12.

84. The following lists the major published examples from controlled excavations. Unless otherwise stated, the dates given are those of the excavators: Edith Hall, Exc

ations in Eastern Crete: Sphoungaras (Philadelphia, 1912), 69, fig. 45, MMIII-LMIB; E.J. Forsdyke,"The Mavrospelio Cemetery at Knossos," BSA 28 (1926-1927), 254, 259, 264-266, plate 19, MMIII; Levi, Le cretule di Haghia Triada e di Zakro," Annuario 8-9 (1925-1926), for Zakro, fig. 172, MMIIIB and Haghia Triada, figs. 30-32, 37, 57, all pre-LMIB destruction (Greek Gems, 38); R. Seager, Explorations in the Island of Mochlos (New York, 1912), 91, figs. 6.30, MMIII and 53, pre-LMI; CMS I, 252, no. 261, LHII-Vapheio; CMS I, 423, no. 409-Skopelos; CMS I, 237, nos. 207 and 208, LHII-III-Prosymna; S. Hood, G. Huxley and N. Sanders, "A Minoan Cemetery on Upper Gypsades," BSA 53-54 (1958-1959), plate 63, nos. II.5, VII.20, VII.21, LMIII.

85. Greek Gems, 42; Schiering, Gnomon 44 (1972), 482.

86. Greek Gems, 46. In Talismanic Stones, 14, Kenna lists 9 'talismanic' gems found in the area of the palace at Knossos.

87. Greek Gems, 392. What Boardman means exactly by "triangles and shells" is not clear to me. The fish in 'talismanic' designs are formally related to bundles as a type of intentional visual pun (Cf. Talismanic Stones, plates 8 and 12). The comparison of the fish-bundle motif finds at least one parallel in the design of an embossed plate from Shaft Grave V at Mycenae (Palace of Minos IV, fig. 256). I do not find convincing Boardman's other parallels for this motif. The fish (dolphins?) in Figure 43 are identical to Marine Style examples such as E. Vermeule, Greece in the Bronze Age (Chicago, 1964), fig. 27. However, regarding "hearts and ivy" another possible comparison is Furumark, Pottery, fig. 36, 12.11 (Myc. IIA) or fig. 36, 12.26 (Myc. IIIA:1). For the "lion mask/papyrus fresco", cf. Furumark, Pottery, fig. 34e (Myc. II). For "arc and rock pattern" is should be noted that Palace of Minos IV, fig. 250 is dated by Evans from LMIB to LMIII. I accept Boardman's comparison of patterned axes in glyptic and metalwork which Evans sees as being in the LMII tradition (Palace of Minos IV, fig. 315 bis).

88. Talismanic Stones, 27.

89. This arrangement is indicated in Talismanic Stones, 10. "If the stones of this class are placed by proveniences in chronological order, there is the probability that a stylistic or typological development may be perceived."

90. In the absence of published photographs or drawings, I do not feel that Kenna's descriptions of gems gives enough information that the critical reader can accept his chronology. One does not know whether he has actually seen all the gems and sealings which he mentions. Cf. Talismanic Stones, note 23, "These (sealings from Gournia) were seen some years ago in Heraklion, but have not been found." Other 'talismanic gems do not suggest a clear pattern of development. Those designs from Haghia Triada are vaguely similar to VII.20 from Gypsades. Those from Sphoungaras relate somewhat in their style to the 'later' gems from Prosymna (CMS I, no. 208). A stone from Gypsades (II.5 from that excavation report) is similar to one from Skopelos (CMS I, no. 409), etc.

91. Talismanic Stones, 15. Boardman dates the Sphoungaras gems to LMIA not MMIII. Greek Gems, 45. Regarding the dating of the two Gypsades gems (II.5 and VII.20) see Sinclair Hood, George Huxley and Nancy Sanders, BSA 53-54 (1958-1959), 245 and 247.

92. In confirmation of this view see: Greek Gems, 44-45; Boardman, Class Rev 22:1 (1972), 139; Schiering, Gnomon 44 (1972), 418; Schiering, Gnomon 44 (1972), 481-482. In opposition see Kenna, Talismanic Stones, 28-33.

93. Levi, Annuario 8-9 (1925-1926), 117, fig. 116.

94. Sp. Marinatos, Excavations at Thera V (Athens, 1972), 36.

95. Greek Gems, 48. Boardman refers to more than one sealing from the palace. Only one seems to me to have been impressed by a Cut Style gem. Cf. M.A.V. Gill "The Knossos Sealings: Provenance and Identification," BSA 60 (1965), 76, plate 19.

96. This opinion is that of the excavators. M.S.F. Hood and P. de Jong, BSA 47 (1952), 254. See also Hans-Günter Buchholz, TAPA ns 57 pt. 8 (1967), 155 note 28. A related cylinder is reported to have been found at Knossos near the Royal Road and may date to LMIB or the "15th century". No reasons are given for these dates in the preliminary notices of the finds. This stone depicts a scene of a griffin hunting wild goats. (Kenna, AJA 72 (1968), 330 and M.S.F. Hood, "Archaeology in Greece," Archaeological Reports (1959-1960), 24.) Two further examples of cylinders are Figures 64 and 67 from Rutsi-Myrsinochorion, tomb 2 and are associated with the last burial. Neither of these cylinders is rendered in the Cut Style although the Figure 64 design depicts a scene for which parallels exist in Aegean iconography (Cf. Figure 65). The Figure 67 animals are composed of simple cuts which relates them technically to the Cut Style but their style and feeling are quite different. While this composition has been described as depicting butterflies, it clearly relates to Mitannian compositions of goats and trees. (Sp. Marinatos, "Pylos," Archaiologike Hetaireia to Ergon (1956), 90-96 and "Excavations at Pylos," Archaiologike Hetaireia Praktika (1956), 202-206; Schachermeyr," Forschungsbericht zur ägäischen Frühzeit, 1957-1960," AA (1962), 274.) For a comparable Mitannian cylinder to Figure 67 see E. Porada and Briggs Buchanan, Corpus of Ancient Near Eastern Seals in North American Collections (Washington, D.C., 1948), no. 1046E.

97.Wace, Archaeologia 82 (1932), 99 and 106.

98. M.S.F. Hood, "Another Warrior-Grave from Ayios Ionnis near Knossos," BSA 51 (1956), 81-83, plate 14c-d. The style of the sealstones and the presence of flat-bladed daggers together with the impression made by the finds as a whole, suggest that the tomb is not earlier than LMIB. "It may perhaps belong to the latter part of that period, which overlaps with the early phase of Late Minoan II at Knossos, say about 1450."

99. CMS I, 154; Siegelbilder, 155. Various remains were thrown out as the tomb was prepared for a younger burial and the remains including the gem were found wit LHII ceramic. Over the remains were found LHIII objects including an undecorated beaker. Wace, Archaeologia 82 (1932), 53-55. For the LHIIB dating see Furumark, The Chronology of Mycenaean Pottery (Stockholm, 1941), 30.

100. Blegen, Prosymna I (Cambridge, 1937), 177.

101. Ibid.

102. Furumark, The Chronology of Mycenaean Pottery (Stockholm, 1941), 131. This is in agreement with Marinatos LHII-III dating cited in CMS I, 237. See also Buchholz, TAPA ns 57 (1967), 157 note 56. Another cylinder which is somewhat similar to Figure 7 is Figure 66 depicting winged griffins on either side of a papyrus stalk. Between them is a frontal figure in a Syrian robe. While good parallels are known for the griffins, (Cf. Levi, Annuario 8-9 (1925-1926), fig. 113) an Aegean origin seems unlikely. First, the bodies of the griffins are composed of two almost completely distinct parts. Also, in the Cut Style, tube cuts are used to adorn wings, body or to form eyes. (Cf. Figures 2, 3, 7, 8 etc.). They do not serve simply as filling ornamen as above the griffin's heads. While the Syrian garment is paralleled in Aegean glyptic (Cf. Seyrig, Syria 32 (1955), fig. 1, plate III.3), the frontal figure is characteristic of Cypriot glyptic. (E. Porada, "The Cylinder Seals of the Late Cypriot Bronze Age," AJA 52 (1948), plate 8.10.

103. CMS I, 238; Siegelbilder, 167; Blegen, Prosymna I (Cambridge, 1937), 195-196. The third group of remains, from which this gem comes was adjacent to the second group which was earliest in the tomb. Among the vases belonging to the second group were two alabastra, a squat jug and a saucer with Blegen believed to be of the LHII type. Obvious problems exist with the dating of these remains.

104. CMS I, 59.

105. Siegelbilder, 165, no. 6. The motif is a lion and is incorrectly identified by Biesantz as a griffin. For the date of this grave see Arne Furumark, The Chronology of Mycenaean Pottery (Stockholm, 1941), 66.

106. CMS I, 400.

107. Greek Gems, 392. The examples which he lists are Figures 14a, 25a, 31, 59a; Ashmolean Museum AE 1231; Xanthoudides, Archaiologike Ephemeris (1907), plate 7.73.

108. Greek Gems, 392. Boardman's comparisons are Figures 3 and 54; Cretan Seals, no. 355; Ashmolean Museum AE 1231; CMS XII, nos. 141, 159; S. Xanthoudides, Archaiologike Ephemeris (1907), plate 7.73; CMS VII, mos. 151, 164; P. Zazoff, "Gemmen der Privatsammlung Dr. J. Jantzen Bremen," AA (1963), Abb. 2-6; E. Brandt, Antiken Gemmen in deutschen Sammlungen (Munich, 1968), nos. 47 and 61 (My Figures 15 and 25a). This 'style' overlaps with the construct attempted by Kenna (Supra, 9-10) but neither group is well defined stylistically.

109. Figures 9, 10, 13, 14, 15, 40, 42 etc.

110. Cf. Figures 2, 4, 7, 8 etc.

111. Xanthoudides, Archaiologike Ephemeris (1907), plate 7.73 and CMS XII, no. 159.

112. Supra, 39.

113. This gem comes from Prosymna, LHII-III context. Cf. Buchholz, TAPA ns 57 pt. 8 (1967), no. 56.

114. Cf. Figure 33 (Mycenae, ca. 1500-1200); 28 (Mycenae, LHII); 24 (Mycenae, LHI-III); 22 (Prosymna, LHIII); 37 (Menidi, LHIIIB).

115. Greek Gems, 43 .

116. Depictions of fish or foreparts of fish, for example, do display a characteristic Cretan fluidity and torsional rhythm (Cf. Talismanic Stones, plate 8). However, many others do not and appear to strive for random pattern simply to fill the field. These patterns are not modelled and torsional, but angular, linear and unimaginative. Cf. Talismanic Stones, plates 6.4 and 6.7 7.2, 3, 4, 6, 7; 12.1, 2; 13.1, 2, 3; 14 etc.

117. Greek Gems, 42.

118. Supra, note 86.

119. CMS IX, xvi. Here carnelian is defined as principally orange; sardonyx, usually orange or clear. In no other CMS volume is there an attempt to explain the definitions of the materials listed.

120. S.H.Ball, A Roman Book on Precious Stones (Los Angeles, 1950), 13. This applies particularly to Pliny's description of gem stones.

121. Greek Gems, 394 distinguished the two. CMS IX, xxi-xxii seems to favor steatite as a material, while it is hardly mentioned in the other CMS volumes. Cf. CMS I, xxi; CMS IV, xviii-xix; CMS VII, xvii-xviii; CMS VIII, xvii; CMS XII, xvi-xvii.

122. Clifford Frondel, The System of Mineralogy III (New York, 1962), 195, 198, 199, 208, 210, 214.

123. Ibid. Under the microscope, chalcedony and its subvarieties show a fibrous structure with the fiber direction perpendicular to the layering and to the free surface. It fractures readily across the microscopic banding and parallel to the fibers to give an uneven or splintery surface with a rather waxy luster.

124. Ibid. 206.

125. Ibid. 214.

126. Ibid. 210.

127. CMS IV, xviii.

128. CMS IX, xxi.

129. However, no. 111, identified as carnelian is finely banded as would be expected of agate and no. 220, described as agate, is unbanded.

The following catalogue does not pretend to be exhaustive. The writer's intention was only to assemble characteristic examples of the Cut Style and comparisons to visually supplement the text and allow the reader to gain a clearer understanding of the Cut Style. Thus, many of the foregoing examples are not discussed in the text of the paper. All of the examples are sealings or drawings of sealings except for two: Figures 15 and 25a. The impression of these two gems were not available to be photographed. Where no good photograph of an impression could be found, a drawing was substituted. A few sealings were excluded because they only appeared in very poor photographs. Reproductions are larger than life size but not proportionally so to the original object. No attempt has been made in the catalogue to correct the terminology for shape or material; these were merely quoted from the source of the photograph. (See appendix). Since there is a stylistic consistency within each motif, the listing is an arrangement by iconography. Thus, the designs are assembled in the following order: griffins, goats, fish, birds, cylinders and miscellaneous motifs. Not all the gems are in the Cut Style which appear in the catalogue.

CATALOGUE

1 Levi, Annuario, 8-9 (1925-1926), 117 fig. 116
no dimensions
clay sealing
lentoid ?
Haghia Triada

2 CMS VII, no. 135
32 x 29 millimeters (used hereafter)
agate
lentoid

3 Greek Gems, plate 84
27
agate
lentoid
said to come from Kritsa (CMS XII, no. 247)

4 CMS XII, no. 233
14
brown sardonyx with creamy surface
lentoid

5 CMS IV, no. 266
15.7 x 6.1
red, black and yellow banded carnelian
lentoid
said to come from Lastros

6 CMS IX, no. 104
16
hematite
lentoid, type III

7 CMS I, no. 206
20 x 7-8
onyx
cylinder
Prosymna, grave II

8 CMS VIII, no. 88
20
carnelian
lentoid

9 Szabo, Bulletin du Musée Hongrois des Beaux-Arts, 29 (1966), plate 4
19.8 x 9.9
hematite
lenticular

10 Greek Gems, plate 146
26 x 15
carnelian
amygdaloid

11 CMS VII, no. 120
22 x 17
burnt carnelian
amygdaloid with facetted back

12 CMS VII, no. 93
15 x 11
carnelian
glandular shape
said to come from Crete

13 Greek Gems, plate 143
25
carnelian
lentoid
said to come from Aghia Pelagia

14 CMS IX, no. 22D
27.5 x 17
agate
amygdaloid type II
said to come from Mycenae (Greek Gems, plate 147)
I can see no reason to doubt the authenticity of this gem and it seems unlikely that Boardman would have included in Greek Gems without mentioning that it was suspect.

14a CMS IX, no. 105
21
burned sardonyx
amygdaloid type II
said to be found in Crete

15 E. Brandt, Antiken Gemmen in deutschen Sammlungen
Band 1 (Munich, 1968), no. 47
21 x 8.2
carnelian-agate
lentoid

16 CMS XII, no. 261
18.8
banded agate
lentoid

17 CMS IX, no. 141
26 x 22
sardonyx
lentoid type VII
said to come from Crete

18 CMS IX, no. 140
22 x 21
sardonyx
lentoid type VIa

19 CMS I, no. 481
13
sardonyx
lentoid

20 CMS IX, no. 139
23 x 21
grey and brown agate
lentoid type VIa

21 CMS VII, no. 139
19
black marble
lentoid with full carination
said to come from Knossos

ıo. 212

ı, grave XIII
:ed with LHIII ceramic

no. 153

ıo. 158

ın

grave 529
ed with LHI-III ceramic (Wace, Archaeologia 82 (1932), 99)

no. 261
.3

come from Knossos

Antiken Gemmen in deutschen Sammlungen, Band 1
1968), no. 63

come from Melos

no. 263
.9
rble

o. 482

e

ɔ. 143

grave 55
ed with LHIIB ceramic

29 CMS IV, no. 262
22.7 x 9.4
white, grey and yellow banded agate
lentoid

30 CMS VII, no. 152
23 x 21
banded agate
lentoid

31 CMS VII, no. 151
25
rock crystal
lentoid
said to come from Ialysos

32 Cretan Seals, no. 13P
17 x 15
black steatite or slate
lenticular

33 CMS I, no. 56
22 x 18
carnelian
amygdaloid
Mycenae, lower town chamber grave 12
ca. 1500-1200 B.C. (CMS I, no. 56)

34 CMS IV, no. 229
21.5 x 11.6
hematite
amygdaloid
said to come from Sitia, Crete

35 Cretan Seals, no. 10P
20 x 18
hematite
amygdaloid

36 CMS IX, no. 161
18 x 17
hematite
lentoid type III

37 CMS I, no. 387
19 x 14
carnelian
amygdaloid
Menidi, Attica, tholos grave (Siegelbilder, 165 L2, S6)
Associated with LHIIIB ceramic

38 CMS IV, no. 228
20.2 x 9.5
pink and black banded agate
amygdaloid
said to come from Messara

39 M.S.F. Hood, BSA 51 (1956), plate 14d
20 x 11
carnelian
amygdaloid
'warrior grave' at Ayios Ioannis near Knossos
prior to the LMII destruction of Knossos (BSA 51 (1956), 81)

40 CMS IX, no. 106
13.5 x 10
agate
amygdaloid type II

41 CMS VII, no. 121
26 x 19
calcined by fire, perhaps carnelian
glandular

42 M.S.F. Hood and P. de Jong, BSA 47 (1952), no. III.23
19 x 8
carnelian
cylinder
Knossos, 'warrior grave' III
LMIB-II context (BSA 47 (1952), 267-269)

42a CMS I, no. 405
29 x 18
carnelian
amygdaloid

43 Cretan Seals
17 x 8
carnelian
cylinder
said to come from eastern Crete

44 Greek Gems, plate 81
28 x 18
mottled chalcedony
amygdaloid

45 Greek Gems, plate 82
28 x 19
veined agate
amygdaloid

46 CMS IV, no. 176
20 x 14.7
rock crystal
amygdaloid
said to come from Sinda, Crete

47 CMS XII, no. 185
L:24 width of sides: 14, 14, 13
dark brown carnelian with black markings
3 sided prism bead

48 CMS XII, no. 201
13.9 x 13.4
sardonyx
lentoid

49 CMS I, no. 456
19 x 15
rock crystal
amygdaloid

50 CMS I, no. 460
11 x 9
sardonyx
amygdaloid

51 CMS XII, no. 161
12
burnt sard or chalcedony
lentoid

52 CMS IX, no. 71
16.5 x 11
agate
amygdaloid type I

53 CMS VII, no. 77
16 x 14
burnt carnelian
glandular

54 Greek Gems, plate 83
27 x 17
agate
amygdaloid
said to come from Kritsa, Crete

55 M.A.V. Gill, BSA 60 (1965), plate 13 R15
-
-
sketch of sealing
palace at Knossos
pre-LMII destruction

56 CMS XII, no. 219
17.5 x 9
brown carnelian
amygdaloid with facetted back

57 CMS IV, no. 260
12.6 x 4.8
hematite
lentoid
said to come from Krassi, Crete

58 CMS VIII, no. 155
17 x 12
carnelian
amygdaloid

59 Zazoff, AA (1963), Abb. 2.6
18 x 16.8 x 9.3
carnelian
lentoid

59a CMS VII, no. 164
24 x 18
rock crystal
glandular

60 CMS VII, no. 259
15 x 12
carnelian
glandular

61 CMS XII, no. 162
L: 13 each side, width: 11.5
burnt sard or chalcedony
3 sided prism bead

62 CMS VII, no. 122
23 x 15
black jasper
glandular

63 CMS VII, no. 94
22 x 8
carnelian
cylinder

64 CMS I, no. 285
17 x 7
sardonyx
cylinder
Rutsi-Myrsinochorion, tomb 2
LHIIA-IIIA1 context (Marinatos, Antiquity 31 (1957), 1

65 St. Alexiou, AAA 2 (1969), 430, plate 1
14
sardonyx
demi-cylinder

66 Seyrig, Syria 32 (1955), plate 3,1
18 hematite
cylinder

67 CMS I, no. 284
21 x 8
carnelian
cylinder
Rutsi-Myrsinochorion, tomb 2
LHIIA-IIIA1 context (Marinatos, Antiquity 31 (1957), 1

68 Cretan Seals, 10P
18
dark red jasper
lenticular

69 CMS I, no. 55
15.5 x 17
carnelian
lentoid
Mycenae, lower city, chamber grave 12
ca. 1500-1200 (CMS I, 59)

70 CMS VII, no. 53
13
green jasper
lentoid

71 CMS XII, no. 290
20 x 15
brown striated agate perhaps affected by heat
amygdaloid

72 CMS XII, no. 180
19.5 x 15
pinkish brown spotted carnelian
amygdaloid

73 CMS I, no. 394
20
opal
lentoid
Perati, tomb I, grave 2
Associated with LHIIIC ceramic (CMS I,400)

74 CMS I, no. 463
16 x 11
carnelian
amygdaloid

75 Sp. Marinatos, Excavations at Thera V, (Athens, 1972), pla
-
brown jasper
lentoid
Thera, A 16
pre LMIB destruction

PLATES

ate 85b

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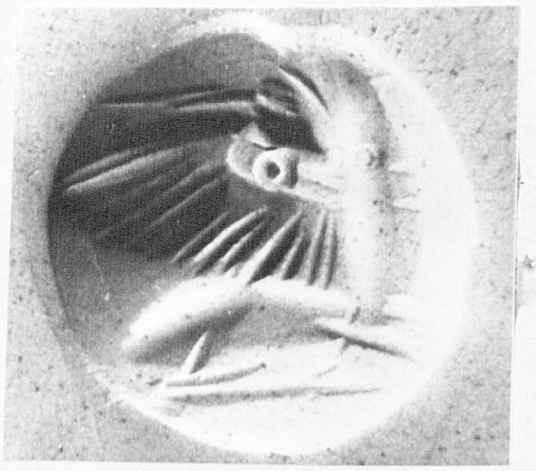
2

3



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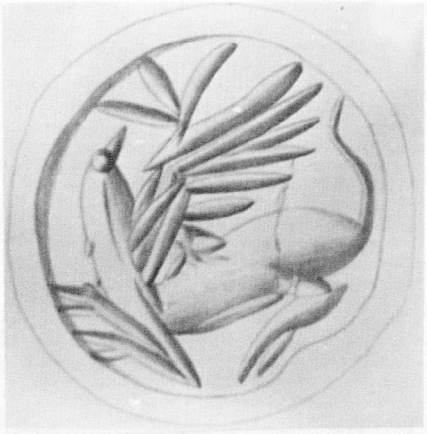

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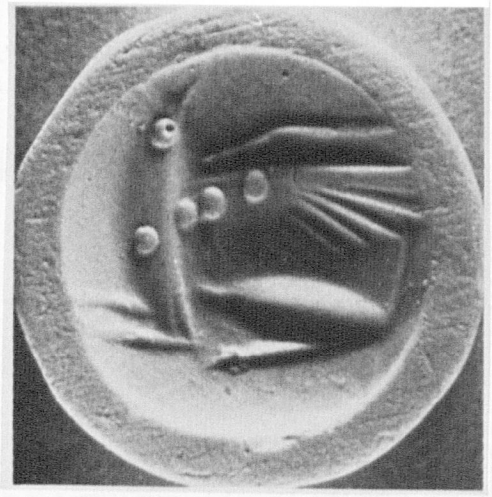

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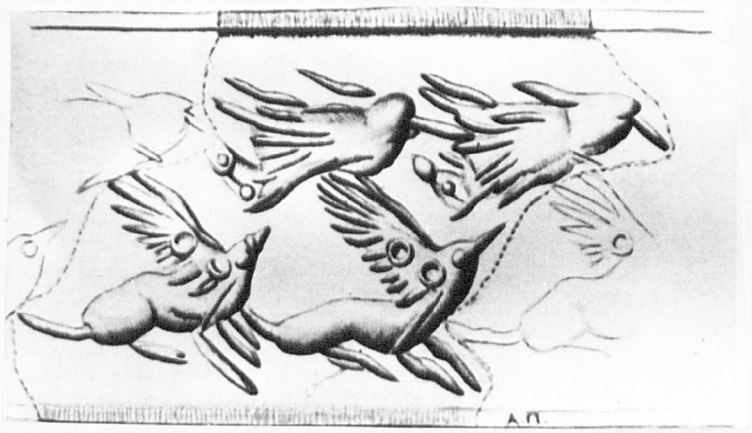

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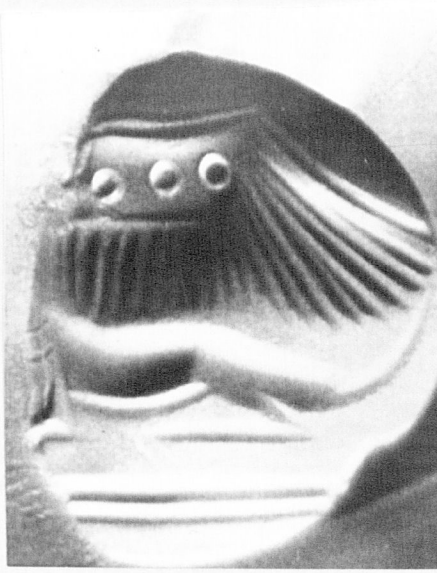

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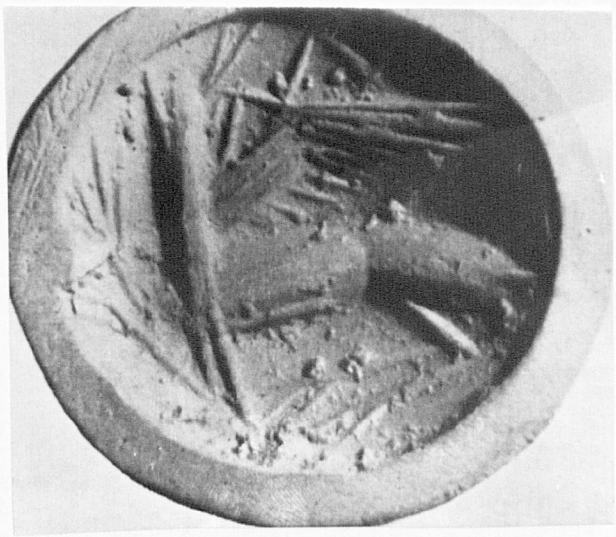

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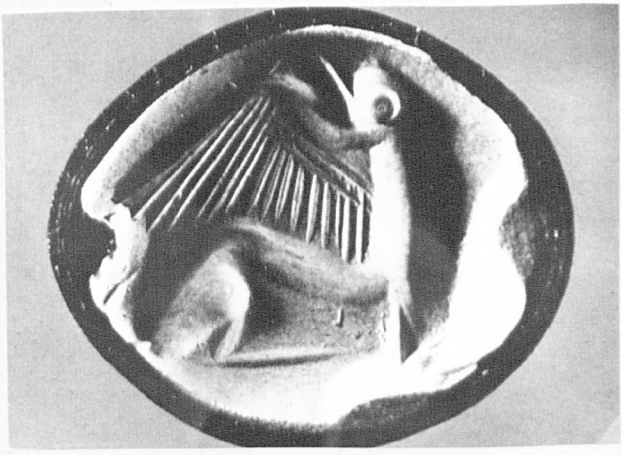

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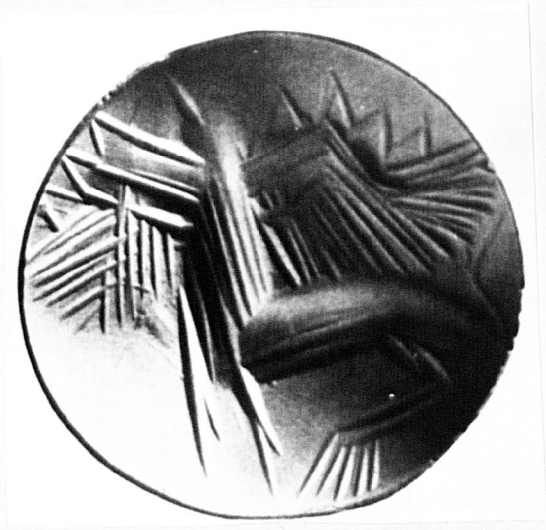

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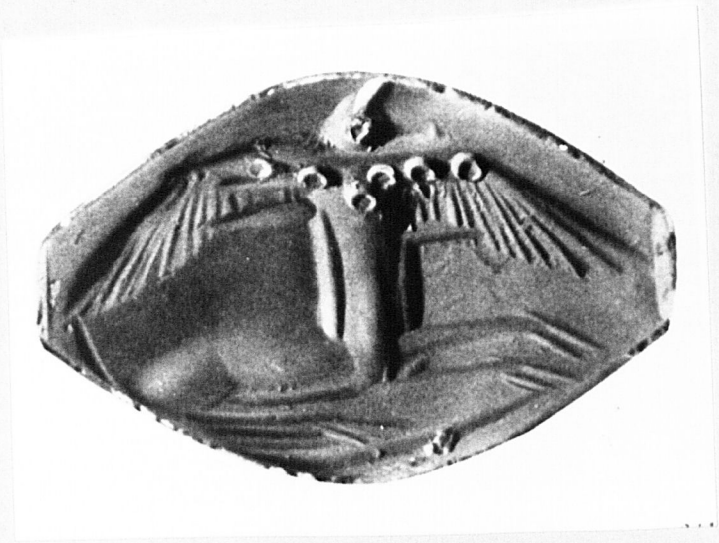

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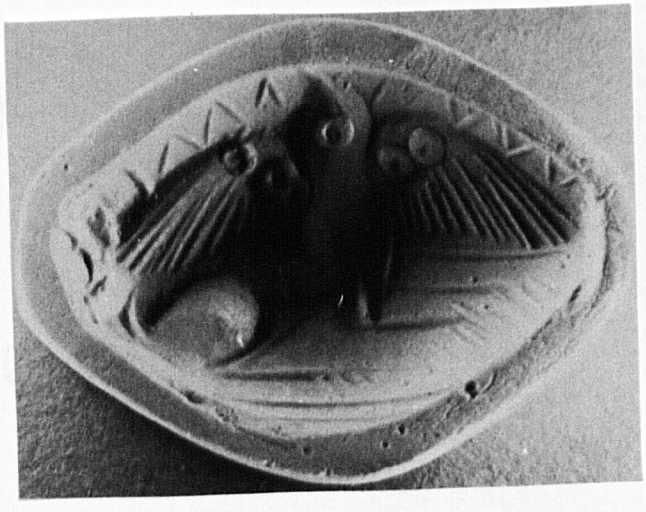

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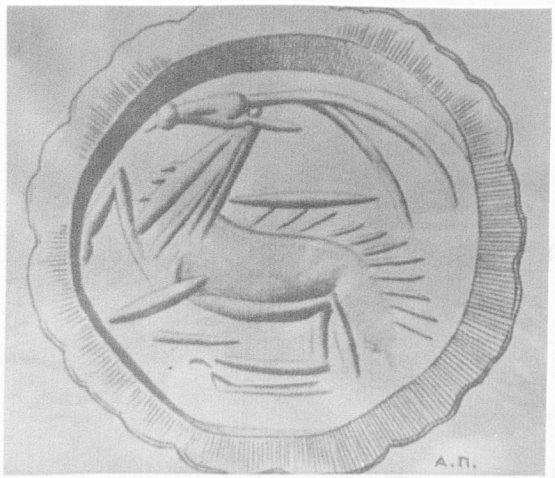

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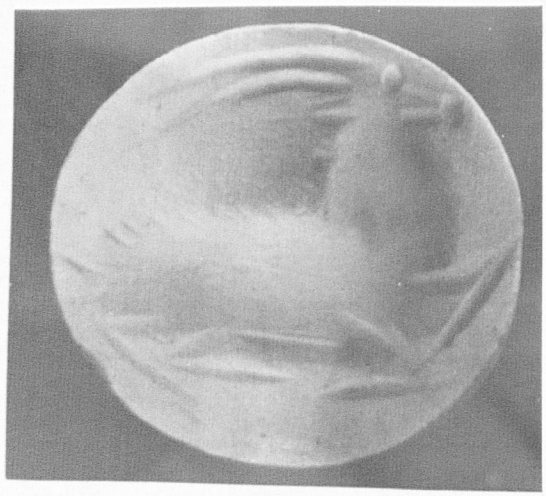

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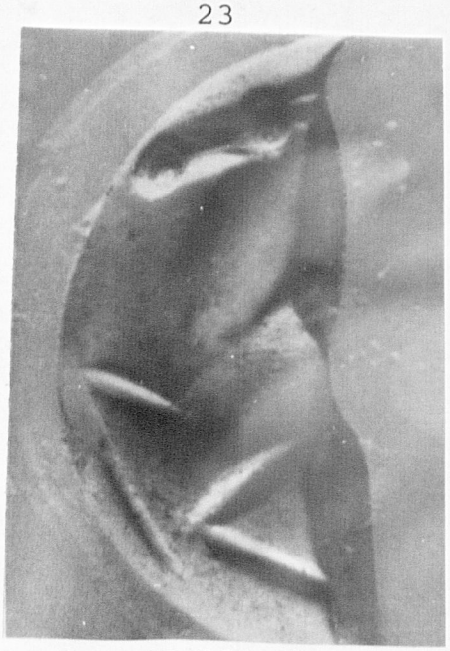

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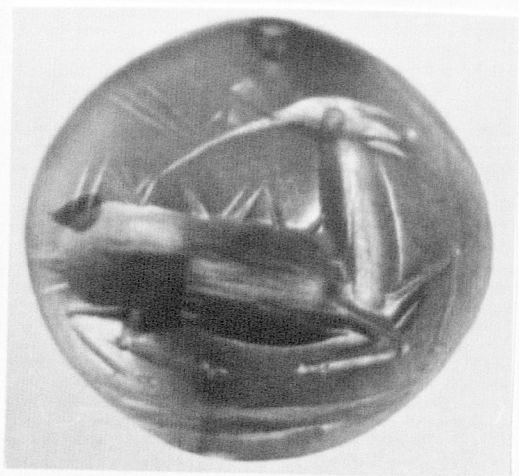

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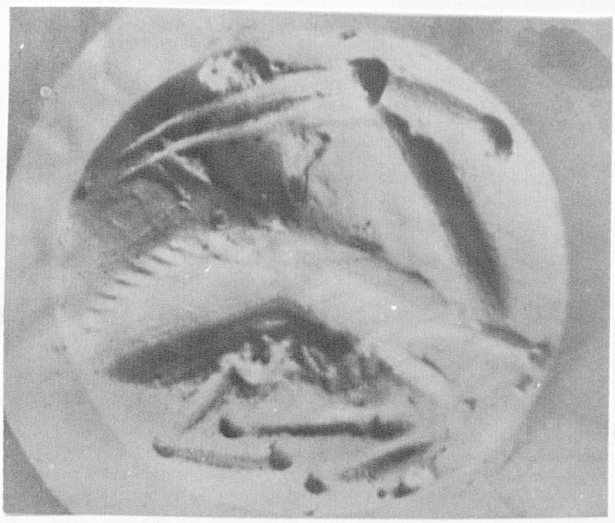

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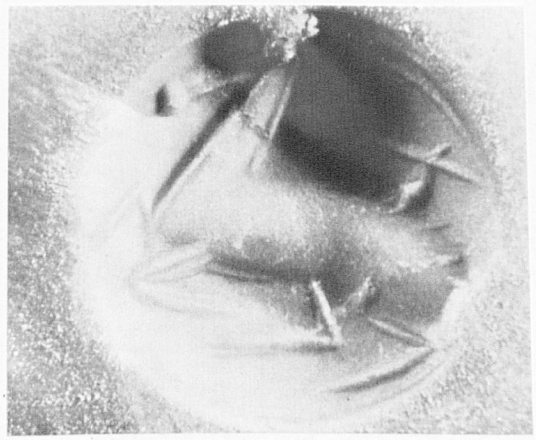

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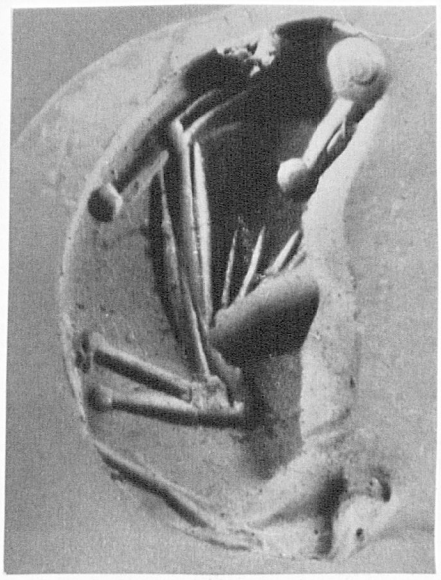

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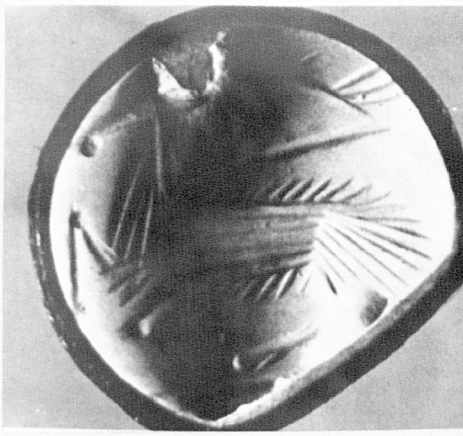

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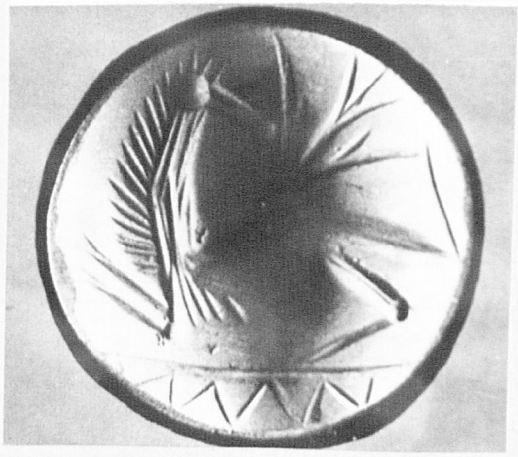

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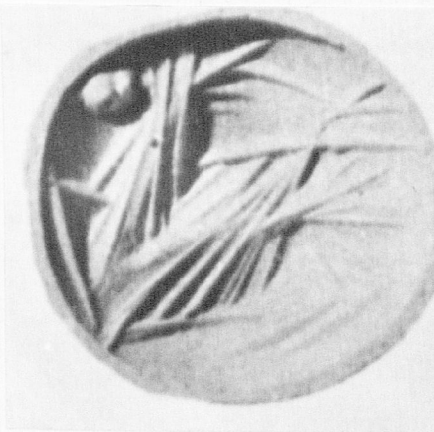

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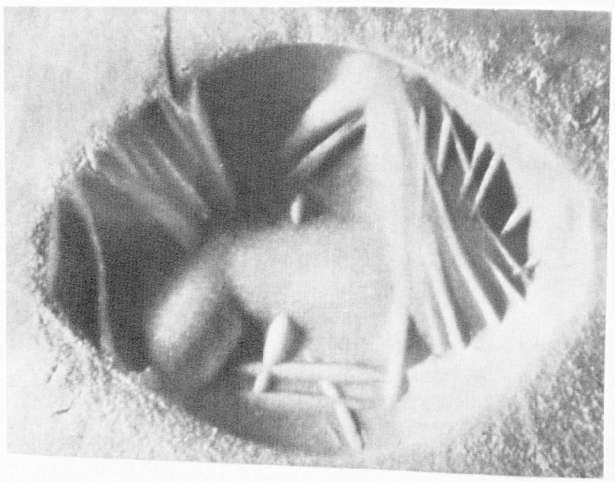

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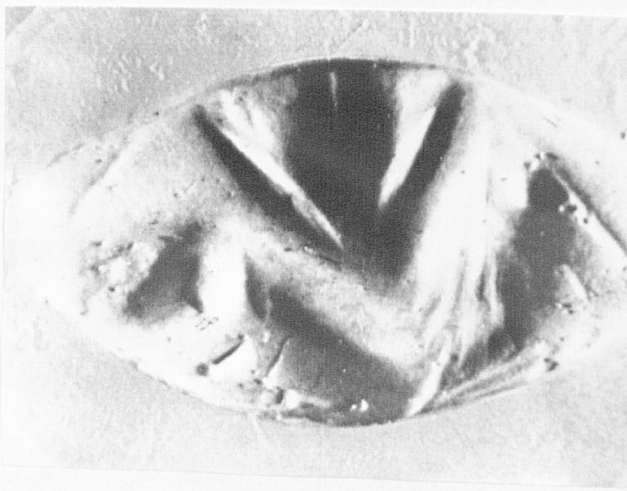

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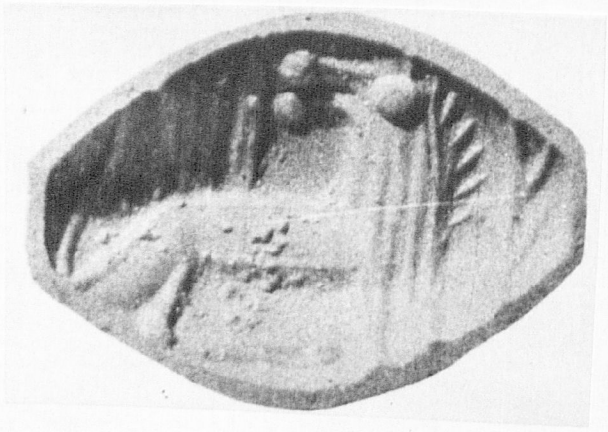

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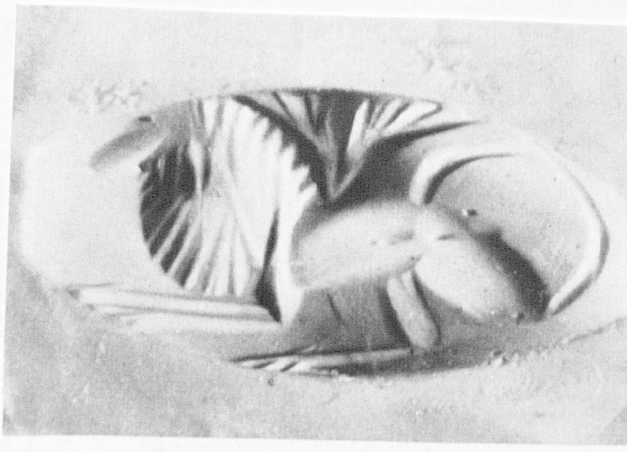

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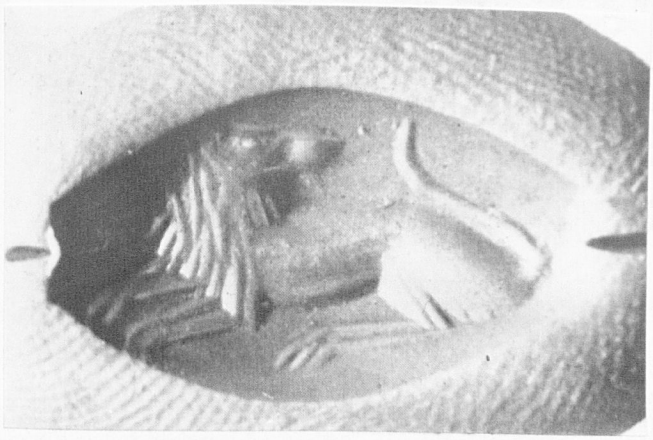

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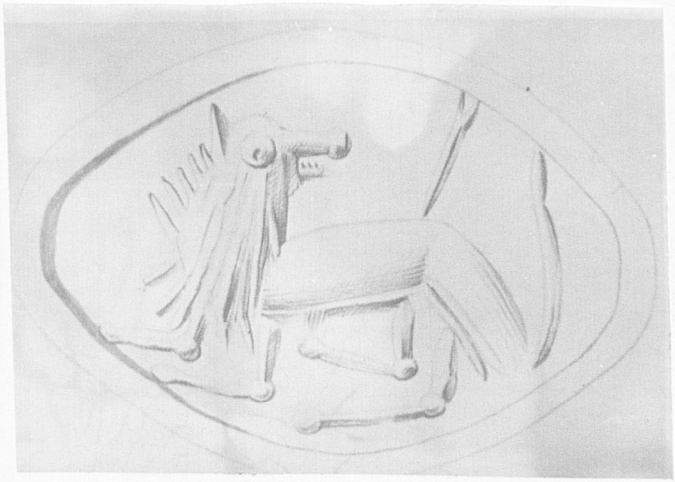

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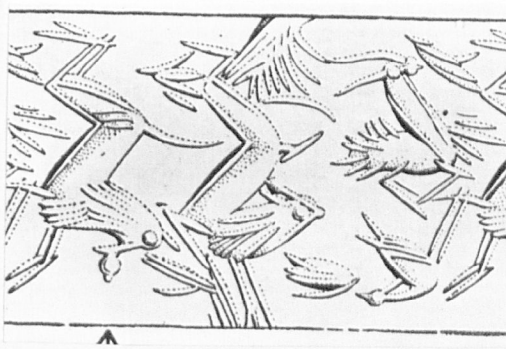

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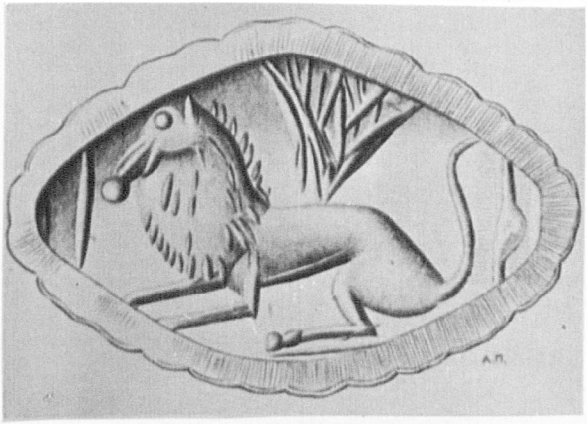

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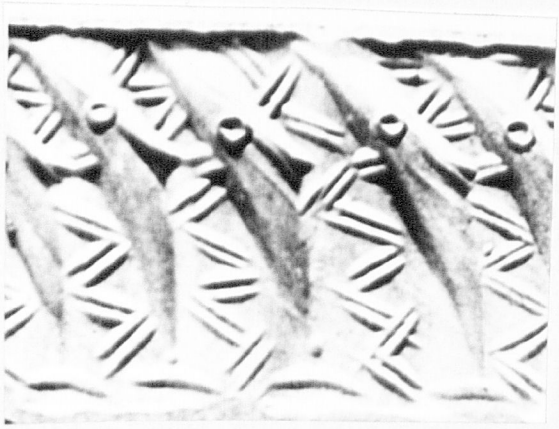

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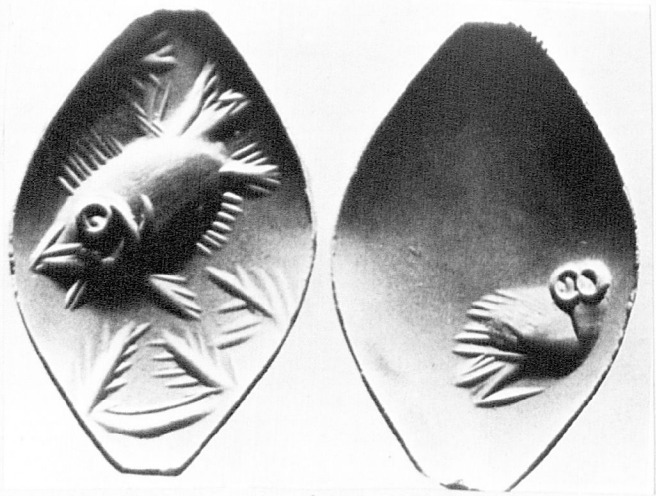

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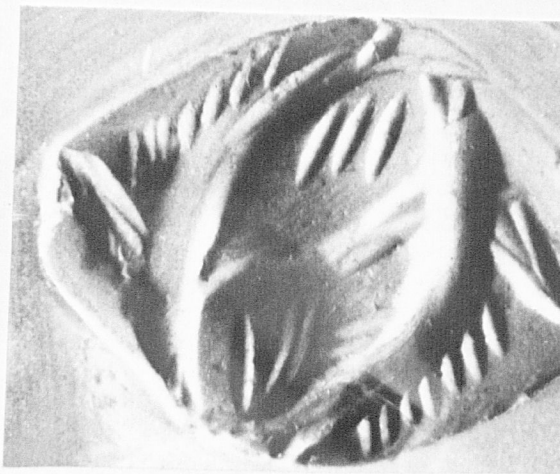

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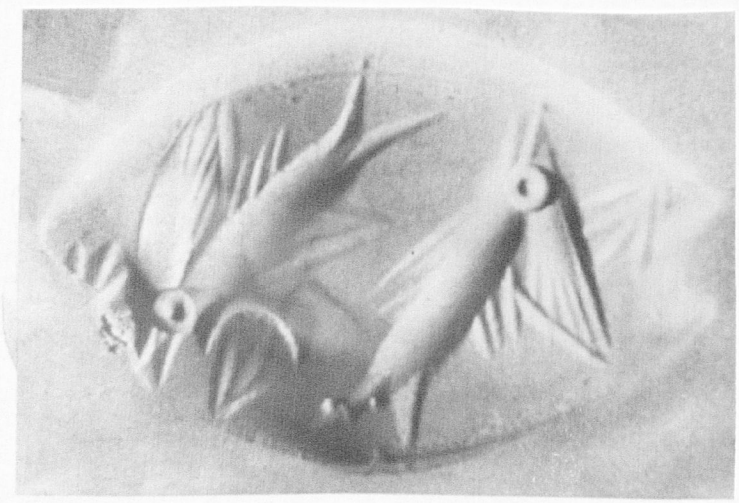

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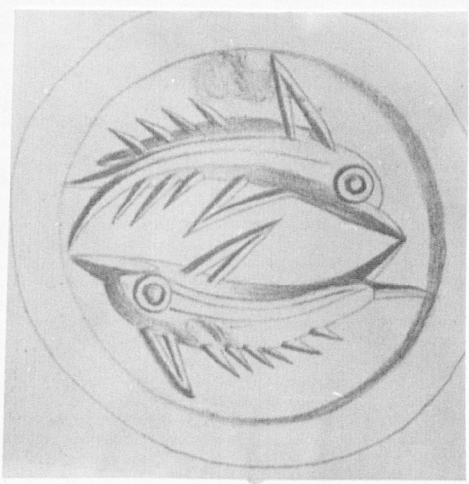

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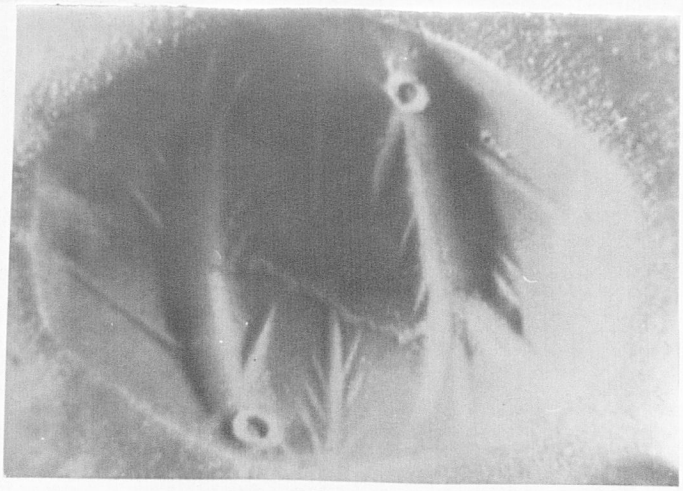

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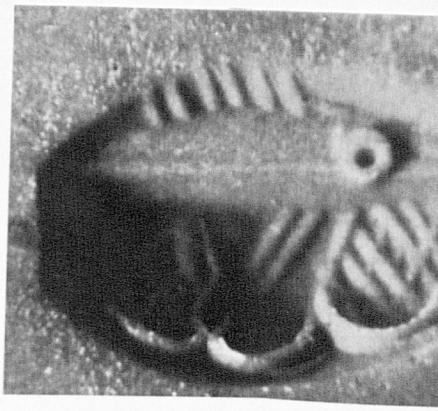

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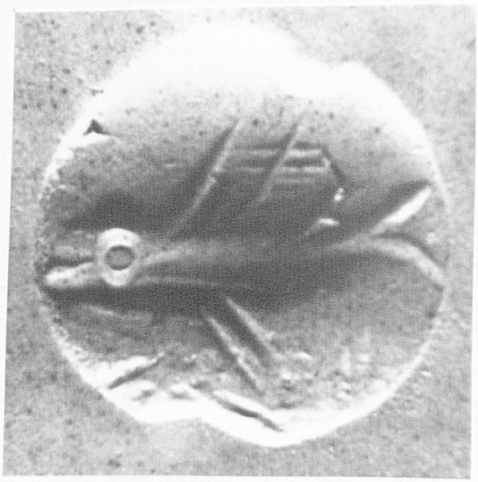

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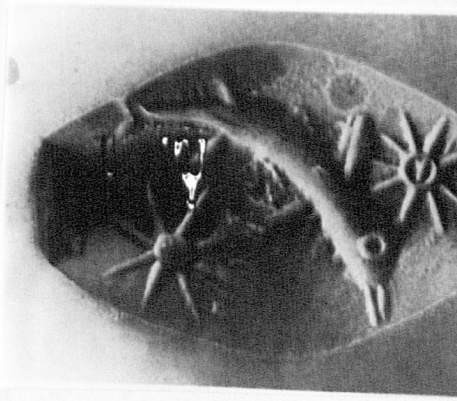

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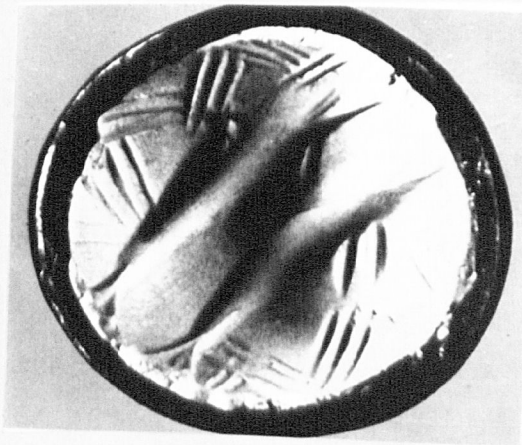

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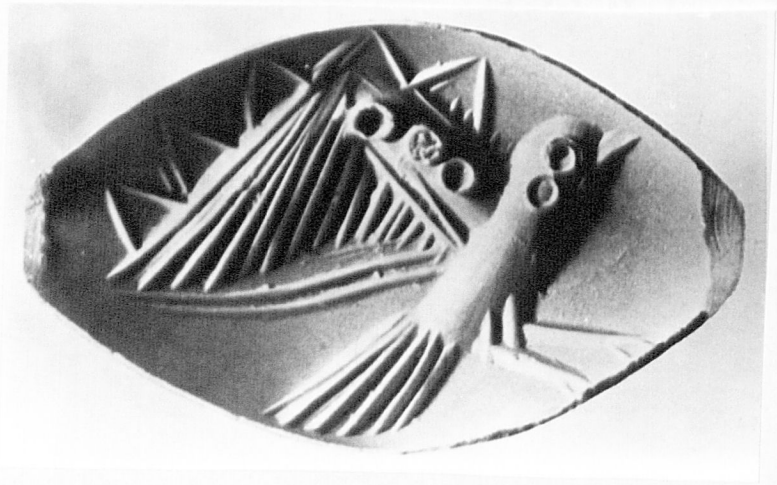

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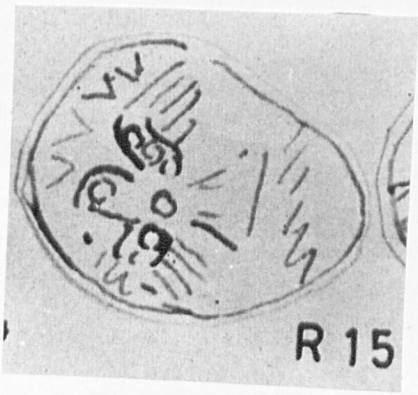

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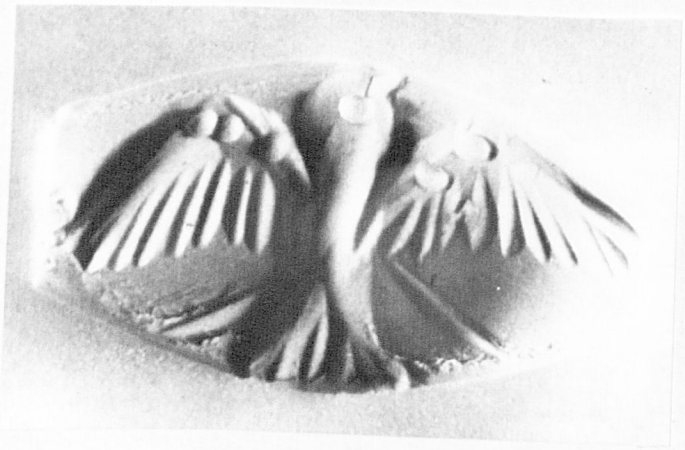

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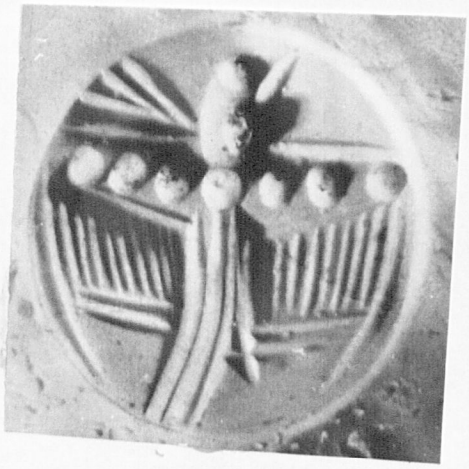

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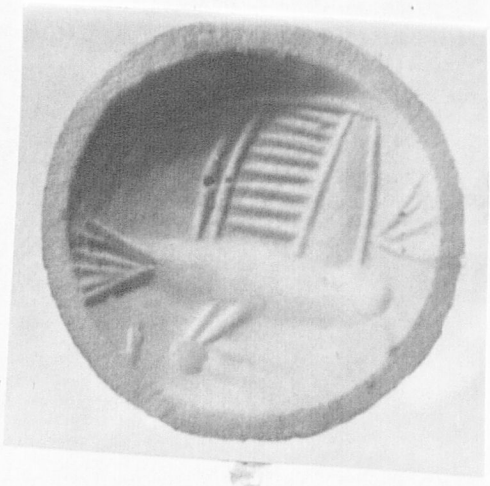

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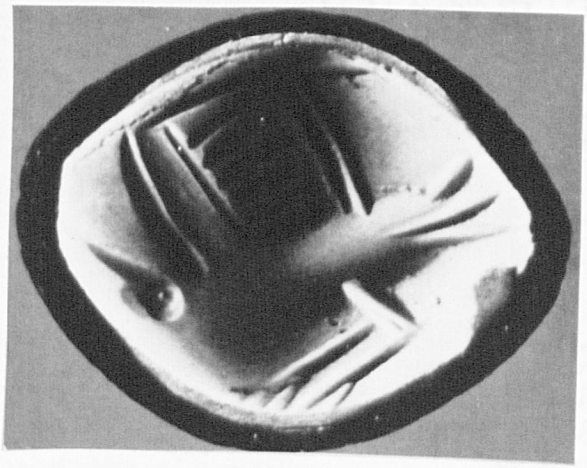

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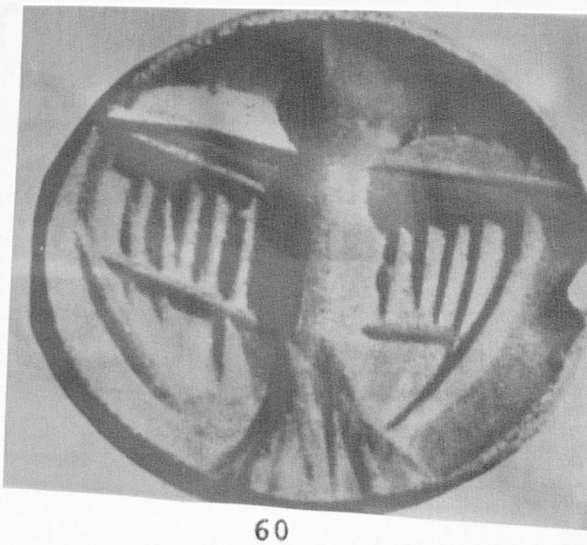

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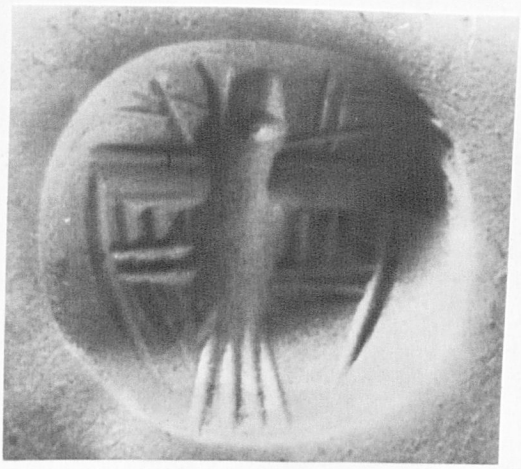

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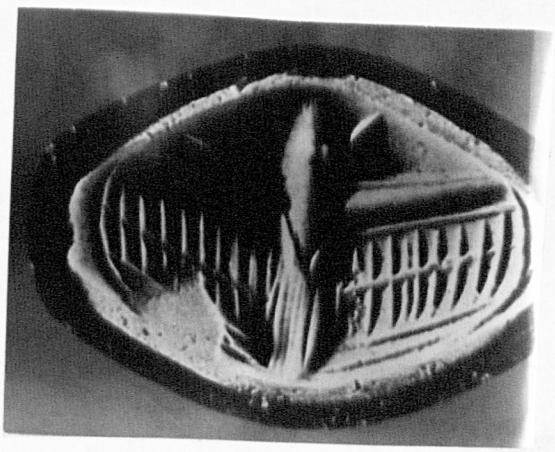

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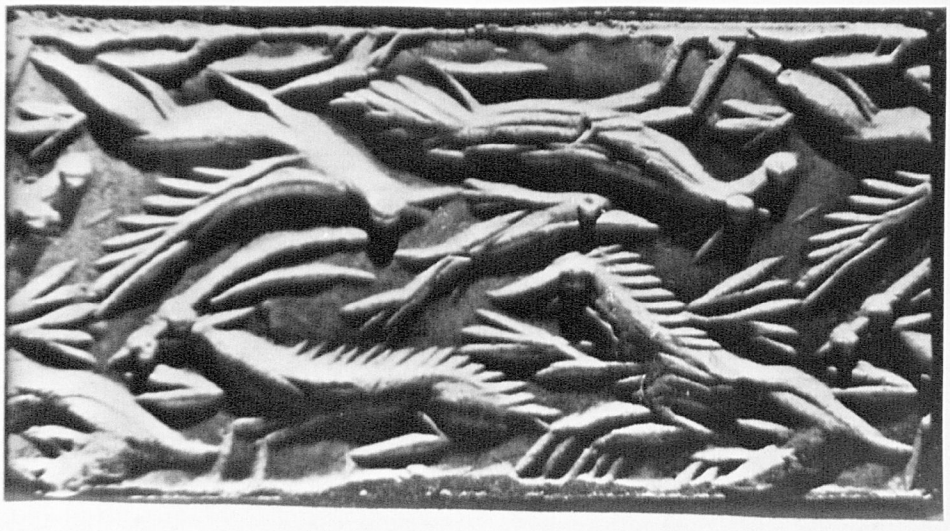

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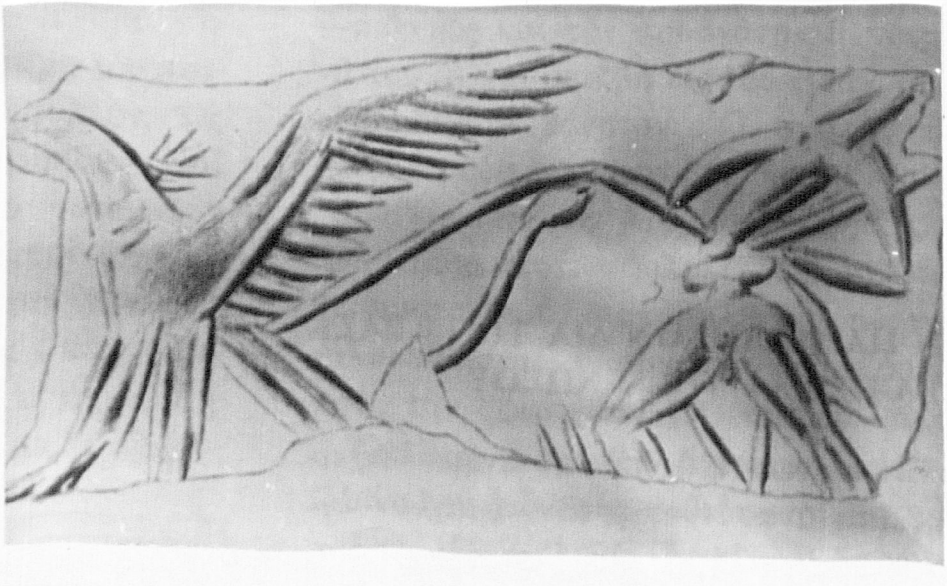

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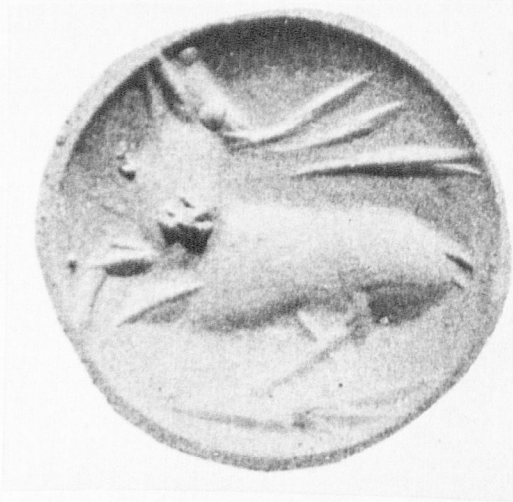

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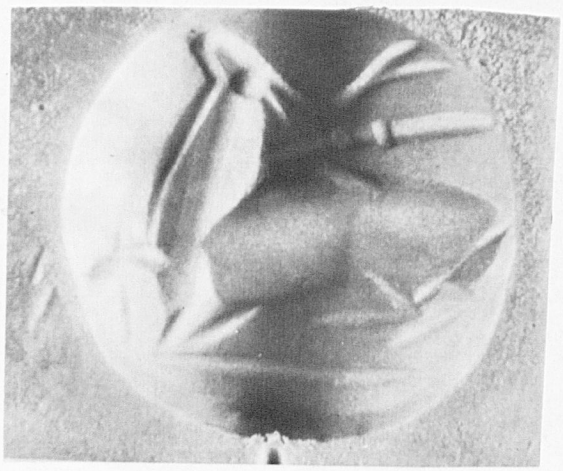

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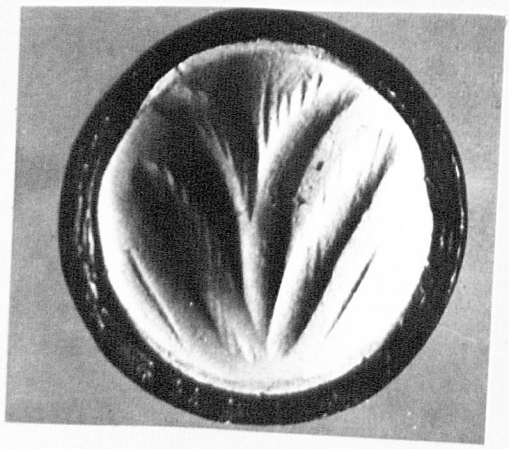

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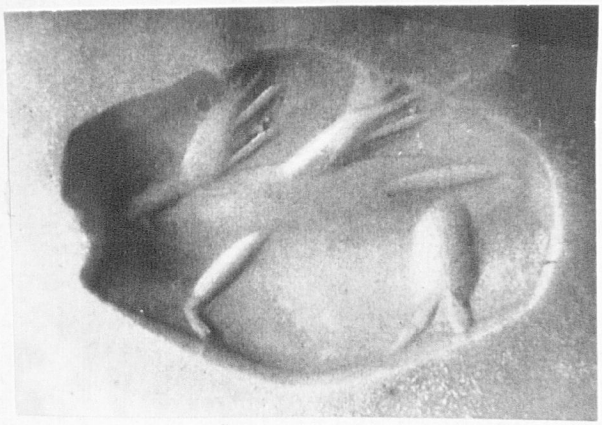

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BIBLIOGRAPHY

The works most relevant to the topic are indicated by an asterisk.

Aldred, Cyril in Charles Singer, E.J. Holmyard and A.R. Hall. A History of Technology Vol. I Oxford, 1958.

Alexiou, S. "A Parallel to the Priest King Relief from Knossos." AAA 2 (1969), 429-435.

* Ball, S.H. A Roman Book on Precious Stones. Los Angeles, 1950.

Barnett,R.D. "Early Greek and Oriental Ivories." JHS 68 (1948), 1-25.

Benson, J.L. "Aegean and the Near Eastern Seal Impressio from Cyprus" The Aegean and the Near East. Studies Presented to Hetty Goldman. Edited by Saul S. Weinberg. Locust Valley, 1956. Pp.59-79.

* _____. Review of V.E.G. Kenna, Cretan Seals in AJA 66 (1962), 416-417.

Berry, Richard W. "Cylinder Seal Mineralogy and Petrology." AJA 73 (1969), 67-69.

Betts, John H. "Some Unpublished Knossos Sealings and Sealstones." BSA 62 (1967), 27-45.

_____. "The Vapheio Gems: A Note of Clarification." AJA 70 (1966), 368-369.

* Biesantz, Hagen. Kretisch-mykenische Siegelbilder. Stilgeschichtliche und chronologische Untersuchungen. Marburg, 1954.

Bisi, Maria. "Il Grifone. Storia di un motivo iconografico nell 'antico Oriente Mediterraneo." Studi Semitici 13 (1965).

Blegen, Carl. Prosymna.2 volumes, Cambridge, 1937.

Blinkenberg, C.S. Lindos fouilles et recherche. Berlin, 1931.

Boardman, John. The Cretan Collection in Oxford. Oxford, 1961.

_____. The Date of the Knossos Tablets. Oxford, 1963.

* _____. Greek Gems and Finger Rings. London, 1970.

_____. Island Gems. London, 1963.

_____. Review of A. Sakellariou, Corpus der minoischen und mykenischen Siegel I in Gnomon 38 (1966), 264-267.

_____. Review of J.A. Sakellarakis and V.E.G. Kenna, Corpus der minoischen und mykenischen Siegel IV in Class Rev ns 21 (1971), 462-463.

_____. Review of V.E.G. Kenna, The Cretan Talismanic Stone in the Late Minoan Age. Studies in Mediterranean Archaeology 24. Lund, 1969 in Class Rev ns 22:1 (1972), 139.

Börner, Rudolf. Minerals, Rocks and Gemstones. London, 1962.

Bosenquet, R.C. "Excavations at Palaikastro. I." BSA 8 (1901-1902), 286-316.

Bosenquet, R.C. and R.M. Dawkins. "The Unpublished Objects from the Palaikastro Excavations 1902-1906." BSA Supplementary Paper No. 1. London, 1923.

Brandt, Elfriede. Antiken Gemmen in deutschen Sammlungen I. Munich, 1968.

Buchanan, Briggs. Catalogue of the Ancient Near Eastern Seals in the Ashmolean Museum I. Oxford, 1966.

* Buchholz, Hans-Günter. "The Cylinder Seal." in George Bass."Cape Gelidonya: A Bronze Age Shipwreck." TAPA ns 57 part 8, 1967, 148-159.

Caley, Earle R. and John F.C. Richards. Theophrastus on Stones. Columbus, 1956.

Chapouthier, Fernand. "L'Orient et la crète a propos d'un cylindre crétois," Arch Eph 1937 part 1, 321-324.

Chapouthier, Fernand and Rene Joly. "Fouilles exécutées a Mallia, deuxième rapport." Études crétoises 4 (1936).

Chapouthier, Fernand, Pierre Demargne with Andre Dessene "Fouilles a Mallia, exploration du palais." Etudes crétoises 12 (1962).

Davis, Norman de Garis. The Tomb of Rekh-mi-Re. New York, 1943.

* Davis, Ellen N. The Vapheio Cups and Aegean Gold and Silver Ware. 2 volumes, doctoral dissertation, New York University, 1973.

Delougaz, Pinhas, Harold D. Hill and Seton Lloyd. Private Houses and Graves in the Diyala Region. OIP 88 . Chicago, 1967.

Delplace, Christianne."Le griffon créto-mycenien." Ant Cl 36 (1967), 49-86.

Demargne, Pierre. Aegean Art, The Origins of Greek Art. London, 1964.

Dessenne, Andre. "Communication des ateliers de pierres gravées a Mallia." Academie des inscriptions et belles lettres. Comptes rendus (1957), 123-127.

_____. "Le griffon créto-mycenien: inventaire et remarqu BCH 81 (1957), 203-215.

_____. "Mallia." BCH 81 (1957), 693-695.

* Effenterre, Henri and Micheline van. Corpus der minoischen und mykenischen Siegel. IX Berlin, 1972.

Erlenmeyer, H. and Hildegard Zal-Boerlin. "Von minoischen Siegeln." Antike Kunst 4 (1961), 9-20.

Evans, Arthur J. The Prehistoric Tombs of Knossos. London, 1906.

* _____. The Palace of Minos at Knossos. 4 volumes and index London, 1921-1936.

_____. "The Tomb of the Double Axes." Archaeologia 65 (1914), 1-94.

Fimmen, Dietrich. Kretisch-mykenische Kultur. Berlin, 1924.

Forsdyke, E.J. "The Mavrospelio Cemetery at Knossos." BSA 28 (1926-1927), 243-296.

* Frankfort, Henri. Cylinder Seals. London, 1939.

_____. The First Season's Work at Tell Asmar and Khafaje. OIC 16. Chicago, 1933.

Frondel, Clifford. The System of Mineralogy of James Dwight Dana and Edward Salisbury Dana, Yale 1837-1892. III New York, 1962.

Furtwängler, A. Die antiken Gemmen. 3 volumes Berlin, 1900.

_____. Beschreibung der geschnitten Stein in Antiquarium. Berlin, 1896.

Furumark, Arne. The Chronology of Mycenaean Pottery. Stockholm, 1941.

* _____. The Mycenaean Pottery, Analysis and Classification. Stockholm, 1941.

* Gill, M.A.V. "The Knossos Sealings: Provenance and Identification." BSA 60 (1965), 58-98.

_____. "Seals and Sealings: Some Comments." Kadmos Band 5 Heft 1 (1966), 1-16.

Hall, Edith H. Excavations in Eastern Crete: Sphoungaras. Philadelphia, 1912.

Hansen, Donald P. "Some Early Dynastic I Sealings from Nippur." in Studies Presented to George M.A. Hanfmann. Edited by David Gorden Mitten, John Griffiths Pedley and Jane Ayer Scott. Mainz, 1971, pp. 47-54.

Hogarth, D.G. Hittite Seals with Particular Reference to the Ashmolean Collection. Oxford, 1920.

Hood, M.S.F. "Another Warrior-Grave from Ayios Ionnis near Knossos." BSA 51 (1956), 81-99.

_____. "Archaeology in Greece." Archaeological Reports (1958), 3-24.

_____. "Archaeology in Greece." Archaeological Reports (1959-1960), 3-26.

_____. "Archaeology in Greece." Archaeological Reports (1961-1962), 3-31.

Hood, M.S.F. and P. de Jong. "Late Minoan Warrior Graves BSA 47 (1952), 243-277.

_____. "Late Minoan Warrior Graves from Ayios Ionnis and the New Hospital." BSA 47 (1952), 243-277.

Hood, Sinclair, George Huxley and Nancy Sanders. "A Minoan Cemetery on Upper Gypsades." BSA 53-54 (1958 1959), 195-262.

Hutchinson, Richard Wyatt. Prehistoric Crete. Baltimore, 1962.

_____. "Unpublished Objects from Palaikastro and Praisos." BSA 40 (1939-1940), 38-50.

Jakovides, Sp. "Excavated Mycenaean Graves at Perati." Archaiologike Hetaireia Praktika (o953), 88-102.

_____. "Mycenaean Graves of Perati." Archaiologikon Deltion 19 (1964), 87-95.

Kantor, Helene. The Aegean and the Orient in the Second Millenium. Archaeological Institute of America Monograph Number 1. Bloomingdale, 1947.

Karajian, H. Mineral Resources of Armenia and Anatolia. New York, 1920.

Kenna, V.E.G. "Ancient Crete and the Use of the Cylinder Seal." AJA 72 (1968), 321-326.

_____. "The Art of the Cretan Seal." AAA 4 (1971), 130-135.

* _____. Corpus der minoischen und mykenischen Siegel. VII Berlin, 1967.

* _____. Corpus der minoischen und mykenischen Siegel. VIII Berlin, 1966.

* _____. Corpus der minoischen und mykenischen Siegel. XII Berlin, 1972.

_____. "Cretan and Mycenaean Seals in North America." AJA 68 (1964), 1-12.

* _____. Cretan Seals. Oxford, 1960.

* _____. The Cretan Talismanic Stone in the Late Minoan Age. Studies in Mediterranean Archaeology 24. Lund, 1969.

_____. "The Historical Implications of Cretan Seals." AA (1964), 911-954.

_____. in Letters to the Editor. AB 44 (1962), 168-169.

_____. "Seals and Script with Special Reference to Ancient Crete." Kadmos 1 (1962), 1-15.

_____. "Seals and Script II." Kadmos 2 (1963), 1-6.

_____. "Seals and Script III. Cretan Seal Use and the Dating of Linear Script B." Kadmos 3 (1964),29-57.

_____. "The Vapheio Gems - A Further Comment." AJA 71 (1967), 409-410.

Keramopoilloi, Antonio. "Mycenaean Graves in Aegina and in Thebes." Arch Eph (1910), 178-251.

Kontoleon,Nikolaos M. "Naxos Excavation." Archaeologike Hetaireia Praktika (1965), 167-182.

Lacy, A.D. Greek Pottery in the Bronze Age. London, 1967.

Lamb, Winifred. Excavations at Thermi in Lesbos. Cambridge, 1946.

Levi, Doro. "L'Archivo di Cretule a Festòs." Annuario 35-36 (1957-1958), 7-192.

_____. "Le Cretule di Haghia Triada e di Zakro." Annuario 8-9 (1925-1926), 71-201.

_____. "La Tomba A Tholos di Kamilari presso a Festos." Annuario 39-40 (1961-1962), 7-148.

Lucas, Alfred. Ancient Egyptian Materials and Industries. London, 1962.

Marinatos, Spyridon. "Environs de Pylos." BCH 81 (1957), 558-565.

_____. Excavations at Pylos." Archaeologike Hetaireia Praktika (1956), 202-206.

_____. (translated by J. Boardman) "Excavations near Pylos, 1956." Antiquity 31 (1957), 97-100.

_____. "Pylos." Archaiologike Hetaireia to Ergon (1956), 90-96.

_____. Thera V. Athens, 1972.

Marinatos, Spyridon and Max Hirmer. Crete and Mycenae. New York, 1960.

* Matz, Friedrich. Frühkretische Siegel. Berlin, 1928.

_____. "Die kretisch-mykenische Kunst Form und Entwicklung." Die Antike 11 (1935), 171-210.

* Mellink, Machteld. Review of H. Biesantz, Kretisch-mykenische Siegelbilder in AJA 59 (1955), 337-338.

Mylonas, George. Mycenae and the Mycenaean Age. Princeton, 1966.

Newberry, Percy. The Life of Rekhmara. Westminster, 1900.

Nilsson, P. The Minoan-Mycenaean Religion and its Survival in Greek Religion. Lund, 1968.

Palache, Charles, Harry Berman and Clifford Frondel. The System of Mineralogy. I New York, 1966.

Persson, Axel Waldemar. The Religion of Greece in Prehistoric Times. Los Angeles, 1942.

_____. The Royal Tombs at Dendra. Lund, 1931.

Petrie, William Flinders. Tools and Weapons. London, 1917.

* Pliny, Natural History. London, 1962 by D.E. Eichholz.

Porada, Edith. "The Cylinder Seals of the Late Cypriot Bronze Age." AJA 52 (1948), 178-198.

Reusch, Helga. "Zum Wandschmuck des Thronsaales in Knossos." in Minoica. Festschrift Sundwall Edited by E. Grumbach. Berlin, 1958, 334-358.

Richter, G.M.A. Catalogue of Engraved Gems of the Class
sical Style. New York, 1920.

* Sakellarakis, J.A. and V.E.G. Kenna. Corpus der minoisc
und mykenischen Siegel. IV Berlin, 1964.

* Sakellariou, Agnes. Corpus der minoischen und mykenisch
Siegel. I Berlin, 1964.

_____. Mykenaike Sphragidoglyphia. Athens, 1966.

Schachermeyr, Fritz. Ägäis und Orient: die Überseeische
Kulturbeziehungen von Kreta und Mykenai mit Ägyp-
ten, der Levante und Kleinasien unter besonderer
Berücksichtigung des 2. Jahrtausends v. Chr. Os-
terreichische Akademie der Wissenschaften. Philos-
ophisch-Historische Klasse. Denkschriften 93. Vier
1967.

_____. "Forschungsbericht zur ägäischen Frühzeit, 1957-
1960." AA 77 (1962), 271-276.

Schiering, Wolfgang. Review of Sakellarakis and Kenna,
Corpus der minoischen und mykenischen Siegel. IV i
Gnomon 44 (1972), 417-420.

_____. Review of V.E.G. Kenna, The Cretan Talismanic
Stone in the Late Minoan Age. Studies in Medit-
eranean Archaeology 24, Lund, 1969 in Gnomon 44
(1972), 481-486.

_____. Review of V.E.G. Kenna. Corpus der minoischen
und mykenischen Siegel. VII and VIII in Gnomon
43 (1971), 54-60.

Seager, R.B. Explorations in the Island of Mochlos.
New York, 1912.

Stubbings, Frank H. The Aegean Bronze Age, CAH 4.
Cambridge, 1962.

Szabo, M. Review of V.E.G. Kenna. Corpus der minoischen und mykenischen Siegel VII in AJA 73 (1969), 475-476.

Szabo, Nicholas. "Quelques monuments de la glyptique crétois-mycénienne." Bulletin du Musée Hongrois des Beaux-Arts 29 (1966), 3-7.

Tsountas, Kr. "Tomb Excavations at Mycenae." Arch Eph (1880), 119-197.

Vanderpool, Eugene. "News Letter from Greece: Pylos." AJA 61 (1957), 283.

Vermeule, Emily. Greece in the Bronze Age. Chicago, 1964.

_____. in Letters to the Editor. AB 44 (1962), 169-170.

_____. Review of Sakellariou. Corpus der minoischen und mykenischen Siegel I in AJA 70 (1966), 201-202.

_____. Review of V.E.G. Kenna. Corpus der minoischen und mykenischen Siegel VIII in AJA 72 (1968), 292.

* _____. Review of V.E.G. Kenna. Cretan Seals in AB 43 (1961), 241-245.

Vernier, M. Émile. La bijouterie et la joallerie égyptiennes. Cairo, 1907.

Wace, A.J.B. Chamber Tombs at Mycenae in Archaeologia 82 (1932), 1-242.

Walters, Henry Beauchamp. Catalogue of the Engraved Gems and Cameos, Greek, Etruscan and Roman. London, 1926.

Younger, John G. "The Vapheio Gems: A Reconsideration of the Find-Spots." AJA 77 (1973), 338-340.

Xanthoudides, Stephanos. "From Crete." Arch Eph (1907), 10-186.

* Xénaki-Sakellariou, Agnes. "Les cachets minoèns de la collection Giamalakis." Études crétoises 10 (1958), 1-95.

Zazoff, P. "Gemmen der Privatsammlung Dr. J. Jantzen, Bremen." AA 1 (1963), 41-88.

Zervos, Christian. L'Art de la crète neolithique et minoenne. Paris, 1956.

Zwierlein-Diehl, Erika. Antiken Gemmen in deutschen Sammlungen II Munich, 1969.