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P. Yule**

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Paul Yule: *Early Cretan Seals: A Study of Chronology*, Marburger Studien zur Vor- und Frühgeschichte Band 4; Mainz: Verlag Philipp von Zabern 1980, XIV, 246 Seiten.

It has now been over eight years since Paul Yule's book, *Early Cretan Seals* (hereafter, ECS)¹, was published, initially conceived as a PhD dissertation for the Institute of Fine Arts, New York University (1979).

As a dissertation, ECS would have made a fine quarry from which numerous insightful studies could have been mined, but as several reviewers have remarked (see Appendices I and II), the book contains numerous errors ranging from petty typographical misprints to the more irritating incorrect citations. Since scholars are beginning to refer to ECS in their own work,² it might be worthwhile to assess its reliability and major contributions.

¹) For standard abbreviations, consult the *American Journal of Archaeology* 90 (1986) 381-394; in addition, the following are also used:

- AGDS = Antike Gemmen in deutschen Sammlungen.
 CMCG = A Sakellariou, *Les Cachets minoens de la collection Giamalakis* (Etudes Crétoises X; Librairie Orientaliste Paul Geuthner, Paris 1958).
 CMS = Corpus der minoischen und mykenischen Siegel (Berlin 1964 - present).
 CMS Beiheft 0 = F. Matz, ed., *Die kretisch-mykenische Glyptik und ihre gegenwärtigen Probleme* (Harald Boldt Verlag KG; Boppard, 1974).
 CMS Beiheft 1 = Wolf-Dietrich Niemeier, ed., *Studien zur minoischen und helladischen Glyptik* (Gebr. Mann Verlag; Berlin, 1981).
 CMS Beiheft 2 = Artemis Onassoglou, *Die "Talismanischen" Siegel* (Gebr. Mann Verlag; Berlin, 1985).
 CS = VEG Kenna, *Cretan Seals with a Catalogue of the Minoan Gems in the Ashmolean Museum* (Oxford UP, 1960).
 DH = Diantha S. Haviland, *The Early Group of Cretan Seals* (PhD dissertation for Bryn Mawr College, 1964; University Microfilms 66-12, 804).
 ECS = P. Yule, *Early Cretan Seals. A Study of Chronology* (Verlag Philipp von Zabern; Mainz, 1980).
 S = Shape Class.
 ES = Early Seals, seals manufactured before ca. 1725 B.C.
 HM = Herakleion Museum.
 HMs = sealings in the Herakleion museum.
 KSPI = MAV Gill, "The Knossos Sealings. Provenance and Identification," *BSA* 60 (1965) 58-98.
 LS = Late Seals, seals manufactured between ca. 1550 B.C. and ca. 1325 B.C.
 MS = Middle Seals, seals manufactured between ca. 1725 B.C. and ca. 1550 B.C.

Seals catalogued in the CMS volumes are listed here merely by volume number in Roman numerals then the seal number in Arabic numerals, e.g., II 1.251 refers to the ivory stamp cylinder no. 251 in CMS volume II, part 1: Iraklion, Archäologisches Museum. *Die Siegel der Vorpalastzeit*.

All dimensions are in centimeters.

²) The first in-depth use of ECS seems to occur in G. Walberg 1986, which relates the two art media, EM and MM vase painting and contemporary seal engraving. A few errors in ECS have unfortunately crept into her study, e.g., seal II 2.77 (ECS Motif 18.1; Walberg, p. 54 fig. 75 a) does not carry a hippopotamus, but, as Poursat and others point out, a bull. Since ECS does not include most Mainland or Island material, Walberg misses the star motifs that occur on seals earlier than the Phaistos sealings, e.g., V 476 from EH/EC II Ayia Irini in Keos. And the closest parallel to the sealing Kn KSPI L24, said to be from the Temple Repositories (dated MM II in ECS), is I 257 from the Vapheio Tholos

For reasons of economy this review will not attempt to go through ECS in every detail; instead, it will first give some general comments on the book's other sections and then look closely at the two chapters on stylistic groups (Ch.7) and shape classes (Ch.3). It is hoped that such a broad and then a narrow analysis will give a sample of the many problems that bedevil this book as well as the many insightful conclusions that redeem it.

It must be said first that, in spite of the many errors that can annoy the scholar and mislead the casual reader, the basic chronology is correct, especially for the period prior to ca. 1700 B.C., though this chronology can only be extracted from ECS when considerable and careful attention is paid to the two diagnostic factors: style and sealshape.

In Ch.3 PY defines the shapes accurately, lists their examples, separates them into subclasses based on material, and demonstrates clear chronological lifespans, though for sealshapes with few and heterogeneous examples the lifespans are postulated too confidently. In Ch.7 PY identifies thirteen stylistic groups and places them in a loose chronological order suggested by their members that come from dated contexts.

Since the stylistic groups often reveal preferences for certain shapes, they can indicate periods of popularity for them. Unfortunately, however, PY does not correlate the shape classes with the stylistic groups in detail, though such an analysis does produce a firm chronology for this extremely problematic corpus of material.

The beginnings of Aegean glyptic lie in the Neolithic period; its end occurs within the second half of the XIVth century, say ca. 1325 B.C. Several technical factors can be used to divide this total material into four chronological groups, Neolithic, and, for the Bronze Age, Early, Middle, and Late seals, abbreviated here ES, MS, and LS.³⁾

LS seals are characterized by several factors: the appearance of sealstone artists on the mainland after a hiatus in the Middle Helladic period; the use of moulds to mass-produce glass seals and metal fingerings; a restriction in shape from the earlier welter to the three biconvex forms, the lentoid, amygdaloid, and cushion, though a few other shapes were also occasionally produced; and a similar standardization of the iconography with an emphasis on studies of animals, especially the lion, bull, and agrimi, in approximately

cist (LH I context); perhaps the sealing is later but became mixed in with earlier material in the storerooms, a situation that was fairly common.

Walberg seems to have missed the motif of a woman with body formed from a paisley that appears not only on pots (p.18 fig.13; WM 25(vi)1-3) but also on the seal CS 77.

³⁾ I apologize for the introduction of yet another set of terms, but with this early material I feel it is necessary to go back to first principles, a typological analysis based on seal shape, iconography, and style and an archaeological analysis based on seals from dated contexts; together, these two analyses may produce a chronology. Several scholars, however, have passed over such analyses to date seals confidently and subjectively to specific and narrowly defined ceramic periods, thereby giving them not only a date but also a place of origin.

20 common poses. To the reviewer, the first generation of Late Bronze Age artists (ca. 1550–1500 B.C.) includes those who worked in the Cretan Popular style and those who formed the Mycenaean-Vapheio Lion and the Isopata Ring groups (Younger 1983 & 1984).

ECS focusses on earlier seals and techniques. *J. H. Betts* (1987) has presented the criteria for dividing the seals manufactured during the Early and Middle Bronze Ages into two phases. The innovation of the horizontal bow-lathe marks the division between ES seals and MS seals. This tool seems to have consisted of two vertical rods, set upright and forked at the top to support a horizontal rod which could be rotated with a bow. The rod itself could have been a hollow reed, like that attested in Egypt, and rotated to drill small circles. But it also could have been solid with wheels and drills, probably of metal, attached at one end.⁴) In any case, it would have allowed the artist to drill hard stones (stones with a hardness of ca. 6.5+ or 7+ on the Mohs scale).⁵) It is possible that wood drills briefly preceded metal drills; the marks these left (e.g. X 46, and accompanied by marks of the hollow, metal?, drill on II 2.44 and IV 42) are remarkably similar to those produced by the experiments of *Gorelick* and *Gwinnett* (1978).

The date of the introduction of the horizontal bow-lathe can be fairly narrowly pinpointed. On the one hand, only a few pieces from the Mallia workshop and, on the other, the majority of seals that impressed the Phaistos sealings are all drilled seals of hard stones; the fact that these two deposits share only a few motifs, styles, and sealshapes means that some amount of time elapsed between them during which the new drilling techniques were perfected and new motifs and perhaps new shapes were invented. Only the beginning and only the end of the transition from ES seals to MS seals, therefore, can be seen, a transition that seems to have occurred sometime late in MM II, ca. 1750–1700 B.C., say, for convenience, during a period in and around 1725 B.C.

Since the new drilling technique that characterizes MS and LS seals allowed the artist freer movement and better and finer control over his engraving, stylistic analyses have produced a more successful general chronology for these seals; the artists of the ES seals, however, could only gouge and chisel their seals in softstones and incise their seals in bone or ivory, but they compensated for their limited stylistic expression by creating a wide range of shapes and motifs. The very variety of shapes and motifs, however, has often daunted the scholar; this review accordingly addresses this challenge, and it gives therefore only a cursory glance toward MS seals.

⁴) J. L. Caskey, with his usual insight, first hinted at the date for this technique in 1979 (1986: 18). The tombstone of Doros the ringstone engraver of Philadelphia, who died in the second century A.D., provides a relief depicting the tool of his trade. For a recent reconstruction of what this horizontal bow-lathe might have looked like, see Younger, Expedition 23.4 (Summer 1981) 32 fig. 2.

⁵) Conglomerates and basalts (including lapis lacedaemonius and lazuli) and silicates (including agate, cornelian and its cousins sard and sardonyx, rock crystal, amethyst, etc.).

I. General Comments on ECS, chapter by chapter (excluding Chs. 3 and 7)

Foreword

The Foreword sets out PY's method: since "no single criterion is adequate to date early Cretan seals," it is necessary first to define the major criteria (shapes [Classes], motifs [Iconography], and the detectable stylistic groups [Groups]), and to catalogue the extant examples that comprise each.

Although PY nowhere really discusses how a chronology for this early material can be devised, his procedure nonetheless can be inferred, following, as it seems to do, the reviewer's own PhD dissertation (1973). Each Class, motif in the Iconography, and stylistic Group is analyzed separately for its salient characteristics; a dated context provides a *terminus post quem non* for the seals excavated from them, and these seals can be used to create a chronological order for the Classes, Motifs, and Groups which include them; finally, through comparison, other classes, motifs, and groups without seals from dated contexts can be included to create a general chronology.

ECS discusses shape before style; as it turns out, however, the stylistic discussion presents a clear chronological order, fairly independent of seal-shape. If PY had presented this order before he discussed shape, the general chronology would have emerged.

PY compiles the material, arranges it logically, and assigns context dates, usually rather broad, to approximately one quarter of his material. Many of the seals with datable contexts have been recovered from the Messara tholoi, which were in use for a long time as communal burial chambers; when a new corpse was laid out, earlier offerings were usually swept to the side. Seals usually cannot be matched with their original deposits and therefore must be given context dates that reflect the total span of the tomb's use. Nonetheless, these dates, if used with care, can indeed be valuable. See the comments on Chapter 2, below, and Appendix II for emendations to PY's list.

Chapter 1: State of Research

This chapter outlines the previous scholarship. It is necessarily short, for there has been a comparative lack of attention paid to this early material.

Early in this century, when the artifacts of the Minoan civilization were just beginning to be recognized, *Evans* quite naturally subdivided the entire general development of Minoan society into phases where ceramic changes and stratigraphical distinctions coincided, and he devised convenient terms based on the tripartite typological system he had inherited primarily from scholars like his father. Accordingly, he arranges (PM I, 200–202, 271–285, 669–721) seals in a linear scheme that goes from crude (early) to naturalistic (late).

Matz (1928) derived stylistic conclusions about early Minoan art from his analysis of 262 ES seals; since he did not include MS material, he cannot be faulted for the small number of seals he catalogues.

Sakellariou (1958a) published the Giamalakis collection, arranging, for the first time since Evans, material covering the entire Bronze Age; she was also the first to arrange this material within the broad 'Palatial' phases established by *Levi*, thereby wresting seals away from pottery. In the same year she published a seminal study on prisms, pointing out their northeast Cretan origin, now known to have been Mallia.

Kenna, who was primarily responsible for keeping the study of sealstones alive in the 1950's and 1960's, resuscitated Evans's linear development; he published the Ashmolean collection (1960), prefacing the catalogue with a lengthy essay on the development of Cretan seals and emphasizing a functional difference between north Crete (i. e., the prisms are actually amulets) and the Messara (i. e., the ivory seals were actually used for sealing), a difference that has not yet been demonstrated; his chronology arbitrarily places "fine" seals late and "poor" seals early. In his CMS volumes (1966-1974) he dated seals subjectively to narrow ceramic periods.

Boardman (1970) gave a sensible overview of Aegean glyptic and identified a few stylistic groups which he arranged chronologically, avoiding, however, ceramic dates.

At the third Cretological Congress (1976) *Pini* listed early seals from datable contexts (1981) and included in this chronological scheme other material with provenience unknown but in similar shapes and carrying similar motifs; this last study, combined with *Sakellarakis's* inclusion (1980) of datable material from Archanes, directly sets the stage for ECS.

PY unfortunately gives extremely short shrift to his predecessor, *Diantha Haviland*, whose 1964 dissertation, *The Early Group of Cretan Seals*, has never received much attention. Her catalogue, however, was both large, organizing 717 seals out of an approximately 1400 known to her, and up-to-date, incorporating the then recently excavated Mallia workshop and the Lebena Tholoi; and her method of analyzing shape separately from motif was certainly prescient, at times anticipating several modern conclusions. The most notable of these separates the carved ivory and cut steatite seals from the drilled seals in hard stones and focusses on the earlier phase; in contrast, PY combines the two periods without recognizing clearly the differences in technique that distinguish them.

Chapter 2: Ceramic Chronology & Stratigraphy

This chapter catalogues the seals from dated contexts, based on and supplementing *Pini* 1981. The resulting list is fairly reliable. I draw attention, however, to the following, gleaned from my own observations and those of *Pini* 1981, *Poursat's* review, and *Sakellarakis* 1980:

EM II - add: Archanes Tholos E, lower level (Sakellarakis 1980: fig.4; evidence not stated).

EM II, EM III - Pini relocates CMS II 1.474 from Mochlos, the Settlement, here (removing it from EM III, as PY has it) and adds Mochlos, T. II: CMS II 1.472 & 473.

EM III - add: Hood & Kenna 1973, a sealing from Knossos, area of the Early Minoan Houses; and Archanes Tholos C (Sakellarakis 1980; fig.5; evidence not stated).

EM III/MM IA - Pini 1981: 423 dates the Vorou Tholos A material here (not in MM IA - MM IB/II as PY has it).

MM IA - add: Archanes Tholos E, upper level (Sakellarakis 1980; fig.7; evidence not stated).

EM II, EM III?, MM I, MM Ib - omit CMS II 1.366?

MM II - add: Mallia, Quartier Mu (EtCret 26); and omit CMS II 2.109, since it does not come from the Mallia Seal Workshop.

MM IIB - omit the Hieroglyphic Deposit; it is not a true deposit but rather an assemblage of material found in a general vicinity with no closed deposit of pottery to date it.

Chapter 4: Decorative Elements

This chapter identifies 57 basic motifs and then discusses those (Motif 58) that are combinations, abstractions, or pictorializations of motifs.

A discussion of each motif precedes a list of examples. PY acknowledges that these lists are not exhaustive, merely representative; they do not even present all the motifs that appear on all the seals listed by shape in the preceding chapter. Each list of motifs is divided into numbered sub-lists, much like *Furumark's* lists that identify the classes of pots that carry his motifs; PY's sub-lists, however, bring together examples that share formal traits and are ordered according to the number of their examples, not according to any typological, taxonomic, or stylistic feature.

While this chapter usefully identifies the major types of motifs, it does little else. While Ch.3 allows us to see the development of some sealshapes and to order all of them into some kind of chronology, this chapter on motifs provides no information that would allow us to determine an iconographic or stylistic/technical development for any motif or the popularity of any motif for any sealshape or for any style. In contrast, D.S. Haviland pays exhausting attention to the correspondance between motif and sealshape and even between combinations of motifs that occur on multi-faced seals (1964: chs. III & IV).

Several reviewers have remarked on a few inaccuracies in PY's interpretation of motifs; see their comments in Appendix II; add: Motif 1.51/17.16 etc., Kn KSPI L49, a sealing impressed by a ring, does not depict a man attacking a sea monster but rather a battle between the man in one boat

posed against other people, not seen in this fragment, in a second boat whose animal-head prow aegis is preserved at the bottom of the sealing (cf. the Mochlos Ring, II 3.252). And Motif 7.22, Kn KSPI L46, depicts not "a woman" but a man "posed alongside a lion standing regardant" (p. 128). The term 'petaloid loop' has been borrowed from the ceramic vocabulary, though the motif is better known in the decorative arts as a 'paisley'. Because of *Ellen Davis's* recent article, "Youth and Age in the Thera Frescoes," *AJA* 90 (1986) 399-406, we no longer need identify the figure on II 2.251 as a "grotesque" (Motif 17.12), but rather as a child at the first stage of youth with a forelock and two sidelocks.

Chapter 5: Decorative Syntax

This chapter identifies the major types of early glyptic composition and correctly emphasizes their variety. This variety cannot support hypothetical simplifications about ethnic aesthetic preferences, such as *Matz* and *Biesantz* have held on Minoan and Mycenaean *Bildstruktur*.

While it is obvious that symmetrical and radial designs dominate the ES repertory (both Minoan and Helladic), a few seals, usually overlooked, carry chaotic designs; see the Group of the Knossos Stone Slab (catalogued below), and II 1.345 b, II 1.429, I Supp. 170, and V 477, among others.

Chapter 6: Materials and Techniques of Manufacture

This chapter presents a useful summary, though several other authors have also written on materials and techniques. *Boardman* (1970: 373-382) rightly takes priority here, for *Kenna's* account (CS pp. 70-77) is highly idiosyncratic. *Betts* in his introduction to CMS X also presents an informative discussion of materials; for instance, he distinguishes (CMS X, p. 19 n. 16) the pitted fluorite from the smooth rock crystal, a distinction which has occasionally eluded PY (e.g., II 1.432, 2.128 & 148, HM 1567, etc.). *Herrmann's* article on lapis lazuli (1968) seems to have been missed. And the reviewer has tried to identify the characteristic black/brown and white agate (not "onyx", a term which refers to cameos with the sealface cut parallel to the veins, not perpendicular as is the case with Aegean seals) as imported, probably from Egypt, and the cornelians as also imported, either from Egypt or from Mesopotamia, and not in a raw state but as beads (*Younger*, *Archaeological News* 8.2/3, 1979, 40-44).

Recent contributions include a discussion of the enigmatic frit/faience seals by *Helen Hughes-Brock* at the Marburg Symposium, Sept. 1986. *Olga Kryzkowska* (1981, 1983, 1984) has reported on ivory and bone.

Both *Poursat* and the reviewer, however, lament PY's decision to discard the term "steatite" and to lump all dark soft stones under the one category

"serpentine", with or without quotes; Betts (CMS X pp.19-20) goes to the other extreme, eliminating "serpentine" in favor of a generic "steatite". Petrographic analysis does not confidently distinguish between the two, but it is obvious that the Aegean artists did: on the one hand, there was a soft stone that is shiny, greasy or soapy to the touch, and comes in a variety of colors from pale yellow through green to dark inky black and, on the other, a soft stone that is dull, rough in texture, and generally murky green or gray in color, often micaceous (see *Becker 1975 & 1976*). The term 'steatite' connotes the soapy quality of the first, and 'serpentine' the dull greenish color of the second. Such a distinction has its uses, for if the definitions are adhered to, then it is obvious that steatite seals were favored by the early artists in Crete who worked with soft stones (e.g., almost all the seals in the Mallia Workshop) and by Mycenaean artists in LH III A2, the Mainland Popular Group, while serpentines were favored by island artists in the EC and MC period and by Minoan artists in LM I, the Cretan Popular Group.

PY's section on technique could have been exciting; he has observed modern techniques of seal and gemstone production (*Yule & Schürmann 1981*) and knows the literature well. PY misses, however, the innovation of the bow-operated lathe with drill, which occurred sometime during the later life of the Mallia Workshop (not earlier; *S. Hood* points out in his review that II 1.366 was not necessarily found inside the Porti Tholos, latest context MM IB, but may have been retrieved from exterior MM III levels).

Once learned, the drill was an obviously superior tool and from then on it is an essential part of the kit of accomplished artists, whether gem engravers, stone cutters, stone bowl engravers, furniture makers, et al. Only a crisis of catastrophic proportions could have wrested this tool from them; perhaps the final destruction of Knossos was one such catastrophe that somehow caused the artists in the Mainland Popular Group to revert to simple burin incising toward the end of LH III A2.

II. A. *Specific Comments: Chapter 7: Stylistic Groups*

The chapter presents thirteen stylistic groups of seals; the seals in each group often carry similar motifs engraved with similar techniques. These groups are then dated according to their members from dated contexts.

PY describes his groupings in two ways (p.207): "In the case of *style-groups*, the motifs are carved in a stylistically similar manner and the seals themselves are relatively homogeneous in either material, shape, carving technique or all three. *Style-complexes*..." (italics mine), consist of multi-faced seals whose separate motifs find stylistic and iconographic parallels on the faces of other seals, all forming a complicated nexus of related motifs.

One group, Group 2, The Floating Figures Group, consists of three seals that do not convincingly display a common approach or style.

ES Groups

Group 1: The Chip-Cut/Small Plate Signet Group from the Messara (EM I [-II?])

II 1.196, 202, & 203, all from Lebena Tholos II (EM I, late?)

Similar: IV 40 from the nearby Kali Limenes; and V 526 from Asine (EH III)⁶)

The Chip-Cut group consists of two small plate signets (S31 d; II 1.202 & 203), and one thick disk II 1.196. The deep gouges in the seal faces actually serve here to isolate their motifs in intaglio on the stone, not in relief in impression. Thus, the seal 1.202 carries two outlined triangles set base to base, not, as in impression, a dashed square bisected by a hypotenuse with a solid triangle in each angle; the seal 1.203 carries three separated rows of zig-zags, not, as in impression, three registers of wedges; and seal II 1.196 carries a cross defined by two intersecting pairs of lines (cf. IV 40 & II 1.439) and a reticulated pattern in the quadrants, and side b carries, in the center, a circumscribed wheel with nine spokes about a hollow axis, a zig-zag at the periphery, and a reticulated pattern between.

Designs that are more comprehensible in the intaglio on the seal are more numerous than has been recognized: see II 1.150, 269, 270, 330, and 362, and II 2.10 with which cf. VIII 102.⁷) While such seals may have been designed by the artist as pendants, their owners were not limited just to wearing them; see V 462, a seal impression from Ayia Irini in Keos, with a central wheel with eight spokes that resembles the nine-spoked wheel of II 1.196b.

As PY points out, the type of zig-zags or reticulation found here resembles that carved into EC Cycladic stone vessels.

Group 3: The Quatrefoil Group from north central Crete? (EM II-III?)

II 1.104 from Ayios Onouphrios & 454 from Knossos; X 223; XII 9; CS 32 (p. 77) from either Ayios Onouphrios or Central Crete; and Copenhagen NM 282 = XI 229.

Similar: II 1.134 from Koumasa Tholos B.⁸)

⁶) PY places II 1.477 from Mochlos (EM II) near this Group 1, presumably on the basis of the zig-zag on side b, and V 526 in Group 3. Add Tarsus p. 241 fig. 398.

⁷) Also see II 1.333 in Group 5, the Border/Leaf Complex.

⁸) PY also places CMCG 14 & XII 34 near. The spirals of CMCG 14, however, are too angular (cf. V 102 from Lerna; EH II context); the scalloped face of XII 34 with rays ending in spirals in the scallops resembles V 526 from Asine to this group on technical grounds, although actually that seal should belong to the Chip-Cut group, above, on both technical and iconographic grounds.

As PY points out, five of these seals constitute the stone examples of S25, the quatrefoil stamp. It seems logical to assume they were therefore made in a single workshop, whose location, however, cannot be known until more examples are excavated; it is possible, however, that such a workshop, participating in carving techniques also popular in the islands, might have been located in north central Crete, say Knossos or Mallia.

Group 4: The Parading Lions/Spiral (hereafter, PL/S) Complex from the Messara (ca. EM III [-MM II])

PY assigns 60 seals and sealings to this group.⁹⁾ Of the 57 that can be accepted with confidence, all but seven seals and three sealings¹⁰⁾ come from the Messara. One sealing from a house at Knossos comes from a EM III deposit, and stylistic similarities with other groups confirm this rough date for the PL/S Complex.

Thirty-nine seals are stamp cylinders (including the two listed as "near") and three others apparently impressed sealings; five are theriomorphs: two seated/squatting apes, the mother bird and chick, the recumbent calf, and the pig head. The remaining shapes, all rounded lumps of ivory (conoids, hemispheres, pyramidoids, etc.) consist of one or two seals each.

About 25 seals carry the eponymous "parade of lions", lions with hatched manes that walk along the periphery or occasionally in a straight line, sometimes contorted; men and scorpions are also common. The reverse end of the cylinder stamps often carry interlocking S-spirals, which resemble those on single-faced seals. Filler motifs usually consist of hatched leaves, much like those that characterize Group 5, the Border/Leaf Complex, or V's with thickened ends.

The Complex is truly complex both iconographically and stylistically; the common square or cross of interlocking S-spirals is highly distinctive, but there is also a subgroup here of neatly incised running C-spirals or a whirl pattern ending in simple thin loops.¹¹⁾

More importantly, perhaps, is that while most of the "parading lions" with hatched manes and other figures are engraved in an outline style, five

⁹⁾ The amygdaloid from Koumasa, II 1.160, if it is a true amygdaloid, and the hammer-head signet II 1.413 from Mallia House E are shapes probably too late and their motifs too crude to be assigned with assurance to this group. Similarly, IV 42 with its "wood-drilled" circles and hatched palm leaves on side a would be more at home in Group 5, the Border/Leaf Complex (cf. the hatched palm leaves of II 2.293 b and especially II 1.353).

¹⁰⁾ Seals II 1.384 and 385 from Archanes, 396 and 399 from Gournes, 413 from Mallia, 481 f. from Palaikastro, and V 301 presumably from west Crete; sealings Kn KSPI T2 and Tb, and the sealing from a EM III level at Knossos.

¹¹⁾ E.g., II 1.55, 136 a, 137 a, 253, 272 b?, 384 a; II 5.281; IV 41; Kn KSPI T2; CMCG 2; cf. the heads of the men on II 1.385 a, and the lion's tail and the central elements of II 1.222 a and II 5.281, the doubled Dreipass of II 1.312 a, and the loops about the periphery on II 1.133.

seals carry animals whose bodies are thicker and more gouged. These form a small but fairly homogeneous group that does not come from the Messara: three stamp cylinders (II 1.396 a and 399 a from Gournes; and XII 8), a sealing from Knossos (EM III context) probably impressed by another, and one stone reel (V 301 a) apparently from the Chania area. All depict more fully modelled parading lions.

It cannot be ascertained which style, the outline or the modelled, came first or if indeed they were contemporary. The sealing, the only seal design in the PL/S Complex that comes from a dated context, suggests a EM III date for these gouged animals; the reel V 301 and its hatched cross motif on side b tends to support this date; the presence of parading lions with hatched manes on side b of XII 8 indicates either the two types are contemporary or the artist was in a transitional stage, creating a "bilingual" stamp.

Group 5: The Border/Leaf (hereafter, B/L) Complex from the Messara (ca. MM I-II)

PY assigns 160 seals to this Complex;¹² all but 28 come from the Messara, and enough seals come from dated contexts (Archanes and Lebena, EM III-MM IA, and Gournes Padiada MM IA/B) to make it fairly certain that the Complex was fully developed by the end of MM I.¹³ The "wood-drilled" circles of IV 42 make it contemporary with the last products of the Mallia Workshop (MM II).

Ivory constitutes roughly half and steatite and white frit/faience roughly a fifth each of the total material.¹⁴

The B/L Complex has as broad a range of shapes as the PL/S Complex has narrow. Four classes are equally popular with 16–21 examples each: Disks and Diskoids (20 or 21); Gables and Prisms (19; eleven Gables and five Prisms have all three sides engraved); the Theriomorphic/Anthropomorphic seals (18); and Conoids (16). The remaining classes have markedly fewer examples: Stamp Cylinders nine; Scarabs and Scaraboids eight; Half-Ovoids and Plano-Convex seals six each; Hemispheroids five; Half-Cylin-

¹² Three seals may be omitted: the disk II 1.214 and the human foot X 32 since their linear designs are not stylistically diagnostic, and the cylinder CMCG 222 (placed near the complex) since its design is also not diagnostic and its material, chalcedony, is a MS material. One seal, IV 42, may be moved here from Group 4, the PL/S Complex because its hatched palm leaves find parallels with II 1.353 and 2.293. Add: the Petschaft X 46 with waterbird regardant, and more sealings from Phaistos (see below).

¹³ PY also assigns to this Complex II 1.214 from a EM II context at Lebena, but iconographically and stylistically it does not belong.

¹⁴ ECS 202 n.31 lists the 29 extant examples of seals in white frit/faience; of these, 26 are in the B/L Complex. Of the three others, II 1.117 a scarab from Ayios Onouphrios must be late ES because of its "wood-drilled" circles, II 2.25 an amygdaloid? from Platanos with centered circles should be MS, and the cylinder II 2.40 from Mavro Spelio T. 17 carries zig-zags and sports gold caps – perhaps it is an import.

ders, Rectangular Plate seals, and Cubes (including the triple cube from Archanes, II 1.391) three each; Foliate Backs and Reels two each; and one each of the Arch-Incised, Button, Concave-Convex Plate, Cushion, Cylinder, Petschaft, Pyramid, and Quatrefoil classes.

What binds the complex solidly together is the use of hatched leaf-like forms, petaloid loops ('paisleys'), oblongs, rectangles, dentate bands, etc., whether as filling motifs or as primary motifs. As PY states, the curious Archanes script appears on seals only in this Complex; it has been dated to EM III-MM IA on the basis of finds from dated contexts at Archanes.

Animals appear only occasionally.¹⁵⁾ Where the animals and the people appear alone, all are slightly modelled, not just gouged, and they consistently (except II 1.382 a) stand squarely in the center of the sealface surrounded by filling motifs – a compositional formula that becomes standard for the rest of glyptic history.

PY notes overlaps between this complex and the PL/S Complex, but there are far more than just the four he cites (n. 12). Hatched leaf-like elements, common in the B/L Complex, occur in 19 seal designs assigned to the PL/S Complex.¹⁶⁾ Two of these are the sealings II 5.195 and Kn KSPI Tb; if their motives were stripped of their interlocking S-spirals, a characteristic of the PL/S Complex, they would resemble the conoid II 1.101 which is placed in the B/L Complex (cf. the Phaistos sealing II 5.167). It would seem therefore that the B/L Complex is just an extension, presumably chronological, of the PL/S Complex.

Another link between the two complexes is curious: the only example of the Quatrefoil Class in the B/L Complex, IV 122, carries B/L motifs and is in ivory – the rest are in stone and belong to the Quatrefoil Group, whose characteristic motif consists of interlocking S-spirals that also characterize the PL/S Complex.

A more significant overlap occurs on the ivory stamp cylinder II 1.481 from Palaikastro. The obverse end, 481 a presents four slightly modelled caprids, apparently agrimia, parading regardant in the center surrounded at the periphery by a border of hatched arcs; the reverse end, 481 b, however, carries two tête-bêche quadrupeds, presumably lions since some hatching on their manes is preserved (see the photograph of the sealface, top animal). The choice of agrimia for the obverse fits with the popularity of the animal

¹⁵⁾ Six agrimia (II 1.64 a, 85 c, 268 a, 382 a [a parade], IV 24 Da & 25 Da), two kids (II 1.64 b, 287 a), and one lion (XII 74 a), one deer (II 1.374 a), one boar (II 1.64 c), and one waterbird (X 46); there is also a ship with dolphins (II 1.287 b) and a man (II 1.138 b). A few other figures are associated with the Archanes Script, perhaps as signs: an agrimi on II 1.126 a & 391 a, b, c, e, n; a caprid on II 1.392 b; a man on II 1.391 k [hand on 391 j and leg on 391 l]; and a quadruped on XII 63 b and CS 56 a, both of which could be placed near the complex. Another seal (II 2.204 a) related to the complex carries a neatly incised man with wedge-shaped head and extremities.

¹⁶⁾ II 1.63, 222?, 225, 226, 250–252, 295, 311, 321, 336, 363, 385, 387, and 481; IV 27 and 42; CMCG 2; and Kn KSPI Tb.

in the B/L Complex; their parading pose, however, is unique here and seems archaistic. The hatched lions on side b seem appropriate for the PL/S Complex, though the more stolid tête-bêche pose would be unique there. We seem to have another "bilingual".

Observations on shape lend further support to the notion that the B/L Complex is a later development from the PL/S Complex.

The PL/S Complex includes only one class shape (excluding the singletons in the miscellaneous class, S34) that does not occur in the B/L Complex:¹⁷ II 1.413, a hammer-head signet which PY puts in S31f though it really belongs in S31b, a class, which according to its two examples from the earliest contexts, should begin in EM II.

Shapes that are shared by the two complexes are few. Both PL/S and B/L account for one Button each and for one Pyramid/oid each; presumably these two shapes were in use at least during the period of overlap between the two Complexes, whichever one dates first. PL/S includes only one shape class, S32a & S32b the ivory Stamp Cylinder, that has more examples (36) than B/L has (nine). The dated contexts for seals assigned to this class suggest a range of EM II-III, with at least one example II 1.471 coming from a pure EM II context; this context then would suggest a date more like EM II [-III] for stamp cylinders, in which case the greater number of ivory stamp cylinders in the PL/S Complex might reflect a period earlier than the B/L Complex.

Two other shape classes are also shared by both complexes, with more examples attested for the B/L Complex, however, than for the PL/S Complex: three PL/S vs. 16 B/L Conoids, and two PL/S vs. five B/L Hemispheroids. While the class of Hemispheroids is too small to reveal an internal development or to suggest which Complex is earlier than the other, the class of Conoids is large, and PY has broken it into subclasses: three B/L Conoids belong to class S6b whose examples have spiral grooves around the sides; the three examples from dated contexts are no earlier than MM IA. The rest of the PL/S and B/L Conoids belong to subgroups that cannot be closely dated because they consist either of examples from no closely dated context (the six B/L examples in S6e, elongated conoids) or of examples too diverse in shape (the two PL/S and the seven B/L Conoids in the miscellaneous subclass S6g).

The B/L Complex, on the other hand, includes many classes that find no examples among the PL/S Complex. Among these, two are late developments (i. e., they gain popularity with the innovation of the horizontal bow-lathe): the Petschaft (X 46) and the Cushion (II 2.70).

The Phaistos sealings provide the final piece of evidence for placing the B/L Complex later than the PL/S Complex; it is possible to discern amongst the sealings only two that might belong to the PL/S Complex: II 5.271 carries a lion regardant with hatched mane, and 281 carries the typical

¹⁷ I omit the PL/S Amygdaloid II 1.160 from consideration; see fn.9 above.

parade of lions (since their manes are unhatched, was the seal an early type?) about a simple loop design in the center. On the other hand, the sealings present many more designs that should belong to the B/L Complex: the distinctive rosettes 137 and 140 (the latter with a "wood-drilled" center); a simple loop that usually appears as filler (e.g., on 281) decorated the entire seal for 152, 157, and 164, the dentate bands of 167 and 197, the hatched leaves of 206 and 207, and the waterbird with hatched body on 307. Two animals, an agrimi on 261 and a bull on 265, might be related to the neat linear man on II 2.204 with wedge-shaped head and extremities.

We may also see the Petaloid/Star Group, Group 9, as a late dependant of the B/L Complex with its hatched paisleys on advanced ES shapes, the bottles, buttons, and Petschafts. A seal impression from Ayia Irini in Keos, V 479 (early MB context), seems to present a motif that overlaps the two groups: the hatched band looks like a B/L motif and the whorl like a simplified paisley. The design of paisley with frond is also seen amongst the Phaiastos sealings II 5.209-212.

It would thus seem that the PL/S Complex began its development toward the B/L Complex about the turn of the millenium and the B/L Complex continued down close in time to the Phaistos deposit.

Group 8: The Mallia Workshop Complex from Mallia (ca. 1725 B.C.)

PY assigns approximately 611 seals (550 plus 61 published in CMCG) to this group, though he does not publish a complete list and without one it is impossible to assess the group fully, though it obviously was the period's popular group in north central Crete.

The group takes its name from the excavated workshop at Mallia in which seals II 2.86-198, excluding 109, and various tools were found.

The one button seal from the Workshop, II 2.149, is made of schist, an island material, and carries a cross and two centered circles; it almost certainly is an import. All the other seals, however, are stylistically similar, regardless of differences in technique or material, and PY shares this view; on the other hand, he separates the steatite examples from the hard stones and places the first in his main Group (8 A) and the second in his Subgroup (8 B). The word "Complex", therefore, describes the joining of these two subgroups.

Three main techniques can be observed among the seals from the Workshop. The majority are made of steatite,¹⁸⁾ their designs first outlined (e.g.,

¹⁸⁾ Two seals, said to be of hard stones, carry the same types of motifs and in the same technique as do the steatite examples. IV 161 is said to be of "red, green and black banded agate", an odd color combination for agate. CMCG 123 said to be of chalcedony, though in CMCG "chalcedony" is an all-purpose term used to describe agates and cornelians; perhaps the material here has been misinterpreted.

II 2.115, 121, 147, and 188) and then modeled by rough chiselling or gouging. In animal bodies, for instance (e.g., II 2.122 a), the cuts have sides that slope in; if the cut is narrow (e.g., for legs) it is V-shaped in section, if broad (e.g., for the chest or rump) it is trapezoidal.

With this technique so defined, it seems possible to identify imitations: for instance, in the Messara, the Platanos Goat Group (Group 6) including examples amongst the Phaistos sealings (II 5.262? and 263, and perhaps 261 and 287 if they are not actual products of the Mallia Workshop); and possibly in Ayia Irini in Keos, the button seal V 487 with dog.

The second and third techniques occur almost exclusively with harder stones, and therefore PY has placed them in his Group 8 B.

The second technique combines three types of drills, the wood-drill, the hollow drill, and the solid, thin drill, also known as the snub-nose drill, to create motifs that are formally indistinguishable from those created by the chiselling and gouging techniques. The broad, flat, ridged marks of wooden drills are easily detected in the rosette on CMCG 156 of fluorite, in the jug bodies of CMCG 115 (said to be of rock crystal but probably is also of fluorite), and in the dots on CMCG 159 ("chalcedony"). In these two last examples the hollow drill was also used to create the jug handles on CMCG 115 and the circles connecting the dots on CMCG 159. On II 2.79, possibly of a silicate that was burnt (cf. XII 2.112, said to be of ivory), the wood drill was used to create the juglet bodies on side b and the large form in front of the caprid on side c; the hollow drill created arcs for the juglet handles on side c; and the tiny snub-nosed drill was used for the eyes and noses of the animals on sides a and c, the joints of the caprid on side c, and the terminals on the line below the juglets on side b. This same snub-nosed drill was used on the unfinished steatite prism II 2.180 not only to create the small dots but also in a running fashion to model the broader areas.

Marks of the wood drill can also be seen amongst the Phaistos sealings: II 5.59, 110, 140, and 205, and possibly designs such as 16, 17, 56, and 58.

The third technique eschews the wood drill in favor of the snub and hollow drills, presumably now mounted on the horizontal bow-lathe, to carve hard stone prisms. We may see three groups: the first uses the new technique to produce the standard motifs - II 2.150 and 168 from the Mallia Workshop and cut from the same piece of conglomerate; XII 94 also probably of conglomerate (said to be "black and white mottled jasper") with trussed caprids, a dog?, and a man and two goat heads; IX 32 with four juglets; and CS 149 from Siteia of cornelian with two quadrupeds, a zig-zag with bucrania, and hieroglyphs.

In the second group standard motifs are combined with new ones: XII 92 of "red and black mottled jasper" carries a typical quadruped (side b) but new motifs of joined circles (side a) and crossed dots (side c); and XII 93 of agate carries the standard animal heads? (side a) and juglets (side c) and the new motif of intersecting circles (side b).

In the third and possibly latest group the new technique is used exuber-

antly to create entirely new motifs: CS 126 from the Diktaian Cave, an amethyst scarab, perhaps imported from Egypt or the Near East and then engraved with two concentric circles flanked by two animal heads(?) and surrounded by many small circles in the field; II 2.230 from Mallia carries a caprid with head under its chest and a waterbird? in front (side a), two acrobats (side b), and hieroglyphs (side c); and VII 36 carries hieroglyphs on all three faces.

It is obvious that, for us, this third phase in the use of the new drilling technique announces the arrival of MS seals.

The motif of three or four intersecting circles (Motif 23.2/8/10/17) found on XII 93 b is distinctive. Two parallels are assigned to the Border/Leaf Complex: II 1.245, a button like II 1.380 also placed in the B/L Complex, has the exterior two-thirds of each circle hatched like the palm leaf motif that is common to the B/L Complex; and II 2.293 c, a three-sided prism, whose other motifs, hatched triangles, spirals, and palm leaf, are more commonly associated with the Border/Leaf Complex. Two other seals in hard stone present this motif: CS 110 a quartz button from Archanes, and II 2.19 a rock crystal bottle from Kamilari; and one Phaistos sealing also employs this motif, II 5.45, with which cf. II 5.25.

One iconographic aspect of the Mallia Workshop is important and demands attention: for the first time in seals we have attempts at narration: people play games (CS 38 a), make pots (CS 39 b), and draw a bow and arrow (II 2.164 c); II 2.86 a presents a lyre and II 2.143 b a trussed calf (?). These might indeed carry some type of hieroglyphic message, but their immediate reference is to human activity.

MS Groups

The rest of the chapter discusses four more groups. The Hieroglyphic Deposit Group (Group 10), consisting primarily of rectangular bar seals engraved with hieroglyphs, and the Tectonic Groups (Groups 12 A & B; add II 5.9-15, 82, and 85), disks with architectonic or other cut designs, are more iconographic groups than stylistic ones.

The Drilled Lions Group (Group 11) is a true stylistic group, which the reviewer has called elsewhere¹⁹⁾ the Group of the Palaikastro Cat. The Group's core consists of VIII 104 and the two HM disks, recently published as II 3.292 (HM 125) from Latsida Mirambellou and 277 (HM 562) from Palaikastro, House B25 court (MM III?). The other examples PY assigns to it are far too removed to be convincing; it is possible that VII 42 and XII 135 are related, as well as VII 45 and CS 113. The seals he lists in his fn. 69 as comparanda belong instead to later cut-style groups (*E. Thomas* in CMS Beiheft I 225-239 and JGY in C. Renfrew's *The Archaeology of Cult*

¹⁹⁾ Kadmos 22 (1983) 119.

283–286). To this Palaikastro Cat Group, add: VIII 103, and the two sealings from Phaistos II 5.299 and 300.

PY's Group 13, the Temple Repository Mannerist Group, describes a late preference for exaggerated musculature. This preference is not limited to seals and gold rings but dominates the Harvester Vase, the Boxer Rhyton, and the relief frescoes at Knossos. The most recent detailed study of this mannered style is by *Kaiser* (1976) though he does not focus on its appearance in sealstones.

Miscellaneous Comments

PY's 13 groups are not exclusive; others spring readily to mind. I miss a discussion of the earliest datable seals, those with random scratching from EB II contexts at Myrtos and elsewhere; two others have been recently excavated at Phylakopi (soon to be published).

Perhaps the large group of epomia seals with hatching constitutes such an obvious iconographic and formal group it need not be stated explicitly, though the Quatrefoil Group S25, a smaller but similar iconographic and formal group, was.

I realize that this book concerns only the Cretan material, but a better appreciation of it would have emerged if material from the mainland and the islands had been incorporated into the discussion. The examples are few and manageable, numbering mainly the seal impressions from the Argolid, Ayia Irini in Keos, and elsewhere, and a few sealstones. I give here a sample of perhaps informative comparisons.

V 61 (Lerna) & II 1.243 (Platanos).

V 100 (Lerna) & II 1.37 (Ayia Triada), anticipating the interlocking S-spirals of the PL/S Complex.

V 102 (Lerna) & II 1.280 (Platanos).

V 108 (Lerna) & II 1.471 b (Mochlos).

V 117 (Lerna) & II 1.136 a & 137 a (Koumasa), 272 b (Platanos), and 55 (Ayia Triada), and IV 41 a (Kali Limenes).

V 423 (Lefkandi, EH III) & II 1.54 (Ayia Triada).

V 460 (Ayia Irini) & II 1.47 (Ayia Triada) – the joined motif of cross and spiral and the flat carving are similar.

V 464 (Ayia Irini) & XII 34.

The class of scalloped conoids (S31 g) might have received some help if II 1.197 had been included and compared with the impression V 202 from Euboia and V 464 from Ayia Irini in Keos.

There is the Group of the Knossos Stone Slab, odd schematic figures incised not only on prisms of black steatite (II 1.113 from Ayios Onouphrios [EM I–MM II], 309 from Platanos [EM III–MM I B and later], 426 from Phaistos, 453 from Kalo Chorio, and 490; cf. II 1.105 from Ayios Onouphrios [EM I–MM II]) but also on a stone slab from near the north-

west angle of the palace at Knossos (PM I 132–133 fig. 98); *Evans* first drew our attention to this group (PM I 133 n. 1 and 68–69).

There are also many small odd groups, such as II 1.38 and 401, and II 2.230, all versions of pyramids with broad, wavy, scooped-out patterns.

The Phaistos sealings²⁰) should have received an entire section; the sealstones that impressed the sealings find many parallels amongst extant seals, far too many to enumerate here, but a list would have been helpful, separating the motifs that belong to earlier groups like the PL/S and the B/L Complexes, isolating those motifs that were stylistically avant-garde like the large group carrying only cut lines or only bunches of concentric circles, and giving the parallels. If ECS had concerned early Aegean glyptic in general, a section on the Phaistos sealings would have also tackled the knotty problem of influences from contemporary Anatolia and from EH II (compare, for example, V 469 from Ayia Irini with II 5.194).²¹)

II. B. *Specific Comments: Chapter 3: Shape Classes (S = ECS shape class)*

PY organizes this chapter alphabetically by the name of the class, a method to which *Hood* has strongly objected. *D.S. Haviland* organized many of the same classes according to their apparent popularity, a better system but one which new excavations could easily confound.

An obvious way to organize these shapes would have been to group the specific forms into larger families and to have discussed each family according to its internal development. It might therefore have been more cumbersome for the reader to obtain the factual data about each specific shape, but an alphabetical concordance with page references at the beginning of the chapter would have resolved this difficulty.

PY rejects this “chronological” method: “in several cases one [would be] committed to take positions on the chronology of shapes even though sufficient evidence may be lacking.” This objection is true, of course, but by the time readers get to pl. 35, they will see that PY has, in the end, taken some sort of stand on the chronology of shape.

In this section, I shall discuss first those shapes which were rare and more foreign than Minoan, then the shape-families which seem to have responded to the technical innovation of the horizontal bow-lathe, and then those that were made obsolete by it.

Throughout the chapter PY lists the seals of each shape simply by its pub-

²⁰) V 481, a seal impression from Ayia Irini in Keos, is contemporary with the Phaistos deposit; cf. II 5.184 and 185.

²¹) S. Alp 1962. presents the basic Anatolian material; add other impressions from elsewhere in Asia Minor (e.g., Tarsus II, pls. 394: 31 and 397: 16). F. Matz 1974a and 1974b suggests prototypes dating to pre-Hittite times from which the Aegean seals derive their designs. A. Sakellariou 1963 reviews the archaeological evidence for the long (400–600) years that separates the Lerna from the Phaistos deposits. M. H. Wiencke in CMS Beiheft 0 analyzes the motifs stylistically and points out considerable differences.

lication reference or museum number; he creates subcategories for soft (bone, ivory, steatite, etc.) and hard materials (notably the silicates) in order, rightly, to "test Evans's hypothesis that seals in organic materials are Prepalatial and those in hard stone come into production in MM II"; he illustrates typical as well as interesting seals; in a descriptive paragraph he then summarizes information about material, dimensions, stringhole alignments and other technical information, style groups (looking forward to Chapter 7), and context dates (if any); finally, he gives the total time-span for each shape, sometimes too confidently.²²⁾

In many cases, it would have been easier on the reader if PY had put the data into tabular form. Instead, the reviewer has had to consult each seal and note the material, dimensions, motif, provenience, etc., in order to verify PY's conclusions.

Foreign Seal Shapes

There are two major types of sealstones in the prehistoric Mediterranean, stamp seals and cylinders. Whereas the cylinder was the predominant form in the Near East, the stamp seal found favor in Egypt, Asia Minor, and Greece.

The Egyptian stamp seal was shaped like the scarab beetle; a few were imported into the Aegean, and many were made in Crete in imitation of them (S29 & 30a & 30b).²³⁾ Even the designs often mimic the designs on authentic Egyptian scarabs.

The three seals of Class 30c, on the other hand, are probably all ringstones, not scaraboids; they have convex faces, flat reverses, sides that incline from obverse to reverse ("60 degrees" for CS 157), and a stringhole through the short axis (CMCG p.28 does not mention a stringhole for no. 172); a fourth has recently been excavated at Knossos. These ringstones with stringholes must form a different type from the two without stringholes that are extant still in their setting, II 3.240 from Sphoungaras with broad cuts and hatching forming a quasi talismanic motif and IV 58D from Tourtoulou with a griffin in front of a building(?).

The stamp seal of Asia Minor was often shaped like a large cone with a

²²⁾ E.g., p.75: Class S27b consists of two seals distinctly different, sharing only one trait; PY places their motifs in the same stylistic group, the Border/Leaf Complex which he somewhat misleadingly dates to EM III-MM IA; one of them, II 1.333, also comes from a EM II-MM I context. His synopsis of the class, however, states "27b Reels appear to begin in EM III and continue to MM IA or perhaps slightly later." The evidence does not allow such a categoric conclusion; if these two seals constitute a class, which is doubtful, it could be dated just as easily to MM I.

²³⁾ Yule 1983. PY's conclusions are anticipated by DH (p.14): "It must be noted that most, if not perhaps all, of these scarabs seem to be Cretan imitations of the Egyptian form."

rounded top; none has been securely identified as an import in Crete, but similar conoid shapes are common there (S6), and the intricate patterns on Hittite seals of the early MBA find some intriguing similarities among two groups of seal impressions in the Aegean: the contemporary MM II sealings of Phaistos and the earlier Lerna sealings of EH II.

The Near Eastern/Mesopotamian cylinder was occasionally imported early into the Aegean.²⁴⁾

There are 11 cylinders (S9) from Crete.²⁵⁾ In terms of material and motifs these eleven cylinders divide into three datable groups: the MS ones made of silicates (CMCG 134 of rock crystal and 222 of chalcedony/agate); and two ES types, those of frit/faience and "white steatite" (II 2.40 with gold caps, IV 100-102, and HM 2374), and those of steatite (II 2.7 [green] and II 2.59, XII 270, and *Sakellarakis* 1980 fig. 7.11 [black]²⁶⁾).

According to PY's analysis of frit/faience and "white steatite" (194) the second group ought to date early, certainly no later than MM II (II 2.40 comes from a context dated MM IIB). Of the steatite examples, XII 270 with its Random Hatching (Motif 27) ought to date close to the Myrtos stamps of EM II; the hatching on *Sakellarakis* 1980 fig. 7.11 looks similar to II 1.262 & 316 both from Platanos Tholos B and therefore MM I or II; the spirals of II 2.59 (M 46.24), from a context dated MM III, appear to imitate designs on Egyptian scarabs (e.g., II 1.204 & 267, and V 637; esp. cf. II 1.405 & 434) and are formal enough to date close to its context date. The silicate cylinders are MS by definition, the chalcedony/agate CMCG 222 perhaps earlier than 134 whose motif PY places in Tectonic (M 24.14).

ES Shapes that develop into MS/LS Shapes

Of the classes that undoubtedly were very much "at home" in Crete only a few begin as ES seals and develop into MS/LS seals: the ring (S28), the disk-shaped seals (i.e., cylinders whose height is shorter than the diameter: S10, 11, 19, 27, and possibly 30c), and the prisms.

The ring (S28) presents puzzles. The general shape, a bezel attached to a hoop, is clear, but in the Early Minoan period the typical bezel is circular or oval while MS and LS rings have an elliptical bezel that is aligned perpendi-

²⁴⁾ Aruz 1984; Buchholz 1967; Chapouthier 1937; Kenna 1968 and 1969b; and Pini 1982.

²⁵⁾ Of the 11 examples in PY's catalogue, VIII 134 looks wrong; its stringhole is unusually large and the motif is too shallowly engraved to be prehistoric, though the shape and material may be authentic. XII 79 with its drilled circles is probably a MS type if not close to the Late Minoan Cretan Popular Group. On the other hand, we may add to PY's list XII 270, and the second cylinder published by *Sakellarakis* 1980 fig. 7.11 - the other cylinder, fig. 7.10, is HM 2374 in PY's list; both these last are dated by *Sakellarakis* to MM IA levels in Archanes Tholos E, not MM IB as PY states.

²⁶⁾ His identification, "meteorite", is too hard a stone for the context date of MM IA.

cularly to the hoop.²⁷) How the MS/LS rings developed from the ES rings is unclear, although *Evans's* reconstruction (PM IV 510 fig.454) is undoubtedly correct even though the ES bone ring he selects is not typical.

Stylistically, rings are fairly homogeneous. The typical bezel of a bone²⁸) ring carries hatching, but the steatite rings along with just a few bone ones display more interesting designs as a group: spiriliform (II 1.182 & the bone II 1.36 & CS 32), swastika (II 1.351), and chevroned cross (X 25 & 26, and the bone X 28). According to the context dates, they begin in EM II and may have continued into MM I, but since they seem exclusive to the Mesara (DH p.70, with the single exception II 1.470 from Sphoungaras) and their iconography is restricted it is more likely that most were made over a short period of time, say in EM II(-III).

MS and LS metal rings (S28d) have an engraved bezel. The earliest are thought to be attested among the Phaistos sealings.²⁹) It is difficult to be certain about the shape and decoration of ES metal rings. *Branigan* (1976: 165-166) presents a list of pre-LM rings. Two or three from Crete predate the Phaistos deposit but these have circular bezels and are unengraved.³⁰) The Phaistos impressions possibly made by metal rings are all elliptical, and, therefore, we must imagine the introduction of the metal ring with elliptical bezel to have come soon after the innovation of the horizontal bow-lathe.³¹)

Of the rings which PY lists, AGDS I Munich 35 (= XI 189), a damaged

²⁷) Two ES rings, II 1.159 and 186, have an elliptical bezel aligned perpendicular to the hoop. One ES ring, however, II 1.185, has its elliptical bezel aligned parallel to the hoop, and because of this unique arrangement it probably should be reclassified as a stamp (cf. the bronze stamp, I Supp. 65, with rectangular face and thin hoop from Poliochni, late EB context). The ring's motif of interlocking lines is unusual too; compare V 477 from Ayia Irini in Keos and the stamped impressions on a sherd from Poliochni (I Supp. 170 and V pp. xix-xx fig. 1; Pini thinks this was made by an open-work bronze seal) and on a pot from Chalandriani in Syros (I Supp. 172; Matz thought these 40 impressions were made by an Egyptian stamp seal of Dynasties VII-VIII: Buchholz & Karageorghis, *Prehistoric Greece and Cyprus* s. n. 851).

²⁸) S28a is called ivory, but they and those classed in 28c (i. e., II 1.185 and 191 from Lenda, and X 25; add X 24. Apparently BM 1599 F is unpublished) more probably are made from a section of bone, the marrow having been scraped out to form the hoop.

²⁹) Pini (II 5, p. xiii) lists II 5.224, 270, 304, 322; PY lists II 5.201, 202, 205, 245, 259, 270, 276, 277, 304, & 310. Both these scholars have examined the sealings more closely than the reviewer has, but from the published photographs and drawings I feel comfortable only with II 5.201, 202, 270, & 304 having been produced by metal rings.

³⁰) *Branigan* nos. 10, a bronze ring (D. 1.6) from Mochlos T. III (context MM I, plundered in MM III), 14, a silver ring from Krasi (context EM I-MM I), and 15, a bronze ring from Vorou Tholos A (context MM I).

³¹) *Branigan* (1976) lists undecorated bronze rings with elliptical bezels, but none of these necessarily dates earlier than the Phaistos deposit: from Ayios Stephanos and from Corinth (both MH II-III contexts), from Ayia Irini Tholos E (context EM I-MM II; Xanthoudides once saw a quadruped but it cannot be discerned now), from Platanos (context EM II-MM II), from Kamilari Tholos II (context MM II-III), and two with lost bezels and one with part of its bezel extant, all from Avgo (context? MM I-III).

silver ring bezel, looks the earliest; the flying gallop pose is seen on Phaistos sealings (e.g., II 5.259) and the simple branches resemble those on Phaistos II 5.270; the Munich ring, however, presents peculiarities:³²⁾ the agrimi's body is oddly shaped, its head is very linear, and its horns are uncommonly short; it probably belongs to the Group of the Couchant Agrimi, ca. 1650–1600 B.C. (g. II 3.50, a silver? disk).

The other rings that PY lists are difficult to place securely. They are indeed early but need not date earlier than the innovation of mould-made rings, one of the technical achievements that distinguishes LS from MS rings.³³⁾ Of the ring impressions from Knossos, some seem to have been impressed by developed MS or LS rings and others were impressed not by metal rings but by stone seals.³⁴⁾

It is therefore difficult to evaluate the Phaistos impressions that are thought to have been made by metal rings with elliptical bezels: their predecessors seem to have had circular bezels or elliptical bezels that were unengraved, and the extant metal rings all belong to groups dated no earlier than MM III. If the technique of engraving moulds to produce ring bezels with at least part of their designs cast is a criterion of LS groups, then we can imagine at least that whatever the Phaistos rings looked like they must have been solid cast, bezel and hoop together, and their designs must have been entirely engraved with the horizontal bow-lathe.

The typical LS seal is biconvex in section regardless of whether its plan is circular (the lentoid), rectangular (the cushion), or elliptical (the amygd-

³²⁾ Has the bezel been modernly re-set or is the ring of Type VI, a bezel plate set in a cup? Cf. Younger, "Seven Types of Ring Construction," *Aux Origines d'Hellénisme. Hommage à Henri van Effenterre* 87.

³³⁾ VII 68 emphasizes the drill in the bodies of the copulating agrimia, a trait that belongs to the Kamilari-Agrimi Group, and its heavy hoop seems close to I 17 and 18 from the Mycenae Treasure; HMm 143 = II 3.239, the damaged lead ring from Sphoungaras carries a woman and circles and stylistically should be close to the Cretan Popular Group; HMm 530 = II 3.38, the gold ring with circular bezel from Mavro Spelio T. IXE carries a Linear A inscription and need not be earlier than the end of the MM period.

³⁴⁾ An example of a sealing impressed by a developed MS or a LS ring: L49 (HMs 337–9; PM I 698 fig. 520) was impressed by a ring engraved in the exaggerated musculature style that seems characteristic of the late MM-early LM period; it carries the famous scene of a man on a ship supposedly fighting a sea-monster below. The sea-monster is more likely the regardant animal-head prow-aegis of a second boat below (cf. the Mochlos Ring [II 3.252], AT 118 impressed by a ring, and the cushion seal from the Anemospilia Temple [National Geographic Magazine 159.2, February 1981, 221]). The sinewy musculature of the sailor finds stylistic parallels on the last sealing PY lists, L50 (HMs 336; PM I 509), which seems to depict an athletic or battle scene.

Three examples of sealings impressed by a sealstone: L25 and L26 (HMs 387 and 335; PM I 696 fig. 518 a & b) were impressed by cushions, probably of stone. L48 (HMs 396; PM I 694 fig. 514) carries a bull-leaping scene so constricted that the impressing agent must have been a lentoid. Lb (HMs 397; published in Papapostolou, *Ta Sphragismata ton Khanion* pl. 46b) carries two agrimia and a kid; the pronounced jaws and the "rivet" on the haunch and shoulder of the agrimi in front of the kid are characteristic traits of late Dot-Eye and Spectacle-Eye seals (late XVth-early XIVth century).

loid). It is probable that glyptic artists discovered that the horizontal bow lathe could more easily engrave seals with convex faces; while drilling, they could constantly manipulate the seal so that they could see the point of contact clearly.

It seems likely that the LS lentoid (S19)³⁵) developed from the ES/MS disk (S10 & S11), and that the reel (S27) may also have contributed to its development. PY's drawings (p.48) illustrate a likely typology.

In all three classes PY identifies a subclass, the Bordered Seal. Contrary to expectations, these seals do not have articulated rims, as the drawing of IV 19 D, the first drawing of a Bordered Disk, seems to imply, but the subclasses are actually defined by an iconographic element: faces that are circumscribed by a line or by the rare ladder-border.³⁶) Thus, as a shape class, Bordered Reels, Disks, and Diskoids do not exist. A pair of seals each constitutes the two Bordered classes Reels S27b and Diskoids S11e, and in each, each of the two seals is formally distinct. On the other hand, the disks listed in S10b, constitute all those of ivory/bone, a criterion that would have been appropriate for a separate classification, for these seals are not only typologically distinct but also chronologically defined, being ES types.

The reel (S27) has the shape of a fish vertebra with its two faces, however, not concave but convex. Those with provenience known come from the Messara (II 1.116, 152, 189, 333; IV 28 D), though II 2.204 is said to come from Iraklion (a dealer's attribution?). From the photograph of II 1.189, it is possible that it is of ivory (or bone) as PY states, but CMS p.213 describes it as being of ash-colored steatite.

The ES reels seem to be those in or near the Border/Leaf Complex (II 1.333 and II 2.204 in S27b. PY assigns the latter to the Complex; I would place it also close to the Mallia Workshop) and those near the Mallia Workshop Complex (VIII 25 and CS 35 in S27a). Of the MS reels, II 1.152 and 189, with their centered circles and cut designs, could be the earliest, XII 96 with its combination of what seem to be signs and motifs drawn from the Border/Leaf Complex, the middle, and the legible seals of S27c, AGDS I Munich 71 (= XI 147) and IV 28 D with their tectonic designs, and XII 104 with its deer, the latest.

PY brings together all known disks in S10 and S11; the three he thinks might be LS (V 26 with two unfinished? dolphins [CMS Beiheft 2, FI-78], X 285, a talismanic [CMS Beiheft 2, Is-35], and XIII 122 with two water-

³⁵) The lentoid is not, as PY reminds us (47), a simple shape. In plan, it is slightly elliptical, the stringhole usually running through the shorter axis; in section, its faces are biconvex, but since the rim thickens to provide a suitable width for the mouth of the stringhole then the face is less curved along the axis of the stringhole and is more curved (and wider) along the longer axis. Presumably these peculiarities should enable a secure identification of which seal, disk or lentoid, impressed a sealing.

³⁶) PY classes the steatite II 1.341 in S10a, but the rosette on the face is circumscribed by a line. On XII 116 in S11d a "ladder" design circumscribes the face.

birds) are probably MS types,³⁷⁾ which then implies that the basic disk shape does not survive into the LBA. The best known diskoid, I 5, must have been made close to the end of the MM period (Betts 1981).

The disk is circular in plan and rectangular in section, forming in effect a short cylinder; the diskoid has faces that are slightly biconvex. Since the profiles of many seals are not published, it is often impossible to tell the disk from the diskoid; it might have been better not to have insisted on a clear distinction, but rather to have grouped all disks together with the usual subclasses of soft and hard stones.³⁸⁾

PY adds two subclasses for discoids that are Lenticular or Plump. He identifies the Lenticular Diskoids (S 11 c) as the class typologically transitional between the true disk or diskoid and the lentoid. This may be true, but typology here is not a chronology; as true disks and diskoids share similar styles and motifs (e.g., CMCG 136 & 137 in S 10a and I 435 and IV 144 in S 11 a), so do the architectonic diskoids whether they are of hard stone or shaped as lenticular or plump diskoids.

If a typology/chronology can be devised for the family of disks and lentoids, it would classify the ivory disks as ES, some soft stone disks as ES, and the rest as MS types.

The MS lentoid (S 19)³⁹⁾ is identified iconographically by the presence of architectonic or talismanic motifs, or stylistically as a member of the Cut Style. While architectonic motifs do indeed seem to date to MM III, Talismanic seals and their cousins the Cut Style seals may date as late as LM II. PY's list of lentoids is not, therefore, exhaustive but rather selective.

³⁷⁾ XIII 122 forms a stylistic and iconographic group with V 238 from Chania (LM III A context), VII 44, and the seal impression AT 19 (LM Ib context); this group seems to have been the predecessor to the LS Group of the Eleusis Matrix (Younger, *Kadmos* 22, 1983, 128).

³⁸⁾ E.g., II 2.36, 57, and 211 are all described as diskoids but PY includes them in S 10a, disks.

The following HM seals are now published in II 3 - S 10a: HM 863 = II 3.382; and S 11b: HM 125 = II 3.292, 562 = 3.277, 747 = 3.251, 1528 = 3.339, 1609 = 3.340, 1737 = 3.50 (cleaned in 1977 and found to be of silver).

Some notes on a few specific disks: could CS 89 and IV 25 D be forgeries? In S 10c: II 1.184 has groups of 4 lines incised on the rim (= S 10b) and II 1.426, a cut-down and unfinished pyramidal amulet?, and II 1.113 may have been made by the same artist. In S 11c: II 2.18 has its face cut-down, presumably for some type of setting, and II 2.35 is an unfinished lentoid.

³⁹⁾ S 19a: X 93 and 291 are both of cornelian and belong to S 19b; VIII 41, said to be of basalt, may be of black steatite. HM 40 = II 3.378. V 492 carries a bull that belongs to the LS Cretan Popular Group, and VII 150 has a conical reverse which might make this a LS seal.

S 19b: HM 1318 = II 4.124 from Mavro Spelio T. 6 is made of steatite and therefore belongs in S 19a.

Two other LS shapes, the cushion (S8)⁴⁰) and amygdaloid (S1)⁴¹) have MS ancestors, but it is uncertain what the prototypes are.

In terms of dimensions, soft stone cushions seem to fall into two close but distinct groups whose lengths differ though their widths do not: 1.2-1.3 × 1.4-1.5 and 1.2-1.4 × 1.7-2.0; there seems to be no other criterion that separates these two groups, neither iconography nor provenience.⁴²) Hard stone cushions, on the other hand, have a fairly constant ratio between width and length: 1:1.3. The two smallest cushions are probably special: CMCG 124 is the only one to carry hieroglyphs and VII 221, a purple jasper cushion, carries a distinctive kind of reticulation that otherwise is known on two amygdaloids also of jasper, II 2.11 and 75. Of the two largest, CS 204 may be a forgery, and 202 is the highly interesting seal from Priene with the muscle-bound "bull at the cistern" and bull-leaper.

The first cushions might be found in S8c. The ivory/bone cushion II 2.70, should be dated early on grounds of material and iconography; its profile is plano-convex, perhaps indicating that it is an offshoot of the rectangular plate seal (S26). The rounded profile of XII 124 and its stylistic parallel II 5.47, both distinctively small, might then be examples of the next stage, datable, perhaps, to the period when the horizontal bow-lathe was being developed. The conventional cushion shape, that seen in the seals of S8a and S8b, is, however, a MS shape.

It is also difficult to trace the origin of the amygdaloid. The earliest example of the shape seems to date late in the MM period. PY thinks the amygdaloid developed as early as MM II, and he bases this date on the appearance of various cut motifs, all of which are carried, however, by developed MS and LS seals, and II 1.160's branch motif, which he places in the ES group PL/S Complex. The evidence of this last seal is unconvincing; the shape is odd and the branch motif is too crude to be assignable to any stylistic group. If this last amygdaloid is omitted from the chronological discussion then it becomes apparent that the amygdaloid shape arose in the MM

⁴⁰) S8b: XII 126 is said to be of white marble, which may be limestone, not necessarily a hard stone; HM 396 = II 3.238, 959 = II 3.312, 1513 = II 3.205, HM 1888 is really HM 1880 = II 3.189, and 2237 is the unique obsidian cushion from Mochlos. S8c: HM 169 - II 3.105, 778 = II 3.256, and 1430 = II 3.98.

⁴¹) S1a: IV 80 is not an amygdaloid; it is difficult to know what other seal in CMS IV might be meant. HM 707 = II 3.45. S1b: HM 984 = II 3.161. S1c: V 489 was probably broken in antiquity and the second, tiny SH was added to allow the seal to be worn as a pendant; if reconstructed symmetrically the motif on side a is a "cat's mask" (thanks are due to Helen Brock for bringing this to my attention).

⁴²) PY also identifies the Phaistos sealing II 5.47 as impressed by a cushion; the size of the impression, 0.8-0.9 × 1.1, would make the seal very small, uniquely small if the impressing cushion had a conventional profile, regardless of the material; the next largest would be either the softstone cushion XII 122 (1.0 × 1.2) or the hardstone cushions VII 221 (1.0 × 1.5) or HM 2237 of obsidian. If, however, the Phaistos cushion had a rounded profile, it might have looked like XII 124 in S8c; this also carries circles but between herringbone.

period, perhaps more in MM III than in MM II. The other amygdaloid that PY considers early, V 488 from Kea, came from a level with little pottery that was clearly diagnostic and its quasi-architectonic motif seems more characteristic of a MS seal, the small crosses resembling those on Hieroglyphic seals.

The hard stone amygdaloids⁴³) fall into two distinct sizes with no overlap: 1.1–1.3 × 1.4–1.8 and 1.4–1.6 × 1.9–2.2; the tiny amygdaloid IV 30 D (0.9 × 1.1) is unique and its simple decoration looks appropriate for a unfinished trial piece (cf. II 3.162) or for a seal much like the similarly small one that impressed II 5.45. The larger group includes the local stones jasper, agate, quartz, and rock crystal; the smaller group includes the imported lapis lacedaemonius (II 2.16), the two chalcedony seals in CMCG, and five seals of cornelian/sard, a stone imported from the Near East. It would make sense if the imported stones arrived in Crete in small sizes and/or the Minoan craftsmen deliberately created small seals from these stones in order to conserve valuable material.

On the analogy of the development towards the lentoid and cushion, it would be possible to propose the Ellipsoidal Disk (S34i) as the amygdaloid's prototype (its flat faces eventually bulging), or, contrariwise, the Barrel seal (S34b) (becoming thinner and the ends of the face trimmer). But the fact that these two shapes are represented by only one seal each (IV 116 and MMNY 26.31.362) makes such a development unlikely.

The Half-Ovoid (S16) also could conceivably be a candidate, the artist turning to engrave the sides of the seal and pinching the face to mirror the top. All but one of these seals, however, is of white paste/steatite/faience, measuring 0.8–1.0 × 1.1–1.4, and carrying hatched triangles and lines,⁴⁴) and this material and the motifs are characteristic of ES seals (II 2.109 is not from the Mallia Workshop, as J-CP points out). This class, therefore, seems too uniform and too confined to the early period to permit a development to the much later amygdaloid.

Since no early shape can be identified as a convincing prototype to the amygdaloid, one is forced to consider the amygdaloid a biconvex version of the amygdaloidal prism, a developed MS shape that seems restricted to the Talismanic group; both these shapes then would derive from the three-sided prism with elliptical faces.

⁴³) As PY points out, soft stone amygdaloids range in size from 1.0/1.1 × 1.4/1.5 (II 3.45, VII 147, & VIII 67) to the isolated seal V 488 with the uniquely large dimensions of 1.8 × 2.6, but the average length is slightly shorter than 1.8. Of the 14 amygdaloids that PY lists (excluding his IV 80, which is not an amygdaloid), seven (I 443, IV 170 & 171, V 490, VIII 68 & 69, and XII 151) have dimensions 1.1–1.4 × 1.6–1.8, with four others (VII 147, VIII 67, XII 259, and II 3.45 [= HM 707]) slightly smaller (1.0–1.2 × 1.4–1.5), and two others (VIII 122 & XIII 63) that are longer and thinner (1.3 × 2.2 and 1.5 × 2.1, respectively).

⁴⁴) CS 88, whose material PY identifies as ivory (Kenna says faience), is much thinner and longer (0.7 × 1.7), and carries two spirals.

Unfortunately, PY does not distinguish the elliptical prism as a separate shape from the three-sided prism with circular faces; rather, he combines them in his S22, citing the large number of examples, 405, as the reason for not publishing a complete list, although to have obtained such a total he had to have compiled such a list, which could have been entered then as an appendix.

In any case, a casual examination of elliptical prisms reveals, as PY states, they do not seem to date earlier than the prisms with circular faces, and both seem to begin at the time of the Mallia Workshop.

Prisms form an isosceles triangle in section; when one side only is engraved, it is the base; when two sides are engraved, they are usually the two non-base, scalene sides; when three faces are engraved, the shape forms an equilateral triangle in section with all three sides engraved: S 14 and 22.

It is possible to identify the prototype for the prism: the Gabel (S 14),⁴⁵ a ES shape that in section forms a low triangle like the prism with one side, the base, engraved. The shape seems at home in the Messara but a few examples come from central Crete and farther east.⁴⁶ PY is correct about the date of the class being EM-MM I-II.

PY, however, seems to think that the three-sided prism did not arise from the gable because of differences in shape and iconography,⁴⁷ but of the 39 gables he lists, 22 have all three faces engraved as do most prisms and three, II 1.389, 1.393, and 2.236, have all three faces roughly the same size, which would otherwise define them as prisms.

Iconographically, gables, and their cousins the plano-convex buttons, present earlier motifs than prisms do: paisleys, leaves of the Border/Leaf variety, schematic animals, etc. A few carry animals that seem close to those created by the Mallia Workshop (II 2.215, 216, 311, and 312, and CS 56) and two (II 2.236 and XII 3D) may actually be its products, as PY points out (110 fn. 123). More significant, however, is the fact that many, if not most, of the three-sided prisms carry signs of Hieroglyphic Class A; at least two gables (CS 96 and AGDS I 14 = XI 140) carry signs belonging to the Archa-

⁴⁵ S 14b "mostly soft stone" is comprised entirely of steatite seals; the two seals whose material is described as something else, XII 63 of "black marble" and II 2.14 of "dark green jasper", are both probably of steatite. One gable seal, II 1.289, has a rectangular face, which is unique in this group and slightly ironic since it is the only one that truly forms a gable; one of its short, roof-top, sides carries concentric centered circles, a MS motif (cf. II 2.330 and VIII 26). Two other seals in this list are more likely odd lentoids: II 2.53, whose face motif resembles that on the Lentoid V 429 from the Vev Tholos at Akones and whose slightly conical reverse is uniquely engraved with four circles; and CS 93 with a lightly engraved cross with two concentric circles in each quadrant.

⁴⁶ II 1.447 comes from Viannos, 393 and CS 96 from Archanes, II 2.207 from Prassa, 215 from Samba, and 216 from Gouves; II 1.421 comes from Siteia, 485 from "Kritsa", and II 2.260 from Palaikastro.

⁴⁷ "The motifs carved into Gables differ distinctly from those of Prisms" (56) and "Prisms are distinguished from the superficially similar Gables" (67).

nes Script (two seals PY lists as gables but may actually be prisms with such signs, II 1.389 and 393).

It would seem, therefore, that the Gable, S 14, developed into the Prism, S22,⁴⁸ at the time of the Mallia Workshop, which also created elliptical prisms that eventually evolved into the amygdaloid prism and influenced the creation of the amygdaloid.

The rectangular bar or four-sided prism seal, S21, is one of the few classes that seems reserved for Hieroglyphs, the soft stone bars for Hieroglyphic A, the hard stone bars for Hieroglyphic B, although three (not two, *pace* PY) soft stone bars are also engraved with Hieroglyphic B (HM 2184, IV 138 and X 52).

PY lists 25 examples of the hard-stone rectangular bar seal, but he makes a few errors in the summary of his conclusions. The soft stone bars are not larger but generally smaller (typically 0.6–0.9 × 1.4–1.7)⁴⁹ than the hard stone ones (typically 0.5–0.8 × 1.6–1.8 or slightly larger); in other classes, it is the other way around: the hard stone seals are usually smaller than the soft stone varieties. Of the materials, I count one of gold (CMCG 110), six of cornelian (I 425, AGDS II 7 = XI 14, XII 112, and CS 147, 148, and 169), and ten of green jasper (the four listed in II 2 plus IV 136, VII 40, XII 113, and CS 150, 151, and 170); at least two are of chalcedony (XII 95 and 109); XII 107 seems burnt, probably originally of cornelian. XII 108, said to be of red jasper, is almost certainly of steatite; its motifs and style are peculiar (cf. XII 86).

It seems probable therefore that for Hieroglyphic Script B this class of bar prism needed to be of green (jasper) or red (cornelian) stone.

Buttons (S5) form a short-lived class, overlapping as a ES and MS shape. They begin first with seals in the Petaloid/Star Group, a subgroup of the B/L Complex (e.g., II 1.90 and 247) and near, at least, the Platanos Goat Group, a group allied with the Mallia Workshop (e.g., II 2.21 and V 487); the latest carry motifs found amongst the Phaistos sealings: wood-drilled circles (e.g., II 2.38, 66, and 209), concentric centered circles (e.g., IV 78; cf. II 5.169), papyrus (II 1.110 and CS 74; cf. II 5.176), etc.

Another similarly overlapping class is the Foliate Back (S13).

ES Shapes

The remaining seal shapes are more or less restricted to the period before the introduction of the horizontal bow-lathe. A few have enough examples

⁴⁸) Another interesting correspondence in shape is that softstone prisms, being taller than softstone gables by definition, seem to have smaller faces (typical prisms D. 1.2–1.4 and H. 1.0–1.3; typical gables D. 1.4–1.6/1.7 and H. 0.5–0.9), as if to retain the same mass.

⁴⁹) Three of the four smallest ones are discards from the Mallia Workshop.

to reveal a typology. These are discussed here in roughly chronological order.

Two classes of seals, both exclusively from the Messara and both probably restricted to EM II (-III), are said to be made of ivory or bone. It is very difficult, though not, in all cases, impossible to distinguish the two materials; one needs a microscope and the realization that no bone has enough material for making a solid seal thicker than ca. 1.0 cm. From the dimensions given, both classes seem to be made of bone, not ivory.

The epomia or shoulder-shaped seals of PY's S12, constitute a homogeneous class; they were carved from curved sections of bone wall with the seal face occupying the septum, the internal projection down the interior length of a bone like a seam; the face is almost always decorated with some kind of hatching. While the dimensions vary widely, the typical width of the epomion's face (i. e., the height of the original bone's septum) tends to range between 1.4 and 2.0, with lengths from 1.9 to 3.2; epomia with narrower faces are also shorter (0.8-1.3 × 1.7-2.3). No publication gives the thickness of the seal, but none should be thicker than about 1.0 cm.

Epomia also exhibit peculiar Delta-shaped SH's, presumably so they could be strung on necklaces. They are, then, decorated pendants.

Another seal cut from the wall of a bone is the class of Concave-Convex Plates, S5; each seal has just one edge engraved, usually with some kind of hatching. Since the seals are cut from a bone wall, the width of the face corresponds to the thickness of the wall itself. Thus, these seals tend to have a narrow range of widths, from 0.9 to 1.1; seven of the twelve seals in this class also keep the length of the face and the height of the seal about the same so in elevation the seal is approximately square.

It seems fairly clear that the bottle (S3) and the early signets (S31a-h) participated together in a development toward the Petschaft (S31i-k).

The Petschaft (S31i-k) is basically a short-lived MS shape in hard stone (amongst the earliest are II 2.129 and 130 from the Mallia Workshop), though the earliest example of the shape may be the ivory/bone example X 47 which carries a waterbird, hatched like many motifs common to the B/L Complex.⁵⁰)

Bottles (S2) are basically piriform with an articulated pierced handle, pinched or hammer-headed (cf. S31b). The simple bottles start in EM II and continue contemporary with the PL/S Complex (cf. II 1.473); in MM I many have grooved sides (cf. S31c), perhaps a decoration preliminary to the more articulated and lathed Petschaft, carry motifs (II 1.86) associated with the Petaloid/Star Group, which is a group allied with the B/L Complex, and some have animal-head finials (S33b); bottles in fluorite (S3c; II

⁵⁰) PY lists the context date EM II-MM I for II 1.334 (S31i) from Platanos Tholos Gamma, though CMS II 2, p. 272, give EM II-MM II; II 1.334 carries concentric centered circles and radiating lines, a motif that is fairly common amongst the Phaistos sealings (cf. II 5.128-131).

2.432 with a spider, and HM 1567?) seem contemporary with the Mallia Workshop; the latest are the rock crystal bottles II 2.19 with three intersecting circles and 1.103 with cut hatching (cf. the soft stone V 286 with the same shape and similarly late motif), contemporary with the end of the Mallia Workshop and with the Phaistos sealing deposit (cf. II 5.1 and 2).

Stump signets occur in both ivory (S31 a; add CMCg 27) and steatite (V14 [placed in S31 f] and the unfinished 18 of intractable basalt, both from Myrtos [EM II context], and one from a EC II context at Phylakopi (soon to be published). All were probably made in south central Crete.

PY groups five, apparently ES, die-shaped seals in one class, S7; all are basically unique, however. The most carefully made, II 1.64, is a cube of ivory/bone with raised circular faces set off from the main mass. In terms of style, iconography, and size it is similar to II 1.391 from Archanes, a unique seal consisting of three stacked cubes with a thick cylindrical handle. These two seals carry motifs belonging to the B/L Complex.

The other cubes are all of soft stone. The one from Porti carries two circular designs that seem appropriate for sealing motifs, but its diagonal SH makes wearing it uncomfortable. The three others carry uninspired decorative crosses that imply these objects were just beads or perhaps gaming pieces. The two from Platanos, II 1.338 and 339, are apparently by the same artist, but apart from material and vague iconographic similarities these two seals are different in decorative scheme and size; it would seem that the artist had no fixed idea of the shape, a conclusion that applies for the class as a whole.

Stamp cylinders (S32 a & b) and hemispheroids (S18) of ivory/bone seem restricted to the EM III-MM I period. Very few could be earlier; cf. II 1.105, and compare the cylinder IV 41 a with the sealing V 177 from Lerna. The solid cylinders, however, belong mainly to the PL/S (e.g., II 1.300, 310-312; cf. II 1.37; II 1.313 belongs to the B/L Complex). The hollow ones of bone with the marrow scraped out and disks pegged in to cap the hollow centers belong to the B/L Complex and to later groups; II 1.392 carries Archanes Script and a B/L caprid; IV 42 carries wood-drilled circles, and II 1.6-10 and 480 and 482 have neatly cut hatching, all resembling some motifs amongst the Phaistos sealings (II 5.205, 1 and 2).

The other classes have few standardized examples on which to base a typology.

III. Conclusions

PY's study focusses sharply, then, on the period after the EM II destructions and before the Phaistos sealing deposit. In this second phase of early glyptic we see clearly how the Parading Lions/Spiral Complex yields to the Border/Leaf Complex in the Messara and how the Mallia Workshop in the north central part of Crete seems to have arisen at a time when the Border/Leaf Complex had already developed.

For the earlier and later periods, however, ECS is sketchy and, at best, tantalizing.

Though it is apparent in PY's study that the stump signets and small stamps of soft stones and ivory/bone incised with hatching and random scratches belong towards the end of the EM period, a clearer picture of the glyptic situation at that time will emerge only when the seals from the mainland and islands are brought into consideration. The many parallels between Messara seals and seals and sealing designs from the Argolid, Ayia Irini in Keos, and elsewhere on the mainland and in the northern Aegean should reflect a glyptic koinê before the EH/EM II destructions, a koinê that has not yet received a detailed treatment.

While some of the products of the Border/Leaf and Mallia Workshop continued in use long enough to impress sealings found fired in the Phaistos deposit, they both had probably ceased production by then. The new drilling techniques we see in the latest products of the Mallia Workshop seem but experiments next to the more confident seals that impressed the majority of the Phaistos sealings.

Those seals at Phaistos were recent developments, seals of semi-precious stone and finger rings of precious metal; their hard materials necessitated a precise and sharp engraving for which the artists created new geometric motifs of brilliantly cut patterns and new figural compositions set off by ample space.

The late MS material is even more interesting, for its artists were participating in a general sculptural renaissance that also included plastic ceramics, relief vases, and relief frescoes. We need a study detailing how the early tectonic seals, reflected in the Phaistos deposit, developed into the later Architectonic and Talismanic seals, and, especially, how the early figural groups like the Palaikastro Cat Group developed into the mannered compositions with people and animals endowed with exaggerated musculature.

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Appendix I: Reviews of ECS

- Anonymous, *Greece and Rome* 29 (1982) 208.
 M. S. F. Hood, *Antiquity* 58 (1984) 70-71.
 H. Hughes-Brock, *CR* 33 (1983) 88-89.
 A. J. D. Monedero, *Archivio espanyol de arqueologia* 55 (1982) 223-225 [J.G.Y. has not seen this].
 R. Pittioni, *Archaeologia Austriaca* 66 (1982) 163 [J.G.Y. has not seen this].
 J.-C. Poursat, *Gnomon* 56 (1984) 53-56.
 M. H. Wiencke, *JHS* 105 (1985) 237-238.

Appendix II: Collation of Emendations, etc.

Note: Yule publishes a list of Corrigenda on the penultimate endpaper; these are included below (with PY given at the end); the present and previous reviewer notes are also included with the initials of the reviewer given at the end.

ECS

p. & ln. Comments & Reviewer (see Bibliography, Appendix III)

(the numbers refer to pages and lines of text, excluding headers)

passim "Moh" or "Moh's" read "Mohs" [HHB].

x after "Etrécrt" add: "FAMC = Fogg Art Museum, Cambridge" [HHB].

20.24 "Krassi," read "Krassi," [JGY].

30 last row "34aa" read "34z" [HHB].

31.8 "IV 80", read "IV 180", [JGY].

31.12 "443;" read "443," [JGY].

32.13 "workmanship" read "workmanship." [JGY].

32.30 "is pierced" read "is not pierced" [HHB].

39.4 "lunette" read "lunate".

45.21 "1888," read "1880," [JGY].

47.18 "productions" read "production" [JGY].

49.11 "regualrly" read "regularly" [JGY].

53.14 "CS 145" read "CM 145" [HHB].

55 add to Class 13 b: EtCrétoises XXVI no. 250 of faience [J-CP].

57.21 "IV 1;" read "AGD IV Hannover 1;" [JGY].

.25 "II 2 4," read "II 2 14," [JGY].

65.27 "but two exam-" read "but three exam-" [JGY].

66.7 "(three)." read "(five)." [JGY].

67.28 HM 1332 = II 3.31 [JGY].

68.21 "subcalss" read "subclass" [JGY].

82 add to Class 31 c: EtCrétoises XXVI no. 239 of steatite [J-CP].

84.1 "CMS V 284" read "CMS V 484" [JGY].

84.10 "startified" read "stratified" [JGY].

85 last ln add? to Class 33 i [HHB]: Reich, JHS 86 (1966) 165 no.12, handle cut away (Boardman, JHS 88, 1968, 5 n.12 and cf. Island Gems 143 no.1) and AM 1963. 1212 (AR 1963-4, 51).

91 CMS II 1.366 is not certified as coming from inside the Porti Tholos; exterior levels contained later pottery [SH].

96 add to Class 33 h [HHB]: University of Missouri-Columbia (Muse 9, 1975, 8f. no. 144).

foot
steatite

H. 4.4, W. face 1.3, L. face 5.7.

101.8 ff. omit? Class 34 e) Cross [HHB: cf. the later (LH II?) AM 34 (1909) pl. 13. 29 from Kakovatos Tholos B and two in GGFR 391].

102.29 ff. omit? Class 34 p as later, perhaps belonging with vase-shaped pendants [HHB].

104.13 "plan" to be moved 12 mm left, under "c" [PY].

105.20 omit: "Several 6g miscellaneous Conoids ... Old Palatial Period." [HHB: no 6g is listed as coming from any dated context and only one 31f (CMS II 2.61) comes from a MM III context and is probably an heirloom].

109 n. 100 "XII 122" read "XIII 122" [JGY].

112 n. 163 "V 77 a, c, 78 a-c." read "XII 77 a, c, 78 a-c." [JGY].

117.18 "(1972) 1." read "(1972) 179-187." [HHB].

120.35 "Nos. 48-54" read "Nos. 50-54" [HHB].

121.28 Omit? no. 48: CS 204 [JGY, Kadmos, 16, 1977, 155 n.74: forgery?].

125 add to Bulls: II 2.77 [HHB, SH].

131.7 "glyptic" read "glyptic." [JGY].

- 131.31 no. 10 is probably not pre-classical [HHB].
 133 omit Motif 11.14: not "chicks" but people [J-CP].
 139.8 "HM 202" read "HMs 202".
 .10ff omit all references to "hippopotomos", transferring no. 1 (i.e., II 2.77) to Motif 3 "Bulls" [HHB, SH].
 142.36 omit last paragraph, since Motif 21.7 depicts shells [HHB, J-CP].
 143.4 omit Motif 21.7 since it depicts shells [HHB, J-CP].
 149.21 "motif is clearly" read "motif also is clearly" [PY].
 155.10 etc. The term "croix pomée" has been used for years; should we not keep it? [JGY].
 159.16 "rootation" read "rotation" [PY].
 160.24 "S-spirals" read "they" [PY].
 163.29-30 CS 196 (Motif 49.8) comes from Gortyn, as Kenna states [HHB].
 167.8 "MM II (-III?)" read "MM II" [PY].
 170.31 "departure.¹⁴⁴" read "departure for chronological purposes.¹⁴⁴" [PY].
 172.11 "stauk" read "stalk" [JGY].
 174.11 "the circle" read "the outer circle" [PY].
 176 Header "GENERAL OBSERVATIONS" read "DECORATIVE ELEMENTS" [JGY].
 178 n. 45 "butterflys and dragonflys" read "butterflies and dragonflies" [JGY].
 181.12 "1971)" read "1973)".
 182 n. 142 "4111" read "411" [JGY].
 189.15 "(FKS 340, 267)" read "(FKS 240, 267)" [PY].
 190.21. "theirs'." read "theirs." [JGY].
 198.9 "are exceptions" read "are possible exceptions" [PY].
 .31 "parentheses)" read "quotation marks)" [JGY].
 203 n. 61 "However" read "G. Herrmann, Lapis Lazuli: the Early Phases of its Trade," Iraq 30 (1968) 21-57. However" [HHB].
 204 n. 81 "140-141." read "140-141. M. J. Becker, "Minoan Sources for Steatite and Other Stones Used for Vases and Other Artifacts. A Preliminary Report," *Deltion* 30.A (1975) 44-85 and "Soft-Stone Sources on Crete," *JFA* 3 (1976) 361-374 [HHB].
 208.19 "Class 26" read "Class 25" [JGY].
 .20 "eight" read "seven" [PY].
 210.31 ff. omit the last two sentences, since CMS II 2.109 does not come from the Atelier and may have been a heirloom kept in Quartier Mu. [J-CP].
 222.23 "some show" read "they show" [PY].
 223 n. 27 omit "The 'MM II' Scarab ... [1935-36] 17).", since the seal in question, CS 126, was discovered in 1897, too early to be a forgery. [HHB].
 226.36 "system to" read "system at least to" [PY].
 227.40 "eight" ready "eighty" [PY].
 232.13 "prepresentations" read "representations" [PY].
 237.4 AM 1890.99 is published in S. Casson, *AntJournal* 7 (1927) 39 ff. no. 7, pl. v. 7 and in *The Technique of Early Greek Sculpture* 45 fig. 17 a. 7. [HHB].
 245.41 "(1980)" read "(1980) 97-105" [PY].
 Plate 7 "B. Full-length figures" begins with nr. 3 [PY]; erroneous emendation: nr. 3 is Kn KSPI L35 with 3? canine heads, noses to center, counterclockwise [JGY].

Appendix III: A Select Bibliography for Early Aegean Glyptic (excluding reviews of ECS; see Appendix I)

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Peter Högemann: *Alexander der Große und Arabien. Zetemata, Monographien zur klassischen Altertumswissenschaft, Heft 82, Verlag C. H. Beck, München 1985, IX und 236 Seiten.*

Das Interesse an traditionellen althistorischen „Randgebieten“ erlebt eine weise Renaissance. Nicht nur die zunehmende archäologische Erforschung und entsprechende Entdeckungen in Ländern z. B. des Nahen Ostens (wie eben Arabien) tragen zu dieser Entwicklung bei, sondern auch die allgemeine Wendung unserer heutigen historischen Forschung zu Berührungspunkten und -bereichen der griechisch-römischen Antike mit Kulturen, die sich mehr oder weniger an sie angepaßt und in der Regel quellenmäßig in ihrem Schatten gestanden haben. Die Epigonen eines bis zum Überdruß erneuerten exklusiv-europäischen Klassizismus sehen nun oft in dem, was mit Momiglianos Begriff „Alien Wisdom“ so schön apostrophiert wurde, eine echte Bereicherung ihres geistigen Tätigkeitsfeldes¹).

Die antiken Araber sind bis vor einigen Jahren für die Sparte der Althistoriker, was besonders die Nachkriegszeit betrifft, höchstens in spontaner Assoziation mit den weitgefächerten, wenn auch jetzt methodisch zumindest einem anderen Zeitalter verhafteten, Studien von *F. Altheim* und seinem Kreis²) wie auch der systematischen Ausgabe und Studie zahlreicher, insbesondere nabatäischer Monumente und Inschriften³), ins Blickfeld gekommen.

¹) Für die Entwicklung sowohl des gesamteuropäischen wie auch des speziellen neu-griechischen Geschichtsbewußtseins ist wohl jetzt die Veranstaltung einer Reihe von Kolloquien in Delphi mitbezeichnend, die das „European Cultural Center of Delphi“ unter dem Obertitel „Hellenism in the Orient“ veranstaltet (das erste der Reihe hat im November 1986 stattgefunden). Zum Omphalos paßt eine solche Problematik: dort nimmt z. B. auch die Handlung von Heliodors „Aithiopia“ ihren tatsächlichen Anfang.

²) Vgl. vor allem das fünfbandige Sammelwerk: *F. Altheim und R. Stiehl, Die Araber in der Alten Welt, Berlin 1964-1969.*

³) Wir verdanken sie grobenteils einer ganzen Schule französischer (und frankophoner) Gelehrter. Heute wirkt für diese langjährige Tradition vielleicht der Name von Jean Starcky am repräsentativsten.