

SEALS AND BEADS: THEIR SHAPES AND MATERIALS COMPARED

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That many of the materials used for beads and seals tend to be associated with a particular range of forms is a fact we are all in a general way aware of. I want here to consider these relationships in more detail. How far does the choice of shapes to 'go with' each material depend on the physical properties of the material, and how far does it reflect cultural factors such as symbolism and taboos, whether native Aegean or part of the 'cultural baggage' brought in by certain imported materials? How much, in other words, is due to 'nature' and how much to 'nurture'? Secondly, why are some materials used predominantly for beads, others predominantly for seals, and what cultural, social and economic inferences might the differences suggest?

The briefest perusal of CMS II,1 and CMS IV or of Yule's table 'Overview of Shapes' (Yule, ECS 27ff.) suffices to strike one with the astonishing richness of the earliest Minoan seal-makers' creative imagination — and with the contrast with later generations, which had so many more materials and advanced techniques at their disposal but did so much less with them.

The shapes most closely tied to material are those in bone, particularly the epomion (e.g. CMS V Suppl. 1A Nos. 295–298), concave-convex plates (e.g. CMS V Suppl. 1A No. 144; cf. Yule, ECS 38f.) and ring and hammer-headed shapes (e.g. CMS II,1 Nos. 6–10. 31–36; V Suppl. 1A Nos. 285–294), whose basis lies in specific configurations of the metapodials.¹ Shapes in ivory, whether from elephant tusk or from the canines or incisors of hippopotamus, have more freedom, the greater amount of compact and solid material making possible chunky hemispheroids and theriomorphs such as CMS V Suppl. 1A Nos. 16–21.² The sim-

* Mrs. A. Xenaki-Sakellariou very generously gave me permission to publish Giamalakis 3118 and I am grateful also to Dr. Ch. Kritzas and the Archaeological Service for publication permits for that piece and HM 2232. Figs. 1b and 2 are from the CMS archive; drawings Fig. 1a are mine, kindly inked by Dr. R.D.G. Evely. For Fig. 3, reproduced from J.C. Overbeck, *Keos VII*, Pl. 104c and for pertinent information I thank Mrs. G.F. Kerr and Dr. T. Blackburn. For other information I thank Dr. M. Trad (Egyptian Museum, Cairo), Dr. A.P. Kozloff, A. Caropresi and M. Ballantijn (Egyptian decorated cornelians), Miss M.T. Price of the Univ. Museum, Oxford (enstatite; CMS X No. 53), Prof. Sir J. Boardman, Dr. M. Henig, Dr. O.H. Krzyszkowska, Dr. P.R.S. Moorey and Prof. I. Pini.

¹ O.H. Krzyszkowska, *Ivory and Related Materials. An Illustrated Guide* (BICS Suppl. 59, 1990) Figs. 22. 27. 28; ead. in: CMS Beih. 3, 117ff. Pace A. Blasingham, *Hydra 10*, 1992, 9 sheep bones are just as usable as cattle, and leg bones could be obtained by seal-makers before cooking without significant sacrifice of food, since there is little meat on them (O.H. Krzyszkowska, personal communication).

² Yule, ECS 61. 91ff.; H. Hughes-Brock in: CMS Beih. 3, 82.

pler cone, pyramid and cylinder shapes are closer to the raw material (tusk tips) but are produced with plenty of variation and elaboration (e.g. CMS V Suppl. 1A Nos. 34–37).

The mysterious pieces dubbed by Pini 'weiße Stücke' display a certain preference for scarab- and round-faced shapes but exhibit the same play of imagination (e.g. CMS V Suppl. 1A Nos. 213–215 and especially the theriomorphs 221–225).³ The still poorly understood material (apparently consisting in at least some cases of a base of silicate of magnesium)⁴ is clearly versatile and easily worked and counts in some sense as the first artificial material for seals, a clever invention which satisfied the carver's wish (need, when harder substances were beyond his capabilities) for a soft material and the 'consumer's' wish for a product which is strong and durable. Similar inventions were made in other regions; a comparative study of all of them might cast interesting light on the spread of technology. Alongside the early 'glazed steatite' of Egypt and Mesopotamia and the white material of the 'Gulf seals' of Dilmun (the Bahrain area) we can set the hard-baked paste of talcose steatite used in Harappan India.⁵ The last substance must be a craftsman's dream — Mohs 1 in working state, increasing dramatically to Mohs 6 or 7 after firing. It is also an archaeologist's dream, because it was used for tiny disc beads, which survive in myriads, making analysis by destructive techniques no problem.⁶ Unfortunately in Crete we have only seals so must wait, as Pini has pointed out, until chance presents us with some badly preserved specimen or uninformative fragment which can be sacrificed to science. Meanwhile one can ask, if the material of our 'white pieces' was so capable of producing interesting seal shapes, why was its use so short-lived and so limited? Was its manufacture tricky or tedious or costly? (Grinding the steatite to powder to make the Indian paste must have been a laborious job!). Was it a secret technique guarded by a few workshops or even a single family, as the distribution of findspots, known and alleged, might suggest? Certainly it is overwhelmingly a seal material. CMS IV Nos. 100–102, each described by Sakellarakis and Kenna as 'perhaps a bead' (presumably because of their relatively uncommon cylindrical shape), can now be recognized as simply members of the 'white pieces' seal family, No. 101 being a particularly

³ I. Pini in: *Pepragmena* 6, 115ff.

⁴ *Ibid.* 124f.

⁵ W. Boochs, *Siegel und Siegel im Alten Ägypten* (1982) 97; P.R.S. Moorey, *Materials and Manufacture in Ancient Mesopotamia. The Evidence of Archaeology and Art. Metals and Metalwork. — Glazed Materials and Glass* (BAR-IS 237, 1985) 133ff.; D.T. Potts, *The Arabian Gulf in Antiquity*, I (1990) 110ff. 159ff. 277ff.; M.R. Mughal, *The Dilmun Burial Complex at Sar* (State of Bahrain, Directorate of Archaeology and Museums, 1983) 64f.; K. Frifelt, *The Island of Umm an-Nar*, I (*Jutland Arch. Soc.* XXVI,1, Aarhus 1991) 116; J. Deshayes, *Syria* 51, 1974, 254; E.C.L. *During Caspers in: J. Schotsmans — M. Taddei* (eds.), *South Asian Archaeology 1983* (Istanbul University Oriental series minor 23, 1985) 435ff.

⁶ K. Hegde, *Archaeology* 36, 1983, 68ff. The combination of components of the Indian material (60% silica, 30% magnesia, etc.) occurs naturally in talcose steatite. Firing at over 850° would cause the mineral to decompose and give off its water of crystallisation, forming a mixture of cristobalite, alumina and (synthetic) enstatite. This suggests similarities to what has been observed about the surface, at least, of our 'white pieces'.

What of the Los Angeles cylinder? See H. Hughes-Brock in: *CMS Beih.* 3, 84 n. 29. I was then unaware that enstatite can be synthetic. Natural enstatite, Mohs 5–6, is usually greenish. Enstatite is a chain silicate belonging to a problematical group which has been redefined several times.

straightforward member of Yule's Border-Leaf Complex.⁷ So far only two objects have come to light which appear to be beads, i.e. unengraved (v. infra).⁸

It is a paradox of human nature that the greater the challenge is, the more lively the response. The organic materials with their limiting properties, and in the case of bone really rather uncompromising configurations, elicit an imaginative range of shapes. The soft stones, available in masses big enough to make large vases of and not cursed with awkward fracturing habits, can be worked to any shape at all but in fact seem to follow the lead of the white materials fairly tamely, content for the most part to decorate the ivory-based cone shapes with torsional fluting and ladder incising⁹ and occasionally even imitating the characteristically bone ring shape and hammer-head profile.¹⁰ The insignificance of terracotta for both seals and beads is likely to have a socio-economic explanation: an engraved object (whether or not used for impressing) had a value which required a more prestigious and hard-wearing material while humble beads could be made of clay without the expense and trouble of firing.¹¹

If the early white and soft-stone seal shapes are the peacocks of Minoan seal forms, the contemporary beads are certainly peahens. The hundreds of beads visible at a glance in Xanthoudides' *The Vaulted Tombs of Mesará* (e.g., Pl. LVIII) are mostly quite simple — spheres, discs and cylinders, almondish forms, bicones and barrels. The occasional segmented cylinder is the most adventurous and ambitious shape, inspired ultimately, perhaps, by crinoid stems (fossilised echinoderms) or as a 'short-out' devised during the manufacture of small disc beads.¹² Many of these beads are of the blue-grey or blue-greenish

⁷ Yule, ECS 47.

⁸ Pini (supra n. 3) 126. The 'microbeads' from early Cretan sites appear to be simply of soft stone, though most, as far as I know, have not been examined especially closely.

⁹ Yule, ECS 39ff. class 6a. 6b. 6f.

¹⁰ e.g. Kenna, CS 32; CMS V Suppl. 1A No. 114, cf. 292. 293 and remarks p. XVIII. Cf. J.G. Younger, *Hydra* 8, 1991, 43. (Evans's idea, PM III 139, is out of date.) On imitation, however, Walberg thoughtfully remarks, "The idea seems to have been to create different possibilities of perception and interpretation rather than actual imitation." (G. Walberg, *Tradition and Innovation: Essays in Minoan Art* [1986] 15f.).

¹¹ On seals see I. Pini in: *Aux origines de l'hellénisme; la Crète et la Grèce — hommage à Henri van Effenterre* (1984) 73ff.; on beads, J.G. Younger, *Hydra* 8, 1991, 35ff. and H. Hughes-Brock in: *Nichoria II* 633. On the rather curious early trio from Gournia CMS II,1 Nos. 464ff. see now V. Fotou's account of the findspots, all Neopalatial: V. Fotou, *New Light on Gournia*, *Aegaeum* 9, 1993, 26f. 33ff. Nos. 2. 8. 12. CMS II,1 No. 466, a big fat disc, is hardly an orthodox Minoan seal. One face looks uncannily like a debased Egyptian palm, as well as like the man and dots on a terracotta disc from much farther away: P. Kjaerum, *The Stamp and Cylinder Seals. Failaka-Dilmun, the Second Millennium Settlements*, I,1 (*Jutland Arch. Soc. XVII*,1, Aarhus 1983) No. 332 (where also, p. 9, remarks on glazed steatite — cf. supra n. 5). On the other face the quartered circle with dot within each quarter is too ancient and international a device to tell much: cf. Pini op.cit. 76 and Younger op.cit. 44. It appears, e.g., on Oxford, Ashmolean Museum No. 1968.1843, associated with allegedly Cretan fakes but probably genuine, perhaps from S.E. Europe (some associated fakes were seized in Salonica): see H. Hughes-Brock in: CMS Beih. 3, 85f. n. 36.; also on CMS V Suppl. 1A No. 270 (if genuine); on CMS II,2 No. 61 it must have looked old-fashioned beside Nos. 59. 60.

¹² K. Oakley, *Antiquity* 39, 1965, 16. H. Barge, *Les parures du néolithique ancien au début de l'âge des métaux en Languedoc* (1982) 26 Fig. 2.7. The Museum of Fine Arts, Boston, kindly allows me to mention a small group of beads of characteristic shapes on anonymous loan there, said to be from near Lebena (see forthcoming MFA Aegean Catalogue). Several recent books unfortunately caption as 'Prepalatial' *tout court* a colour photo-

stone found in pebble form on the local beaches. Although not unattractive, they might be thought dull in colour, but perhaps they contrasted effectively with the colours of garments or bare skin, and in any case we need, as always, to remember that they may have been worn alongside brightly coloured beads made of perishable things like seeds, painted wood and (unbaked) painted clay.

The Prepalatial beads exhibit a curious phenomenon which seems to last throughout the Bronze Age (and which I hope to treat of elsewhere) — the absence of white beads. A search through the publications of dozens of sites all over the Aegean yields extremely few beads of bone, ivory or even white stone. Why? Perhaps white was simply considered not 'decorative', but the scarcity is so pronounced that one wonders whether there was not perhaps some kind of taboo. Was white, the colour of bone, unlucky to wear on one's person? Was white associated somehow with death and mourning, like black with us? We ourselves do not use black much for jewellery; the jet and black enamel in fashion several generations ago was produced specifically for mourning wear. Whatever the reason, the contrast here between plain beads and engraved objects is striking.

The difference between beads and seals is not always a simple matter, however.¹³ How were they distinguished, and how sharply, in the Minoan mind? In our own minds there is clearly some confusion. The ultimate question, for us, is not, how do we use such-and-such an object but whether we put it in the CMS or not. CMS IV Nos. 100–102 did get admitted to the CMS in 1969, though under suspicion as possible beads, and subsequent study has vindicated their presence there. But then why not the tiny green cylinder from Mochlos Tomb XX with its neatly spiralling ladder ornament (cf. CMS II,2 No. 7)?¹⁴ The cylinder Sakellariou, CollGiam 222 looked to Xenaki-Sakellariou in 1958 more like a Neopalatial bead; Buchholz simply follows her. Yule in 1980 took it without question for a seal, however, putting it 'near' his Border-Leaf Complex (Pini and I would say MM II or III).¹⁵

Simple stone pendants like Mochlos XIX 14 and recent finds from Kommos and Krotos Kainourgiou raise the same question (cf. CMS V Suppl. 1A Nos. 62–63).¹⁶ There is a further complication when the shape of the object makes it unsuitable for sealing (as CMS II,4 No. 239, with Pini's remarks, LXXI) or when the incisions are too shallow to make any useful impression (as on CMS I Suppl. No. 36) though they are clearly intended to 'add something' to the object and usually reflect some at least elementary considerations of design (compare here CMS V No. 16 with No. 17 — one lightly scratched, one quite deeply).

graph of the Mochlos 'necklace' despite its talismanic seal and LM relief-beads (not Seager's mistake: R.B. Seager, *Explorations in the Island of Mochlos* [1912] 78f. No. XXIIa Pl. X). For some remarks on the Mochlos beads and their materials see K. Branigan, *Aegaeum* 7, 1991, 101.

¹³ For a thoughtful consideration of beads, pendants, seals, amulets, spindle whorls, tools, net weights, burnishers, touchstones see P. Francis, *Ornament* 11,3, 1988, 33. 66–76. Cf. id., *Man Makes his Mark. 7500 Years of the Seal — an Exhibit Catalogue* (Center for Bead Research, Lake Placid N.Y., 1989) 1f.

¹⁴ Seager (supra n. 12) 75 Fig. 36. Some confusion: H.-G. Buchholz in: G. Bass (ed.), *TransactAmPhilosSoc* 57, 1967, 155 No. 33 (the object is in HM).

¹⁵ Yule, *ECS* 47. 209. Buchholz (supra n. 14) 153 No. 16 ('134' is wrong). Translucent red-brown cornelian.

¹⁶ Seager (supra n. 12) 72 Fig. 41. Kommos, from MM III deposit in house X: M.C. Shaw, *Hesperia* 62, 1993, 136 Pl. 20b.c. Krotos Kainourgiou: A. Pariente, *BCH* 114, 1990, 829 Fig. 204 left.

The field is often halved, sometimes quartered, the remaining lines sometimes forming a neat pattern but sometimes straggling at random (e.g. CMS II,1 No. 197).¹⁷

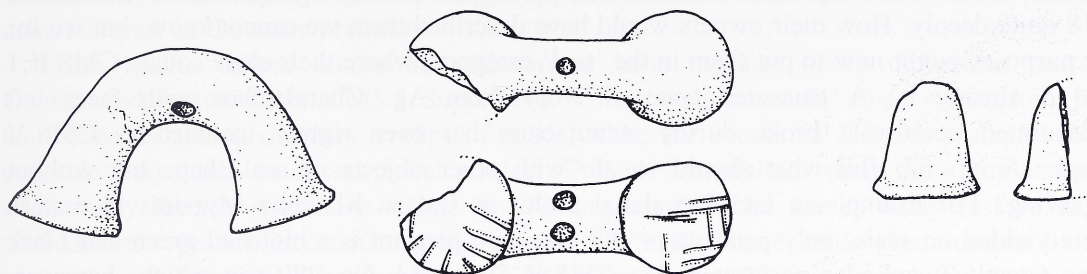


Fig. 1a White stone 'seal' from Mochlos. Heraklion Museum, Inv. No. 2232. Scale 1:1.



Fig. 1b Heraklion Museum, Inv. No. 2232.
Scale approx. 1,5:1.

Fig. 2 Heraklion Museum, Coll. Giamalakis
Inv. No. 3118. Scale approx. 1,5:1.

¹⁷ On early devices from Myrtos, Krasi, Lebena see M.H. Wiencke in: CMS Beih. 0, 155f. For quartered circle designs parallels from outside the Aegean abound. See G. Brunton, Qau and Badari I (1927) Pls. XXXII-XXXIII; A. v. Wickede, *Prähistorische Stempelglyptik in Vorderasien* (Münchner Vorderasiatische Studien 6, 1990) Nos. 206. 511. 513. 522. 532; M. Gimbutas, *The Gods and Goddesses of Old Europe* (1974) Figs. 48. 80 and esp. remarks p. 89-91 on the year as 'a journey embracing the four cardinal directions', thus the recurrent cycle of life. Cf. also supra n. 11 and (on technical aspects) J.H. Betts in: CMS Beih. 3, 9.

Such schemes occur also, however, on two objects of unequivocally 'seal' shape and colour which I publish here by way of example: HM 2232, a surface find from the cemetery area on Mochlos (but imported from the Mesara?)¹⁸ and Giamalakis 3118 (*Figs. 1. 2*). The shape of HM 2232 looks like a concave-sided cylinder bent round; both are somewhat reminiscent of a curved pendant from Paros.¹⁹ HM 2232 is only lightly incised, Giamalakis 3118 quite deeply. How their owners would have described them we cannot know, but we for our purposes ought now to put them in the 'seal' category, where their close cousin CMS II, 1 No. 15 already is. A truncated cone of ivory from Ag. Charalambos with faces left undecorated because it broke during manufacture has been rightly included as CMS V Suppl. 1A No. 37. But what should we do with other objects of seal shape but without engraving? For example, a late Prepalatial tholos at Galana Kharakia Myrsinis in eastern Crete yielded no seals, only pendants — but one such pendant is a blotched green and black stone (steatite?) cylinder perforated like CMS V Suppl. 1A No. 270 (on which, however, M. Tsipopoulou sees disquieting features) but with its ends blank.²⁰ The combination of shape and perforation in both these pieces is characteristic of the white materials.²¹

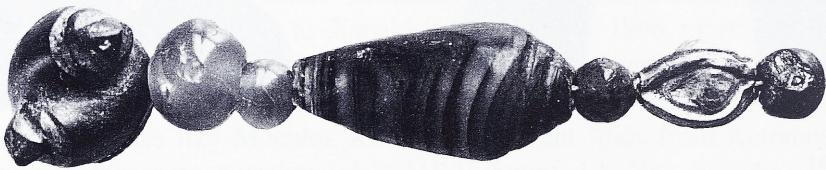


Fig. 3 Beads from Keos, grave 24.

Sporadically throughout the seal-making centuries we find objects of seal shape but blank. Pini mentions two such in the shape of intertwined animal foreparts, the only 'beads' among the well over 100 'white pieces' now known.²² What appears to be a third animal-foreparts object, but of cornelian, was found with cornelian and other beads in a MC grave on Keos —

¹⁸ Found by me, 21 May 1963, complete but in two pieces (one now missing as in *Fig. 1b?*). Δ-boring. White (?)steatite — Cretan or imported?

¹⁹ Pyrgos, tomb 105 (Ch. Zervos, *L'art des Cyclades* [1957], *Figs. 257–259*; J. Thimme, *Art and Culture of the Cyclades in the Third Millennium B.C.* [1977] *Fig. 105*).

²⁰ Thus N. Platon, *KretChron* 13, 1959, 373f.

²¹ See Yule, *ESC* 90. Contrast the perforation of CMS VIII No. 35, a lightly scratched stone cylinder.

²² Pini (*supra* n. 3) 126.

interesting, since Cretan seals of the period did not travel to the Cyclades (*Fig. 3*).²³ This is a seal shape in conception, though not very common (Yule, ECS 93f. lists only 15 examples; curiously, of his nine in hard stones three are unperforated). From the 'white pieces' workshop(s) 'beads' come as an oddity, whereas the hard-stone examples are assigned by Yule mostly to his Malia Workshop Subgroup, and at Mallia beads and seals were apparently manufactured on the same premises.

From Mallia indeed comes an undecorated bone cushion — an unfinished seal?²⁴ Unengraved lentoids like CMS I Suppl. No. 8 may well be such, since we seldom find lentoid beads among ordinary groups of beads, while the occasional 'lentoid manqué' (with one side flat) might be a seal-maker's reject.²⁵ With amygdaloids there are complications, since many faceted specimens which have a largeish flat face are certainly just beads, a well-known type not exclusive to the Aegean.²⁶ Such a face made them usable to the seal-engraver, however. The engraver of CMS I Suppl. No. 22 knew this but did not quite eradicate the longitudinal central groove which is a common feature of these beads. Is the faceted lentoid CMS X No. 248 out down from an amygdaloid? The rather large amygdaloid CMS V Suppl. 1A No. 47, unengraved, is of agate, a commoner choice for seals than for beads, so might have been intended originally for seal-making. So might also a few blank three-sided prisms, e.g. a fine agate with its faces set off by a groove and with a granulated gold collar from the Nichoria tholos tomb and one in rock crystal deposited with a Knossian burial — looted or salvaged from a destroyed palace workshop?²⁷

The 'Petschafte'²⁸ of course have no ambiguous overlap with beads. They illustrate indeed a certain gap between beads and seals apparently produced by a combination of the development of palatial society, the growth of oversea contacts and technological progress. The new hard stones and the new-found ability to work them result in the shift of interest from shapes (confined to variations of detail on the basic stalk signet) to an intoxication with material and colour, which vary more in this seal family than in any other and include not only the old soft stones and even apparently bone (CMS X No. 47) but also metals, cornelian and rock crystal, jasper and chalcedony. Jasper and the milky blue-white chalcedony however are rarely found among beads now or later,²⁹ and the yellow jasper of which Kenna, CS 117

²³ G.F. Overbeck in: J.C. Overbeck, *Keos VII* 199. 203 No. 7f.; A.-L. Schallin, *Hydra* 10, 1992, 17ff.

²⁴ O. Pelon, *Fouilles exécutées à Mallia. Exploration des maisons et quartiers d'habitation (1963–1966)* III, *EtCrét* 16 (1970) 68 No. 97 Pl. XXVII,5e.

²⁵ Cf. H. Hughes-Brock in: *Nichoria II* 629 Nos. 2013. 2014. E. and J. Sakellarakis, *Archanes* (1991) Fig. 111 illustrate some gold beads which look lentoid — more economical than full spheres of gold. The technical *raison d'être* for the shapes in seals does not exist, of course, for beads.

²⁶ Mostly cornelian, but not all; cf. *infra* n. 52. N. Wilkie in: *Nichoria II* 282 No. 1286 with references. (Cf. CMS I Suppl. No. 167. A serpentine possibly of this shape is now missing: V.E.G. Kenna in: J.N. Coldstream, *Knossos — The Sanctuary of Demeter* [BSA Suppl. 8, 1973] 127 No. 8 with CMS II,3 p. 89.)

²⁷ N. Wilkie in: *Nichoria II* 282 No. 1293 Pl. 5,117; A. Evans, *Archaeologia* 59, 1905, 479 No. 99a,12 Fig. 101 Pl. XCI.

²⁸ Yule, ECS 85ff. CMS X No. 47 (*v. infra*) is 'apparently bone': O.H. Krzyszkowska's unpublished report prepared for Erlenmeyer auction (*infra* n. 31).

²⁹ Bead published as jasper: J.N. Coldstream — G.L. Huxley (eds.), *Kythera* (1972) 262 No. 10. The chalcedony beads from Mochlos may be imports: cf. *supra* n. 12.

appears to be made is rarely seen altogether in Crete (but much more commonly in Egypt). Terminology, identically, can be a problem with chalcedony.³⁰ One adventurous Petschaft-maker even tried his hand at pyrite — for this hard stone (Mohs 6–6.5), dark from oxidation on the surface, brassy-coloured where broken, is the material of CMS X No. 53 (now Oxford, Ashmolean Mus. No. 1989.75).³¹ The Petschafts were made by the finest craftsmen of the time, connected somehow with the new palaces.³² The supplies of the most prized, most unusual and best imported stones went to them. The makers of beads for mere jewellery got second choice.

The same system would seem to have been at work in the New Palace period. Chalcedony and jasper remain firmly in the seal workshops — jasper perhaps partly because of the association of its red and green colours with talismanic motifs (v. *infra*).³³ Haematite too seems to attract certain motifs (e.g. the butterfly),³⁴ but it may also of course have been the speciality of a particular workshop or group of workshops. Its natural properties appear to make it suitable in any case for the flattish amygdaloids and lentoids, perhaps more so than for globular, cylindrical and fluted bead shapes.³⁵ The high polish which can leave it shining (a dark silver colour) almost as brightly as a mirror is clearly easier to achieve on flat surfaces (though not on the motifs themselves). The conchoidal fracturing of obsidian, the very quality which made it so much prized from the Stone Age for tools, discouraged seal-makers. (The engraver of CMS VIII No. 39 gave up and let an accidental fracture on the face serve as 'motif'; cf. CMS I Suppl. No. 120. CMS XII No. 197 is called 'obsidian' but Prof. Pini kindly confirmed my suspicion that it is haematite.) Obsidian is even rarer for beads.³⁶ Seal-makers seem to have had first choice of various spotted and banded stones like those of Kenna, CS 3P (pink, white and green), CMS X Nos. 50. 82 (a rare pink and yellow tufa)³⁷ and a breccia lentoid from the Unexplored Mansion at Knossos.³⁸ The Palaikastro necklace furnishes a rare example of two spotted breccia beads in what was clearly a valuable assemblage.³⁹ Fluorite too seems to be a seal material, though it is possible that beads hide under misidentification, not having benefited from the attention of John Betts.⁴⁰ Even the

³⁰ see Betts — Youngers warning (*infra* n. 52, n. 11).

³¹ See colour photograph and J. Betts's description in Christie's sale catalogue, The Erlennmeyer Collection of Seals, 5 June 1989, lot 40. Pyrite has drawbacks: it reacts very readily with water, the iron sulphide turns to iron sulphate, water is absorbed and the stone cracks. CMS X No. 53 looks reddish so may also include some haematite — which of course may be what the maker thought it was.

³² L. Gorelick — A.J. Gwinnett, Iraq 54, 1992, 63.

³³ On jasper (and rock crystal) as imports from Egypt see P.W. Haider, Münstersche Beiträge zur antiken Handelsgeschichte VIII/1, 1989, 12.

³⁴ Hughes-Brock in: Nichoria II 628 gives some references on this motif.

³⁵ Betts, CMS X, 31f. A haematite bead is mentioned among Bronze Age and Iron Age oddments from the Dictaeon Cave by D.G. Hogarth, BSA 6, 1899/1900, 113.

³⁶ For objects of the rare Gyalis obsidian see H. Hughes-Brock in: Coldstream (*supra* n. 26) 119 No. 38. On obsidian more generally see D. Evelyn in: Popham, MUM 230ff.

³⁷ See Betts (*supra* n. 31) lots 48. 62.

³⁸ Betts in: Popham, MUM 190. 194 No. 9.

³⁹ L.H. Sackett — M.R. Popham, BSA 60, 1965, 303 and colour Pl. opp. p. 248.

⁴⁰ Betts in: Popham, MUM 190f.

agates lean towards seals (agate beads belong mostly to rich burials) — but with some material imported in bead form but reworked into seals.⁴¹ (Consider CMS I Nos. 207, 238, 246 and II,3 No. 389; and is I Suppl. No. 8 a victim of the process?) That the seal industry determined the import and distribution of valuable stones is proven, it seems to me, by the case of garnet. Garnet was available in Egypt for making little globular beads hardly exceeding 5 mm in diameter. With only one possible exception known to me, we do not find hardly it in Crete.⁴² This suggests to me that if a stone was no good for seals, it was not wanted there.

Rock crystal, less clear quartzes, cornelian, amethyst and gold, all relatively abundant and (being without troublesome peculiarities)⁴³ versatile, produce both seals and beads — lapis lazuli too, though it was *not* abundant and some of the sporadic finds in the Aegean reflect rather closely both its foreign origin and its traditional association, caused by its fracture pattern, with flat slab and block shapes.⁴⁴

The bead specialities are amber and the vitreous materials. Amber is a special case. It entered the Greek Mainland at the end of the MBA, before there was anything there corresponding to the Minoan palace economy. I suspect that it remained in private hands, being passed down and redistributed as heirlooms and gifts by individuals and families. What little amber reached Crete probably came as the personal jewellery of Mainlanders and never got into the workshop system. No doubt seal-makers and their patrons would have been delighted to get hold of it, but either they failed to do so — did the Mainlanders prevent it? — or our scant knowledge of LM I tombs has distorted the evidence. Of the amber seals reported only CMS I No. 154 survives — an amygdaloid which could have been made out of very large globular bead cut down. An amygdaloid *bead* possibly made in the same way was worn as mate to a cornelian talismanic of very similar colour, size and shape by an elegant youth (with Cretan connexions?) buried in the Athenian Agora.⁴⁵

In the LBA faience and glass become the distinctive materials for beads, widening the gap between beads and seals. Faience never took root as it did at times elsewhere for seals and in

⁴¹ On agates and on possible Harappan beads see J.G. Younger, *ArchNews* VIII/2–3, 1979, 42 — à propos CMS I Nos. 197, 199. On these two seals see H. Hughes-Brock in: R. Hägg — G.C. Nordquist — B. Wells (eds.), *Asine III*, chapter on Tomb I,1 (forthcoming).

⁴² The exception is two beads, virtually identical, from the Royal Road at Knossos, one unremarkably from a good Roman level but other found in a LM context (mostly IB with some II–III A2). Permission to mention these was kindly granted by S. Hood and by the Managing Committee of the BSA. J. Ogden, *Jewellery of the Ancient World* (1982) 98f. speaks of the "occasional presence of garnets in Mycenaean goldwork", probably from Egypt, but without quoting examples. He points out that the large slices used in the European Dark Ages must come from some other geological source.

⁴³ M. Sax, *Iraq* 53, 1991, 91 regards rock crystal as "perhaps the most difficult material ever worked for seals" because of its hardness (Mohs 7) and brittleness.

⁴⁴ Cf. A. Harding, *The Mycenaeans and Europe* (1984) 58; H. Hughes-Brock in: *Nichoria II* 627f. See the well illustrated article by J.M. Kenoyer, *Ornament* 15,3, 1992, 70ff. 86f. Joan Aruz at this conference drew attention to recut lapis lazuli from Phourni Archanon.

⁴⁵ For more on this see H. Hughes-Brock in: C.W. Beck — J. Bouzek (eds.), *Amber in Archaeology* (1993) 219ff.; also ead. in: J.M. Todd (ed.), *Studies in Baltic Amber* (*Journal of Baltic Studies* 16, special issue, 1985), 257ff.; H. Hughes-Brock — A. Harding, *BSA* 69, 1974, 145ff.

Egypt for scarabs. The cross-hatched cylindrical faience beads with a circumferential groove near each end are a distinctive type going back to a very old and widespread (and still flourishing) scheme of decoration on shinbone cylinders; they have nothing to do with our seals.⁴⁶ In glass, seals are unadventurous (overwhelmingly pointed-back lentoids),⁴⁷ while beads in both glass and faience burst into variety with three-dimensional seed, grain, flower, shell and grooved shapes, as well as flat-backed relief-beads, of which a large number can be seen at a glance in the table in Sakellariou, ThTM 292ff. These are a world in themselves. Many are recognisable (though stylised) copies of natural life-forms (of which the lentil is not one — v. supra n. 25).⁴⁸ Seals portray such things in their motifs but not in their shapes (with rare exceptions, e.g. the trochus shell Kenna, CS 136 and the 'heart' or 'shield' shape of Kenna, CS 187, which *is* shared with beads and perhaps even with the inscribed ladle from Troullos and may also be inspired by a shell shape — it looks somewhat like an elongated crab shell). CMS XII No. 120 must belong to the family of peg-top pendants though included in the CMS because of the cross incised on its top; the shape, like the poppy discussed below, looks practical for seals but is not used for them. The cross shape of Sakellariou, CollGiam 147, CMS XII No. 119 and a cornelian in Oxford is rare for seals and beads alike.⁴⁹

The interplay of natural and cultural factors is seen at its richest in cornelian. The long sturdy pieces it can occur in, together with its regular and predictable fracturing habits, make it ideal for long cylinders.⁵⁰ Better still for beads, since they do not require a flat surface, is the barrel shape: thickening the middle of course reduces the risk of calamity if the long perforations, drilled from both ends, do not meet neatly. The very long specimens (up to 12 cm!) seen in ancient Mesopotamia and to the present day in India are not found in the Aegean, although we do have cornelian beads of 4 cm or so.⁵¹ Amygdaloids, faceted to furnish a flat expanse of face, are found in large dimensions in New Kingdom Egypt. 'Well over 50 per cent' of Minoan amygdaloid seals are cornelian; the corresponding beads are

⁴⁶ See, e.g., CMS II,3 No. 59; G.F. Bass, AJA 67, 1963, 356; S.F. Kromholz, The Bronze Age Necropolis at Ayia Paraskevi, Nicosia (1982) 294; on specimens from Hasanlu and their use, M.I. Marcus, Expedition 31, 1989, 59 = ASSA, 182; finally a curious early find, E.H. Hall, Excavations in Eastern Crete, Sphoungaras (University of Pennsylvania, The Museum Anthropol. Publications III,2, 1912) 67f. Fig. 40A.

⁴⁷ I. Pini, JbZMusMainz 28, 1981, 48ff.

⁴⁸ On some of these see Hughes-Brock (supra n. 41) *passim*.

⁴⁹ 'Heart-shaped': most recently G. de Pierpont, OpAth 18, 1990, 165, where references; cf. S. Hood — G. Huxley — N. Sandars, BSA 53/54, 1958/59, 250. 212 ('perhaps amuletic rather than decorative', agreeing with Evans, PM III 411). The ladle: Evans, PM I Figs. 462-463; Godart — Olivier, GORILA 4, 57ff. Peg-top: Hughes-Brock in: Nichoria II 629; Evans (supra n. 27) 479 thought the shape 'perhaps derived from arrowheads'. Cruciform: Chr. Televandou, AEphem 1984, 37f. CMS XII No. 119 is rather irregularly shaped — a defective lentoid cut down? The Oxford stone from H. Pelagia is cross-hatched on one side (Boardman, GGFR 391).

⁵⁰ B. Allehin in: J.E. van Lohuizen-de Leeuw (ed.), South Asian Archaeology 1975 (1979), 91ff.; G.L. Possehl, Expedition 23, 1981, 39ff.; J.M. Kenoyer — M. Vidale — K.K. Bhan, WorldA 23, 1991, 44ff. Cf. Gorelick — Gwinnett (supra n. 32), esp. 60ff.

⁵¹ Evans mentions a "large oval bead of pale lemon-coloured translucent steatite... Original length 4.2 cm": (supra n. 27) 544 No. 33. I suspect this is pale yellow chalcedony, which one might call pale cornelian. Steatite of course could easily be made into very long beads but it was not. The only other very long beads are in lapis lazuli, e.g. at Ur.

quite common.⁵² These and the cylinders naturally offer themselves as vehicles for writing and even for pictures. (Writing on *beads*, not for impressing, sometimes occurs outside the Aegean in various materials.⁵³) The Pharaohs' hunting scarabs with their abundant verbiage are large objects and thus mostly of faience but there are cornelian beads, mostly barrels, with cartouches. I have even seen in Cairo a cornelian amygdaloid bead (unpublished, as far as I can discover) with a picture worked in white: Pharaoh (apparently Amenhotep III), wearing the crown of Lower Egypt, striking a lion, a cartouche in the field and a delicate border of dot rosettes.⁵⁴ Cornelian, then, is a material for 'conveying messages'. Nor need the messages always be added to the object: in two cases an idea is conveyed by the shape and colour themselves. The red poppy beads common around the eastern Mediterranean could with their signet-like shape and nice flat face easily be used (in a bigger size) as seals or inscribed amulets but they never are.⁵⁵ The opium poppy by itself spoke of health, medicine, ecstasy, sleep, death and probably even (because supposedly an aphrodisiac, if only in the sense that relaxation improves performance) sex and fertility. With all that on one small object, added signs were unnecessary! In the Aegean the other common red amulet-bead is the figure-of-eight shield.⁵⁶ However, since these do occur in other materials, whereas the poppies are overwhelmingly in strong red cornelian (or sometimes jasper), it is conceivable that the cornelians were the speciality of particular workshops and that the red colour has no inherent connexion with the shape. In CMS II,4 No. 189 we apparently have red amulet-bead (not bright red but at least 'sard') and engraved seal combined. It has sometimes been thought that a cornelian or an amber bead found alone in an undisturbed burial had some amuletic value, but it might of course be just a prized centrepiece from a string composed otherwise of perishable materials.⁵⁷

In seals the popularity of red stone and of green (jasper) for the talismanics must surely mean more than that the producers of those pieces happened to have particularly good

⁵² J.H. Betts – J.G. Younger, BSA 74, 1979, 277 n. 11; supra n. 26; also C. Renfrew – J.F. Cherry in: C. Renfrew, *The Archaeology of Cult: The Sanctuary at Phylakopi* (BSA Suppl. 18, 1985) 317ff.

⁵³ E.A. Braun-Holzinger, *Mesopotamische Weihgaben der fröhdynastischen bis altbabylonischen Zeit* (Heidelberger Studien zum Alten Orient, 3, 1991) 360ff.; R.V. McClary, *Bead Study Trust Newsletter* 18, 1991, 3f.; *ibid.* 12, 1988, 1.

⁵⁴ Egyptian Museum, Cairo, in Room 22: Special Register 5069, J.T. 14/5/26/4. 2.0 x 1.5 cm. The white decoration evidently follows the ancient tradition of white etched decoration on cornelian beads, on which much literature: see principally E.C.L. During *Caspers*, BICS 10, 1971, 83ff., and S. Ratnagar, *Encounters: The Westerly Trade of the Harappa Civilization* (1981) 128ff.

⁵⁵ See the classic article by P. Kretikos – S. Papadaki, *AEphem* 1963, 80ff., of which some criticisms by C.P. Behn, *Listy Filologické* 109/4, 1986, 193ff. For an interesting wider perspective see A. Sherratt in: J. Goodman – P. Lovejoy – A. Sherratt (eds.), *Consuming Habits: Drugs in History and Anthropology* (1995).

⁵⁶ A small selection of references: H.R. Hastings, *AJA* 9, 1905, 285ff.; A. Xenaki-Sakellariou, *Gnomon* 1985, 342 on CMS I Suppl. No. 13; VII No. 132; Younger, *Iconography* 273ff. With their flat back and pair (usually) of string-holes these can also be seen as a kind of relief-bead – but it is worth noting that without these features the object would be harder to make and easier to break.

⁵⁷ See H. Hughes-Brock in: Todd (supra n. 45) 259 with references; Renfrew (supra n. 52) 385. Cf. W. Peck, *Journ. Soc. Study of Eg. Antiquities* (Toronto) 13,2, 1983, 73f. Some examples: J. Deshayes, *Argos – Les fouilles de la Deiras* (1966) 103, No. DM 83; G. Touchais, *BCH* 107, 1983, 829 (Voleones Amariou); *id.*, *BCH* 110, 1986, 732 (Psara, Archontiki).

supplies of it. (The geological sources of cornelian are fairly numerous and we cannot as yet know where the Aegean supplies originated.⁵⁸ Heating, which can be repeated many times during manufacture, deepens the red colour.)⁵⁹ Whether this or that stone carried the symbolic values in the Aegean that it had elsewhere we cannot know,⁶⁰ but the popularity of red and green has interesting parallels in later times. In the 5th and 4th centuries the Graeco-Phoenician or Punic scarabs served a market which greatly preferred green, no matter what stone, whereas the Etruscans at the very same period overwhelmingly made scarabs of bright red cornelian.⁶¹ Roman legionaries, whose gem devices not surprisingly tend to Mars and heroic subjects, strongly favoured red and after red, green.⁶² These colours of life, vegetation and rebirth after death certainly make sense in combination with such talismanic motifs as bird, boat and papyrus which figure in Watrous's thought-provoking recent study of Minoan painted larnakes.⁶³ Here indeed may lie a fertile field for further study.

⁵⁸ Younger (*supra* n. 41); During Caspers (*supra* n. 54) 95ff.; Ratnagar (*supra* n. 54); Kromholz (*supra* n. 46) 296; T.W. Beale, *WorldA* 5, 1973, 136f.; W. Heimpel, *ZA* 77, 1987, 51f.

⁵⁹ Kenoyer et al. (*supra* n. 50) 55.

⁶⁰ S. Aufrère, *REG* 34, 1982/83, 3ff.; C. Müller-Winkler, *Die ägyptischen Objekt-Amulette mit Publikation der Sammlung des Biblischen Instituts der Universität Freiburg Schweiz (Orbis Biblicus et Orientalis, series arch., 5 (1987) 485ff.*; R.C. Thompson, *A Dictionary of Assyrian Chemistry and Geology* (1936) XXXVII–XL. In the Aegean we must beware of 'reading back' from later sources, e.g., Pliny. Cf. E. Wasilewska, *JPrehistRel.* 5, 1991, 36ff.

⁶¹ J. Boardman, *Jewellery Studies* 5, 1992, 30f.

⁶² M. Henig (personal communication and short published accounts). Fuller treatment in J.D. Zienkiewicz, *The Legionary Fortress Baths at Caerleon, II: the Finds* (1986) 120ff.

⁶³ L.V. Watrous, *Hesperia* 60, 1991, 285ff.