Fig. 9. — Slab enclosure in Room 17b from west, hilltop, Kommos (photo by J. W. Shaw).

Fig. 10. — Hearth in Room 012 from west, hilltop, Kommos (photo by J. W. Shaw).
also made of upright slabs, was inserted into the floor right against a blocked doorway which once had led to the eastern storerooms. Except for the bin, which was somewhat smaller (40 cm. deep), the enclosures were uniformly an average of 48 x 35 cm. wide internally and 30 cm. high. Each was equipped with a quern, found either in or next to it. The largest quern provided a clue as to the function of these enclosures, since its underside was cut so as to allow it to stand on the ground in a steeply slanted fashion so that whatever was being ground on it would fall right onto the floor of each enclosure. The floors were paved with sheets of plaster, once part of the wall revetment of the stoa, to judge by the fine fabric and the presence of painted polychrome patterns.26 The associated fill was LM IB, which also seems to be the approximate date of the installation in the nearby corridor (space 22) of at least two large hearths built each with two upright slabs against the south wall (29, fig. 14, and 30). The eastern one could have been an oven, to judge from the clay lining preserved against the wall and curving in the interior, but it may never have risen higher to form a clay dome, as is more likely in the case of the "oven" in the North House. The two fixtures in the corridor were used during LM II, possibly a little later. One is tempted to conclude that they are connected with the enclosures in the stoa which were probably used for food processing. On the other hand this area at Kommos had a high concentration of items related to metal working in which the hearths in the corridor may have played a role.27

The enclosures in the stoa went out of use when a curving wall was built over them in the northeastern corner of the room in LM III (not shown in the plan, fig. 3, which represents the preceding phase). Within the small space thus formed, and set in its northwest corner was a very small and badly preserved clay fixture, possibly an oven, since a cooking pot would probably not have fit within it (28, fig. 3: marked "later hearth"). This was in use in LM II and possibly in early LM III.28 Shortly afterwards the structures were covered over along with this end of the stoa and the eastern rooms of

(26) The foreman, George Beladakis, suggested that the querns were set on top of the enclosures. Though this idea does not quite work, since some of the querns are too small, the suggestion alerted me to the possibility of the interpretation noted in the text. The bin against the east wall may have been a stand for a vessel used as the container for the substances ground in the enclosures. Samples of soil which may contain organic remains from within and around the enclosures have been collected, but not yet thoroughly examined.

(27) Of the two fixtures, the western one was made of two upright slabs and a curving line of small stones which enclosed an irregularly shaped interior space, 60-80 x 75 cm. wide. The eastern one, of which the clay sides had disintegrated almost entirely, was smaller, c. 45 cm. wide where the sides projected just slightly from the back wall.

The complete set of fixtures in the stoa and the corridor recalls a group of structures at the mansion of Vathypetro. Two rooms are involved there, one with three slab enclosures, the other, described as a kitchen, with a number of hearths/ovens which from the illustrations seem to be pi-shaped, and which the excavator suggests have also served as bread ovens (S. Marinatos, PraktArchEl 1952, p. 592-610 and especially p. 605-607 and fig. 18). The date of these structures is not clear to me. Vathypetro seems to have been used in LM IB after incurring major damage in LM IA after which it was repaired (see S. Marinatos and M. Hirmer, Crete and Mycenae [1959], p. 68, where the presence of LM IB sherds is noted). See also S. Hood, The Minoans (1971), p. 55, for the idea that the building was used also in LM IB.

(28) The structure of the hearth/oven was difficult to clarify because of the compactness of the fill around it. It was made of clay walls curving at the back and also appearing to curve forward. The interior was tiny and all it contained was a small, fragmentary jug that was very burnt.
Building J/T in a major levelling operation at the time of the construction of Building P in LM III.

Also in transitional use in LM II, possibly early LM III, was a small, pi-shaped hearth built against the north wall of Space 7 in the westernmost sector of Building J/T, which was remodelled and re-used in LM III (24, fig. 3). The use of fire seems to have continued here in this last phase as can be seen from the intense burning on top of a large block set there flush with the later floor.29

PI-SHAPED HEARTH/OVENS IN CRETE AND ABROAD

Before turning to examples of pi-shaped hearths outside Kommos, it is important to clarify how these differ from other similar looking structures with which they might otherwise become confused. I am referring to quadrangular enclosures unconnected with fire, but similarly defined by short, upright walls, these usually of mud brick and often set contiguously as a group on floors. These bins occur in a number of Minoan sites as in the Treasury of the Palace of Zakros, in houses at Phaistos, and recently in some LC I houses at Thera.30 If closed on all four sides, like the bin in the stoa at Kommos, their contents would have obviously been handled from the top, and this may have been the case with those with one side open, when placed with that side too close to a wall. Unlike pi-shaped hearths, such bins and clusters of three-sided enclosures are already known before LM IB-II.31

(29) Compare with the burnt slab, 17, serving as hearth in room 3b (fig. 2), discussed above. The use of fire on a type of platform, apart from the surface of the floor itself, is encountered in one more case at Kommos, in the little Room 4 built in LM III, during the remodelling and the re-use of the northwest section of Building J/T (25, fig. 3). This consisted of sherds set flat on the dirt floor and covering a small round area (c. 42 cm. in diameter) which was extensively burnt. Sherds hearths are known from many areas both in Greece and in the Near East. A parallel from Greece is in a LH III (13th c. B.C.) house at Tiryns, excavated in the 1920’s and uncovered in recent cleaning operations. See P. Gercke-G. Hiesel, *Tiryns V* (1971), p. 1-19 and pl. 20, 2f.


(31) For a discussion of hearths in Minoan houses, see interesting discussions in J. McEnroe’s Ph. D. Dissertation for the University of Toronto, *Minoan Houses and Town Arrangement* (1979), and for the LM III examples in particular Hayden, *op. cit.* (n. 11), passim. It should be noted here that Hayden (p. 124) quotes antecedents for such pi-shaped hearths at three sites, as evidence that they were already in use in LM I: Prasa, Zou and Mallia. There are ambiguities, however, relating to both the identification of enclosures there as hearths and to their date. Thus at Prasa, Room A, a kitchen in House B, had a slab enclosure that was not the hearth noted by the excavator. From his description, the hearth was apparently an open one set in another corner of the room, where traces of burning appeared on the floor, next to a blackened vent in the wall (N. Platon, *PraktArch* 1951, p. 246-257 and 255-256 and fig. 5, p. 252, in particular). At Zou, the hearth mentioned is actually not said to be of the slab type in the published report, though slab enclosures (not specified as hearths) were encountered in another room, apparently in association with a quern and a rubbing stone (N. Platon, *PraktArch* 1955, p. 288-305 and 291, in particular). These enclosures may have been used in connection with grinding, as suggested above for the ones in the stoa at Kommos. As to the pi-shaped fixtures in House E at Mallia, they are more likely to belong to the LM II and LM III periods, as is argued below in my text. Finally, two slab enclosures at Thera have been more recently labelled “hearths” by the excavator, although he himself admits that there was no evidence for fire associated with them (Thera I, p. 27, 28, and *Thera VII*, p. 20).
Fig. 11. — Slab enclosure in Room 012 from east, hilltop, Kommos (photo by J. W. Shaw).

Fig. 12. — Two hearths in Room 5 from east, central hillside, Kommos (photo by J. W. Shaw).

Fig. 13. — Slab enclosure in Room 4 from south, central hillside, Kommos (photo J. W. Shaw).
As for the pi-shaped hearths, one of the earliest examples outside Kommos is in the southeast section of House E at Mallia, which was re-occupied in LM III. Here Room III2 contained a rectangular hearth, found full of ash and made of three upright, unbaked bricks and a fragmentary, probably removable, fourth one closing the fourth side. Nearby was a slab enclosure (fig. 15, at U and T, respectively). Animal bones, shells and carbonized grains found on the floor show that this was a kitchen. O. Pelon, the excavator of this sector of the house, believes that the hearth and some other remodellings in Room III2 belong to Mallia phase III B (equivalent to LM IB-II). He also compares the hearth to one of a somewhat later period (LB III B) found in a house in Troy VIIa, which he connects with a much older tradition of such open hearths in the Near East. To the same period he also attributes a conjectural hearth from the same house at Mallia in the southwest corner of Room III1 to the north, where remnants of bricks and ashes were found (fig. 15).32 A fourth fixture, used in LM III, was found in the same house in Room IV2 (figs. 15, at L, and fig. 16). This, however, may simply have been an enclosure rather than a hearth, since there was no evidence of fire. It was built of a combination of stone slabs and mud bricks set on edge.33

Another example of a hearth/oven (described as both “foyer” and “fournier”) from Mallia comes from a small LM III B room, attached to the maison aux Vases à élavier and made of local sandstone. The drawing provided in the publication does not clarify its exact shape, though it looks like a roundish enclosure, rising above the floor and open at the top (rather than on one side), and set against a wall in which a vertical opening seems to have acted as a vent for the smoke.34

Pi-shaped hearths of either LM II or LM III date also appear at Khondros Viannou, Khania, Palaikastro and Knossos. There may be a related fixture in the later use of the palace at Phaistos.

At Khondros Viannou, among the several slab enclosures that occur in various rooms throughout the site, one can be definitely identified as a hearth because of the mention in the published report of ash and burning.35

At Khania a pi-shaped structure made of hard red and yellow clays and rubble walls was found in a room of LM III A/B date, associated with the earliest of its three (all burnt) floors. This could be a hearth, or an oven, though excavation in that location is incomplete.36 At Kastelli, also at Khania, a double installation of hearth and oven was found in a partially excavated room in a LM III C context. The oven had three walls of small stones coated with clay on the inside; the hearth was made up of a bedding of sherds, and with slabs coated with clay and stucco.37

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32 O. Pelon, *Maisons III (ÉtCrét XVI)*, especially p. 73-77. Hearth U was 50 x 32 cm. wide on the interior. The Near Eastern comparanda for this type of hearth are discussed on p. 77 and note 3. For Pelon’s dating of the later phases of House E at Mallia see also: O. Pelon, *BCH* 91 (1967), p. 494-512 and especially p. 499-500 and 508-511.

33 O. Pelon, *Maisons III (ÉtCrét XVI)*, p. 116; also plans I and II, pl. XXXIII, 2. The fixture seems to be ca. 35-40 x 25-30 cm. wide.


35 N. Platon, *ProktArchEt* 1957, p. 136-147, and 1959, p. 197-206. See also Hayden’s extensive discussion of this site, *op. cit.* (n. 11), p. 32-36.

36 I. Tzedakis, *ProktArchEt* 1977, p. 453-458. Archaeologist Maria Vlazaki, the excavator of the particular trench, suspects that the structure may prove to be a kiln, an idea she conveyed to me during the present conference.

At Palaikastro, an oven has just been discovered in LM III re-occupation levels. It was apparently made of clay and set on a low, semi-oval platform.\(^{(38)}\)

At Knossos the recent excavation of the Unexplored Mansion has yielded information. Two pi-shaped clay hearths were installed, one in LM II in Pillar Hall H in a corner created when partition walls were built between some of the pillars, the other in a little room, D, apparently used until the abandonment of the building in LM III. The lack of finds on the floor of the Pillar Hall makes it impossible to fix the exact function, but Catling, who studied the metal finds, considers it a possible furnace for the production of metal objects. The LM II period gives ample evidence of metallurgy in this building.\(^{(39)}\) The existence of two other pi-shaped hearths/ovens at Knossos seems to be implied by Evans' description of a "rough stone erection...[which] may have had a culinary purpose", one specimen having been found in the "Megaron" of the Little Palace, the other in an unlabelled structure southwest of the House of the Frescoes, and in both cases in re-occupation levels. There is no mention of associated finds.\(^{(40)}\)

In the Palace of Phaistos, a fragmentary structure made of burnt clay-coated walls set in the centre of a court has been restored as horse-shoe shaped and is thought to have been a melting furnace, probably of LM III date.\(^{(41)}\)

**DISCUSSION**

The evidence from the houses at Kommos and other sites in Crete suggests that some of the pi-shaped hearths may have been used partially, and in some cases possibly primarily, for melting metal (as perhaps in the stoa area at Kommos)—a specialized function to which one is also alerted by Catling's interpretation of the evidence at the Unexplored Mansion.\(^{(42)}\) Generally, however, their function seems to have been mainly culinary, as indicated not only by the organic remains in their vicinity, but also by accessory equipment such as potstands, querns for grinding, and pounding tools, as well


\(^{(39)}\) *Unexplored Mansion*, p. 10-12, 21, 204-207, 262-264, 266, note 26 and pls. 3, 25 f and 29 e. The scale in the illustrations shows the hearths to be comparable to the average hearth at Kommos, i.e. some 35-40 cm. wide in the interior.

\(^{(40)}\) *PM II*, p. 20, note 1.

\(^{(41)}\) The fixture which is c. 2.80 X 2.00 m., as preserved, was built over a layer of earth accumulated over the initial pavement of Court 90: PERNIER-BANTI, *Festos II*, p. 215-216, figs. 134, 135 and plan, fig. 285, opp. p. 484. T41. The possible LM III date is suggested by evidence from the nearby magazines on the west side of the court: S. ALEXIOU, Μοναδικάς πολιτισμός (1964), p. 216.

\(^{(42)}\) The possibility that hearths at Kommos may be connected with metalworking has been mentioned to me by H. Blitzer, whose study of the pertinent items and of their distribution should provide a closer estimate of such a possible function. My impression at the moment is that such items only rarely occur in the same rooms and in the same levels with the hearths.
Fig. 14. — Hearth in Corridor 22 from north, southern area, Kommos (photo by J. W. Shaw).

Fig. 15. — Plan of southeast section of House E, Mallia (Maisons III [ÉtCrel XVI], plan II).

Fig. 16. — Enclosure in Room IV2, House E, Mallia (Maisons III [ÉtCrel XVI], pl. XXXIII, 2).
as slab enclosures that one tends to associate with food processing. Some of these rooms well deserve the name of "kitchen".  

Evans noted that fixed hearths largely disappeared from Crete after the pre-palatial period, when Anatolian were supplanted by Egyptian connections and hearths had been replaced by movable braziers. Though this picture has been modified recently, especially with evidence from LM I houses at Mallia, the evidence for fixed cooking installations in LM III at Kommos and elsewhere in Crete stands in striking contrast to the paucity of such information for the MM-LM I period. It is not only the pi-shaped type of hearth which strikes one by the novelty of its shape and location, but the fact that people now prefer to do their cooking indoors in a space which, though used for other functions as well, is primarily devoted to the preparation of food.

Is the emergence of the kitchen a sign of luxury and sophistication? Paradoxically, it may reflect the opposite. Indeed, the fixtures under consideration appear mainly at sites undergoing a period of drastic change, sometimes of decline, or in relative isolation from other sites.

Thus at Mallia House E and the maison aux Vases à étier present rare cases of reuse during LM II and LM III of part of the once thriving MM and LM I town. A period of decline and disrespect for once graceful architectural settings is also symbolized by the installation of a pi-shaped hearth in the Pillar Hall of the Unexplored Mansion at Knossos, where the metal working activity in LM II might have been at the service of Mycenaean overlords, a circumstance indicating a diminished position for the local population, despite the continued production of luxury items. The whole settlement of Khondros Viannou, founded after LM I, gives the impression of a haphazardly organized town and one rather isolated from other LM III sites. One would also like to know the extent and character of the LM III settlement at Chania. There the presence of both pi-shaped hearths/ovens and round, central hearths of Mycenaean type may well imply a more mixed population, as others suggest. It may be significant that the Mycenaean type of hearth appears in the more substantial building there.

Something more specific can be said about the vicissitudes of the site of Kommos. There, terms like "decline" and "impoverishment" are surely applicable to the LM II period in the southern area. The conversion of the east end of the stoa into a simple room, and the installation there of the various enclosures, the failure to replace the destroyed mural decoration which adorned it before, all speak of this state. Recovery comes with the launching of the new major construction, that of Building P in LM III A1. Prosperity is also seen in the impetus of foreign trade and contact, reflected by the pottery imported from the Levantine coast, Cyprus, and Egypt. The southern area now loses the temporary domestic character which marks the earlier LM I-II transitional period.

(43) Room III/2 at Mallia is a good candidate for the term "kitchen". Here reference should be made to another kitchen at Kommos of LM III date, which, however, lacks a built hearth (Room 6, fig. 1). It is the one discussed earlier in connection with an earlier hearth made of a pavement of slabs underlying its upper floor. For a good idea of equipment used in LM III kitchens, see S. Hood - P. De Jong, RSA 53-54 (1958-59), p. 182-193.

(44) PM II, p. 20.

(45) P. Metaxa-Muhly, loc. cit. (n. 6).


Shifting focus back to the Minoan town at Kommos, one senses that its history may not have run on parallel lines with that of the southern civic area. In the town all major construction was limited to the MM and LM I periods. The hearths/ovens of pi-shape, whatever the exact date of their introduction there, had come to stay till the very last days of habitation, in contrast with the situation in the southern area. Did the local people profit from the recovery of the southern area?

One can only guess what caused the introduction of this type of hearth with its specialized location within certain rooms. Had such fixtures simply been placed on upper floors or roofs in earlier times, one might expect to find at least a few examples on ground floors, where there is occasional evidence of cooking and of the use of fire. If, on the other hand, I am right in supposing a context of decline and impoverishment, the changes would have been to some extent dictated by this condition. If, for instance, cooking was done outdoors and by servants in earlier times and often with the use of portable metal braziers, now possibly rare, then the practical shift in location indoors, and the substitution of braziers by crudely built hearths would make sense. It is also possible that certain services offered earlier by the community, or handled by nearby sites, now broke down, forcing the inhabitants to resort to home-made devices. "Shops" of agricultural and industrial types have been recognized in Minoan sites, including at least one connected with the production of oil at Kommos.49 One type of service once offered in a "shop" might have been the baking of bread and the parching of grain (apparently necessary to facilitate separation from the husks), both requiring an oven, and likely to have been executed on a large scale for the community as a whole, rather than individually.50

There is an interesting ethnographic parallel for the hypothetical disruption of such a service in the case of the modern village of Pitsidia, near Kommos. There, during and immediately after World War II, the scarceness of grain led to the closing of the village bakery and to the resumption of bread baking at home. A few little ovens still exist today in old, deserted houses, often constructed within a pre-existing fireplace and with a capacity for baking only some 6-10 loaves of bread. The one illustrated here (fig. 17) is c. 60-70 cm. in diameter, and c. 75 cm. tall to where the round vent is, at the top of the conical dome. Next to it can be seen a small pi-shaped hearth (c. 20 cm. wide and 20 cm. tall) with a metal rack for resting cooking pots on top.51

The problem, however, in applying this interpretation to LM III Kommos and other Minoan sites, is that the public ovens, as far as I know, are yet to be found. Still, they may have existed. In contemporary Egypt there is much information in models and painted representations about the preparation of bread, leavened and unleavened, fried

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(49) See note 3 above. That this was no ordinary house will be argued in the projected publication. For workshops in Late Minoan settlements, see K. Brangan, in P. J. Ucko (ed.), Man, Settlement and Urbanism (1972), p. 751-759.

(50) For the use of the earliest ovens in the world for parching grain, see C. Renfrew, The Emergence of Civilisation (1972), p. 209-210. For the Near East see Aurencje, p. 249-250. For a discussion of the milling and baking of bread in Antiquity, see A. Neuburger, The Technical Arts and Sciences of the Ancients (1930), p. 89-100.

(51) I would like to thank the following people in Pitsidia for providing this information and showing me some of these ovens: G. Beladakis, our excavation foreman, Sifis Phasoulakis, long time excavation workman, and Mrs. Ph. Spinthakis, whose grandmother’s oven is the one seen in the picture.
and baked, and the presence of special shops, sometimes combining granary and bakery.52 There is also an elaborate miller's shop in the LC IA settlement of Akrotiri at Thera, though no bakery seems to have been located.53 One other, final possibility for the introduction of pi-shaped hearths in Crete must be considered, namely that it may be an imported custom, or one introduced to the older population by newcomers.

Here one must recognize inherent limitations in the evidence. Hearths display variable shapes and materials even within a single site, with the result that they often look related to similar examples from other sites, even when there are no indications of contact or any other form of interaction between the people who use them.

Particularly strange, for instance, is the resemblance of the pi-shaped hearths to hearths of the same type and to little ovens with conical domes in Neolithic and Chalcolithic levels in the Eastern Mediterranean and even later, as at Late Cypriot Enkomi, where bigger versions of such fixtures were used chiefly for copper smelting.54 Comparable in scale and perhaps in function in Crete is the possible furnace in Court 90 in the Palace at Phaistos, not far from a series of magazines which seem to have been re-used in LM III.55 Pi-shaped hearths and ovens of a similar shape are also known in Greece from Neolithic to Middle Helladic times, like the ovens at Sitagroi, at Myrtos in Crete, at Eutresis and elsewhere.56

Hearths and ovens typically placed indoors are not features encountered on the Greek Mainland in the Late Helladic period, and thus their introduction to Kommos could not be attributed to Mycenaean from that area.57 More likely would it be a derivation from the East. But despite the long tradition for rectangular hearths, open at the top and often accompanied by ovens there, it is difficult to find examples which could be interpreted as direct antecedents to the Minoan ones.

Two sites provide potentially important information. One is Ugarit/Ras Shamra with its harbour at Minet el-Beida. This harbour town, the excavator believed, developed in the 15th and 14th centuries B.C. upon the arrival of Cypriot and Mycenaean immigrants.58 A house of that period, discovered relatively recently at Ugarit, was full of hearths and ovens, and later houses often had a well and an oven in the court from which the house was normally entered. In one case, remnants of moulds and gold scraps suggested that a goldsmith may have lived there, using the oven also for melting.59

(52) See Neuburger, op. cit., p. 96, fig. 158.
(57) For Mycenaean hearths see: I. Shear, Mycenaean Domestic Architecture (1968), Bryn Mawr dissertation, passim, and p. 446-447 in particular. She refers to one hearth with upright slabs in the West House at Mycenae, but, in fact, it seems to me that there was some confusion in the description of this item in the publication (N. Verdelis, in J. Chadwick, The Mycenaean Tablets III (1963), p. 13-29 and ff.), for it is unconnected with the real hearth, of a different type, which was the only one with evidence of fire. I have not been able to obtain P. Darque's dissertation on Mycenaean houses, but he confirmed my impression that there are no Mycenaean pi-shaped hearths, through personal communication.
Fig. 17. — Modern oven and hearth in Pitsidia, Crete (photo by J. W. Shaw).

Fig. 18. — Hearth/oven and enclosure, Marsa Matruh (courtesy of Dr. D. White).
The other Near Eastern site is a small island at Marsa Matruh on the African coast, between present Libya and Egypt, where the University of Pennsylvania has recently been excavating. D. White, the director, envisions Eastern Mediterranean traders using it as a port of call in the summer months and even settling there seasonally and exchanging products with the local Libyans. Among other items, they could have offered metal objects, some of which were possibly produced locally, as suggested by the discovery of crucibles and metalworking debris. A floor fixture of two adjoining structures, an oven (60 cm. x 70 cm. wide) built of upright flat stones, coated in the interior with clay and suggested to have once had a clay dome, like a “tabun” (here fig. 18), may have been connected with such an activity. The room is also thought to have served as a kitchen, the floor and the compartment next to the “oven” being full of ash. Fragments of metal were found in the vicinity. The pottery that these foreigners brought with them was mainly Cypriot of the 14th-13th centuries B.C., with some Mycenaean, LM III, and two Minoan sherds. The small scale and impromptu production of metal objects bring to mind G. Bass’ “tinker”/“merchant” in the ship wrecked off Cape Gelidonya.

Returning to the pi-shaped hearths and possible ovens from Kommos, trademarks of the latest Minoan periods: unless they are indigenous inventions—and they could well be, being rather simple structures—they, and perhaps others like them in Crete, may have been introduced through contact with people coming from the East, from Cyprus and the Syrian coast, not Mainland Mycenaeans, but their probable associates involved in the eastern branch of maritime trade in the Mediterranean. Evidence for connections with that area, as well as with Egypt, is by now well attested at Kommos. That the hearths/ovens were put primarily to culinary use is also clear. How much they were also used for industrial purposes and metal working—perhaps the primary use of the hypothetical foreign models—is a question that will have to await a more detailed analysis of the metallurgical evidence at Kommos.

Maria C. Shaw.

(60) I would like to express my thanks here for information I received through a number of letters from Drs. D. White, M. McClellan and for being provided with the photograph, here fig. 18. For reports on the excavation see: D. White, *ARCE Newsletter* n. 131 (1985), p. 3-17, and D. White, “1985 Excavations on Bates’s Island, Marsah Matruh”, *Journal of the American Research Center in Egypt* 23 (1986), p. 51-84, and 26 (1989), p. 87-114.